BS EN 1870-7:2012

BSI Standards Publication

Safety of woodworking machines — Circular sawing machines

Part 7: Single blade log sawing machines with integrated feed table and manual loading and/or unloading

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National foreword

This British Standard is the UK implementation of EN 1870-7:2012. It supersedes BS EN 1870-7:2002+A1:2009 which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee MTE/23, Woodworking machines.

A list of organizations represented on this committee can be obtained on request to its secretary.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

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Safety of woodworking machines - Circular sawing machines - Part 7: Single blade log sawing machines with integrated feed table and manual loading and/or unloading

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Sicherheit von Holzbearbeitungsmaschinen - Kreissägemaschinen - Teil 7: Einblatt-Stammkreissägemaschinen mit mechanischem Tischvorschub und Handbechickung und/oder Handentnahme

This European Standard was approved by CEN on 4 August 2012.

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COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

Management Centre: Avenue Marnix 17, B-1000 Brussels

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Foreword

This document (EN 1870-7:2012) has been prepared by Technical Committee CEN/TC 142 “Woodworking machines - Safety”, the secretariat of which is held by UNI.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by April 2013, and conflicting national standards shall be withdrawn at the latest by April 2013.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

This document supersedes EN 1870-7:2002+A1:2009.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of Machinery Directive.

For relationship with the EU Directive, see informative Annex ZA, which is an integral part of this document.

The main technical modification to the 2009 version relates to the introduction of performance levels (PL).

Organisations contributing to the preparation of this document include European Committee of Woodworking Machinery Manufacturers Association "EUMABOIS".

EN 1870, *Safety of woodworking machines — Circular sawing machines*, consists of the following parts:

— *Part 1: Circular saw benches (with and without sliding table), dimension saws and building site saws*;

— *Part 3: Down cutting cross-cut saws and dual purpose down cutting cross-cut saws/circular saw benches*;

— *Part 4: Multiblade rip sawing machines with manual loading and/or unloading*;

— *Part 5: Circular sawbenches/up-cutting cross-cut sawing machines*;

— *Part 6: Circular sawing machines for firewood and dual purpose circular sawing machines for firewood/circular saw benches, with manual loading and/or unloading*;

— *Part 7: Single blade log sawing machines with integrated feed table and manual loading and/or unloading*;

— *Part 8: Single blade edging circular rip sawing machines with power driven saw unit and manual loading and/or unloading*;

— *Part 9: Double blade circular sawing machines for cross-cutting with integrated feed and with manual loading and/or unloading*;

— *Part 10: Single blade automatic and semi-automatic up-cutting cross-cut sawing machines*;

— *Part 11: Semi-automatic and automatic horizontal cross-cut sawing machines with one saw unit (radial arm saws)*;

— *Part 12: Pendulum cross-cut sawing machines*;

— *Part 13: Horizontal beam panel sawing machines*;

— *Part 14: Vertical panel sawing machines*;

— *Part 15: Multi-blade cross-cut sawing machines with integrated feed of the workpiece and manual loading and/or unloading*;

— *Part 16: Double mitre sawing machines for V-cutting*;

— *Part 17: Manual horizontal cutting cross-cut sawing machines with one saw unit (radial arm saws)*;

— *Part 18: Dimension saws* (at Enquiry stage at the time of publication of the present document);

— *Part 19: Circular saw benches (with and without sliding table) and building site saws* (at Enquiry stage at the time of publication of the present document).

The European Standards produced by CEN/TC 142 are particular to woodworking machines and complement the relevant A and B standards on the subject of general safety (see Introduction of EN ISO 12100:2010 for a description of A, B and C standards).

According to the CEN/CENELEC Internal Regulations, the national standards organisations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

Introduction

This document has been prepared to be a harmonised standard to provide one means of conforming to the essential safety requirements of the Machinery Directive, and associated EFTA regulations. This document is a type C standard as defined in EN ISO 12100:2010.

The machinery concerned and the extent to which hazards, hazardous situations and events are covered are indicated in the scope of this document.

When provisions of this type C standard are different from those which are stated in type A or B standards, the provisions of this type C standard take precedence over the provisions of other standards, for machines that have been designed and built in accordance with the requirements of the provisions of this type C standard.

The requirements of this document concern manufacturers, suppliers and importers of single blade circular log saw machines with integrated feed and manual loading and/or unloading. It is also useful for designers.

This document also includes information to be provided by the manufacturer to the user.

Common requirements for tooling are given in EN 847-1:2005+A1:2007.

1 Scope

This European Standard deals with all significant hazards, hazardous situations and events as listed in Clause 4 which are relevant to single blade circular log sawing machines with saw blade diameter ≥ 600 mm and with integrated feed table with manual loading and/or unloading, (hereinafter referred to as machines), designed to cut solid wood when they are used as intended and under the conditions foreseen by the manufacturer including reasonably foreseeable misuse.

This European Standard is not applicable to machines manufactured before the date of its publication as EN.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 614-1:2006+A1:2009, *Safety of machinery — Ergonomic design principles — Part 1: Terminology and general principles*

EN 614-2:2000+A1:2008, *Safety of machinery — Ergonomic design principles — Part 2: Interactions between the design of machinery and work tasks*

EN 847-1:2005+A1:2007, *Tools for woodworking — Safety requirements — Part 1: Milling tools, circular saw blades*

EN 894-1:1997+A1:2008, *Safety of machinery — Ergonomics requirements for the design of displays and control actuators — Part 1: General principles for human interactions with displays and control actuators*

EN 894-2:1997+A1:2008, *Safety of machinery — Ergonomics requirements for the design of displays and control actuators — Part 2: Displays*

EN 894-3:2000+A1:2008, *Safety of machinery — Ergonomics requirements for the design of displays and control actuators — Part 3: Control actuators*

EN 1005-1:2001+A1:2008, *Safety of machinery — Human physical performance — Part 1: Terms and definitions*

EN 1005-2:2003+A1:2008, *Safety of machinery — Human physical performance — Part 2: Manual handling of machinery and component parts of machinery*

EN 1005-3:2002+A1:2008, *Safety of machinery — Human physical performance — Part 3: Recommended force limits for machinery operation*

EN 1005-4:2005+A1:2008, *Safety of machinery — Human physical performance — Part 4: Evaluation of working postures and movements in relation to machinery*

EN 1037:1995+A1:2008, *Safety of machinery — Prevention of unexpected start-up*

EN 1088:1995+A2:2008, *Safety of machinery — Interlocking devices associated with guards — Principles for design and selection*

EN 1837:1999+A1:2009, *Safety of machinery — Integral lighting of machines*

EN 12779:2004+A1:2009, *Safety of woodworking machines — Chip and dust extraction systems with fixed installation — Safety related performances and safety requirements*

EN 50370-1:2005, *Electromagnetic compatibility (EMC) — Product family standard for machine tools — Part 1: Emission*

EN 50370-2:2003, *Electromagnetic compatibility (EMC) — Product family standard for machine tools — Part 2: Immunity*

EN 60204-1:2006, *Safety of machinery — Electrical equipment of machines — Part 1: General requirements (IEC 60204-1:2005, modified)*

EN 60439-1:1999,[1)] *Low-voltage switchgear and controlgear assemblies — Part 1: Type-tested and partially type-tested assemblies (IEC 60439-1:1999)*

EN 60529:1991,[2)] *Degrees of protection provided by enclosures (IP Code) (IEC 60529:1989)*

EN 60825-1:2007, *Safety of laser products — Part 1: Equipment classification and requirements (IEC 60825-1:2007)*

EN 61310-1:2008, *Safety of machinery — Indication, marking and actuation — Part 1: Requirements for visual, acoustic and tactile signals (IEC 61310-1:2007)*

EN 61800-5-2:2007, *Adjustable speed electrical power drive systems — Part 5-2: Safety requirements — Functional (IEC 61800-5-2:2007)*

EN ISO 3743-1:2010, *Acoustics — Determination of sound power levels and sound energy levels of noise sources using sound pressure — Engineering methods for small movable sources in reverberant fields — Part 1: Comparison method for a hard-walled test room (ISO 3743-1:2010)*

EN ISO 3743-2:2009, *Acoustics — Determination of sound power levels of noise sources using sound pressure — Engineering methods for small, movable sources in reverberant fields — Part 2: Methods for special reverberation test rooms (ISO 3743-2:1994)*

EN ISO 3744:2010, *Acoustics — Determination of sound power levels and sound energy levels of noise sources using sound pressure — Engineering method in an essentially free field over a reflecting plane (ISO 3744:2010)*

EN ISO 3745:2009,[3)] *Acoustics — Determination of sound power levels of noise sources using sound pressure — Precision methods for anechoic and semi-anechoic rooms (ISO 3745:2003)*

EN ISO 3746:2010, *Acoustics — Determination of sound power levels and sound energy levels of noise sources using sound pressure — Survey method using an enveloping measurement surface over a reflecting plane (ISO 3746:2010)*

EN ISO 4413:2010, *Hydraulic fluid power — General rules and safety requirements for systems and their components (ISO 4413:2010)*

EN ISO 4414:2010, *Pneumatic fluid power — General rules and safety requirements for systems and their components (ISO 4414:2010)*

EN ISO 4871:2009, *Acoustics — Declaration and verification of noise emission values of machinery and equipment (ISO 4871:1996)*

EN ISO 9614-1:2009, *Acoustics — Determination of sound power levels of noise sources using sound intensity — Part 1: Measurement at discrete points (ISO 9614-1:1993)*

1) EN 60439-1:1999 is impacted by EN 60439-1:1999/A1:2004.

2) EN 60529:1991 is impacted by EN 60529:1991/A1:2000.

3) EN ISO 3745:2009 is superseded by EN ISO 3745:2012.

EN ISO 11202:2010, *Acoustics — Noise emitted by machinery and equipment — Determination of emission sound pressure levels at a work station and at other specified positions applying approximate environmental corrections (ISO 11202:2010)*

EN ISO 11204:2010, *Acoustics — Noise emitted by machinery and equipment — Determination of emission sound pressure levels at a work station and at other specified positions applying accurate environmental corrections (ISO 11204:2010)*

EN ISO 11688-1:2009, *Acoustics — Recommended practice for the design of low-noise machinery and equipment — Part 1: Planning (ISO/TR 11688-1:1995)*

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

EN ISO 13849-1:2008, *Safety of machinery — Safety-related parts of control systems — Part 1: General principles for design (ISO 13849-1:2006)*

EN ISO 13850:2008, *Safety of machinery — Emergency stop — Principles for design (ISO 13850:2006)*

ISO 7960:1995, *Airborne noise emitted by machine tools — Operating conditions for woodworking machines*

HD 22.4 S4:2004,[4)] *Cables of rated voltages up to and including 450/750 V and having cross-linked insulation — Part 4: Cords and flexible cables*

3 Terms and definitions

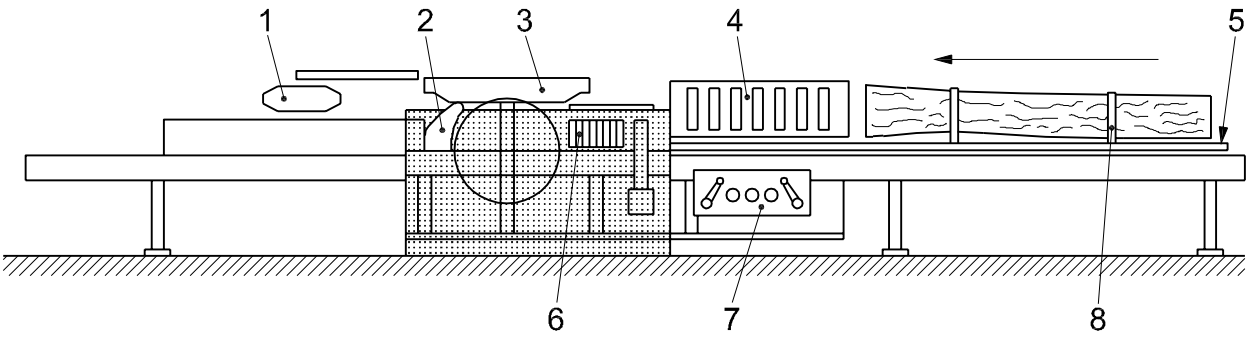
3.1 General

For the purposes of this document, the terms and definitions given in EN ISO 12100:2010 and the following apply.

3.2 Terms

The main parts of the machine and their terminology are illustrated in Figure 1.

4) HD 22.4 S4:2004 is superseded by EN 50525-2-21:2011.



Key

1 dropping device
2 riving knife
3 holding-down device
4 fence
5 feed table
6 feed rollers
7 controls
8 log hook

Figure 1 — Terminology

3.3 Definitions

3.3.1
single blade circular log sawing machine with integrated feed table and manual loading and/or unloading
machine designed for the ripping of solid wood e.g. logs, having the following characteristics:

a) integrated feed table;

b) saw blade diameter ≥ 600 mm;

c) the saw blade is mounted on a horizontal spindle below the table;

d) the saw blade spindle is in a fixed position

3.3.2
stationary machine
machine designed to be located on or fixed to the floor or other parts of the structure of the premises and to be stationary during use

3.3.3
displaceable machine
machine which is located on the floor, stationary during use and equipped with a device, normally wheels, which allow it to be moved between locations

3.3.4
machine actuator
power mechanism used to effect motion of the machine

3.3.5
integrated feed
feed mechanism for the workpiece (or tool) which is integrated with the machine and where the workpiece (or machine element with incorporated tool) is (are) held and controlled mechanically during the machining operation

Note 1 to entry: The words in brackets are not applicable to the machines covered by this document.

3.3.6
anti kickback device
device which either reduces the possibility of kickback or arrests the motion during kickback of the workpiece or parts of it or parts of the machine

3.3.7
ejection
unexpected movement of the workpiece or parts of it or part of the machine from the machine during processing

3.3.8
kickback
particular form of ejection and is describing the unexpected movement of the workpiece or parts of it or parts of the machine opposite to the direction of feed during processing

3.3.9
run-up time
time elapsed from the actuation of the start control device until the spindle reaches the intended speed

3.3.10
run-down time
time elapsed from the actuation of the stop control device up to spindle standstill

3.3.11
dropping device
device designed to remove the workpiece or off-cuts from the integrated feed table

Note 1 to entry: See Figure 2.

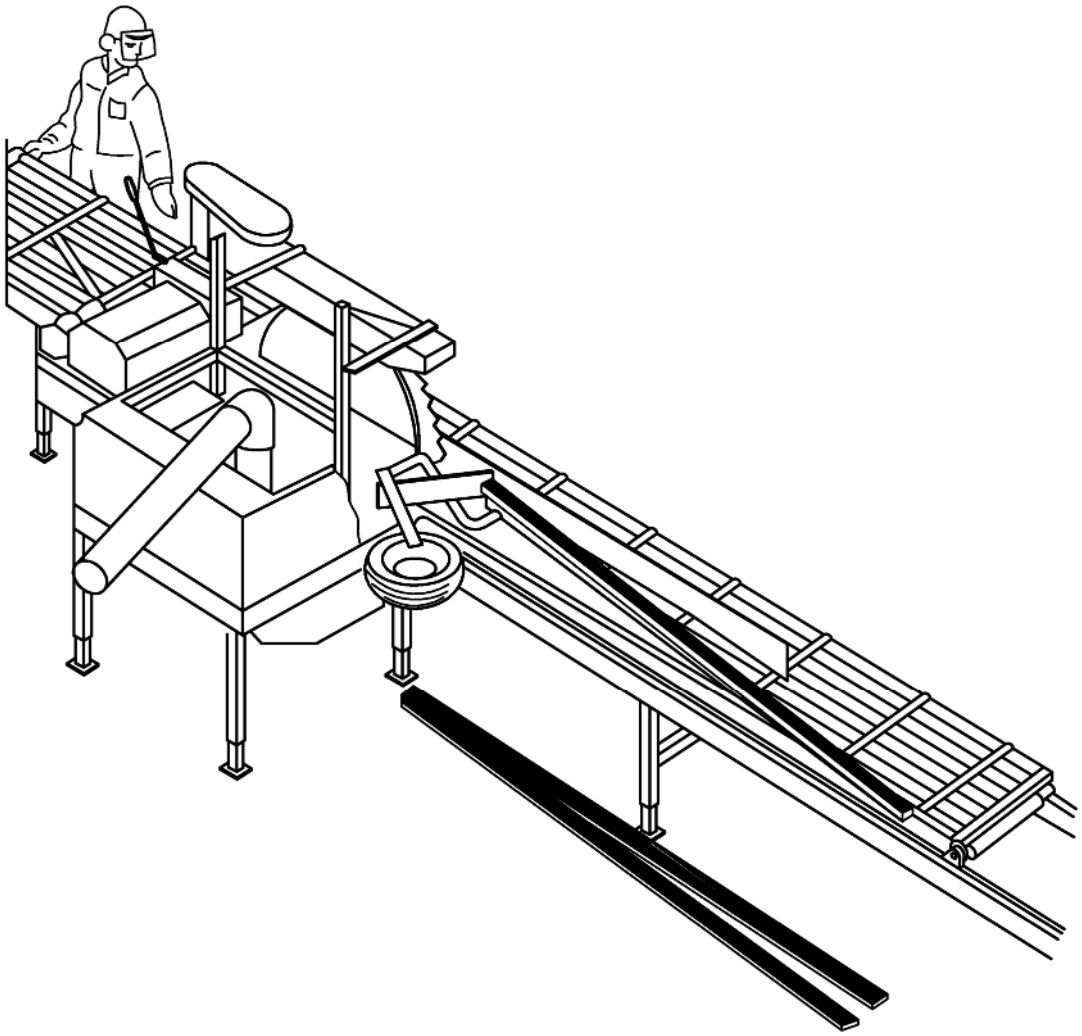


Figure 2 — Example of dropping device (guards not shown)

3.3.12
log lifter
equipment, integral with the machine and which lifts the log from the ground onto the integrated feed table

Note 1 to entry: See Figure 3.

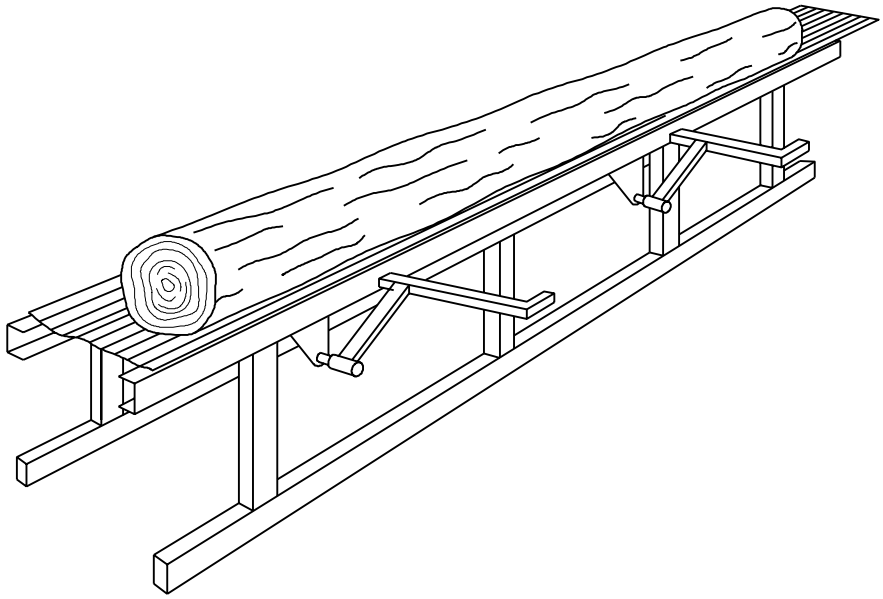
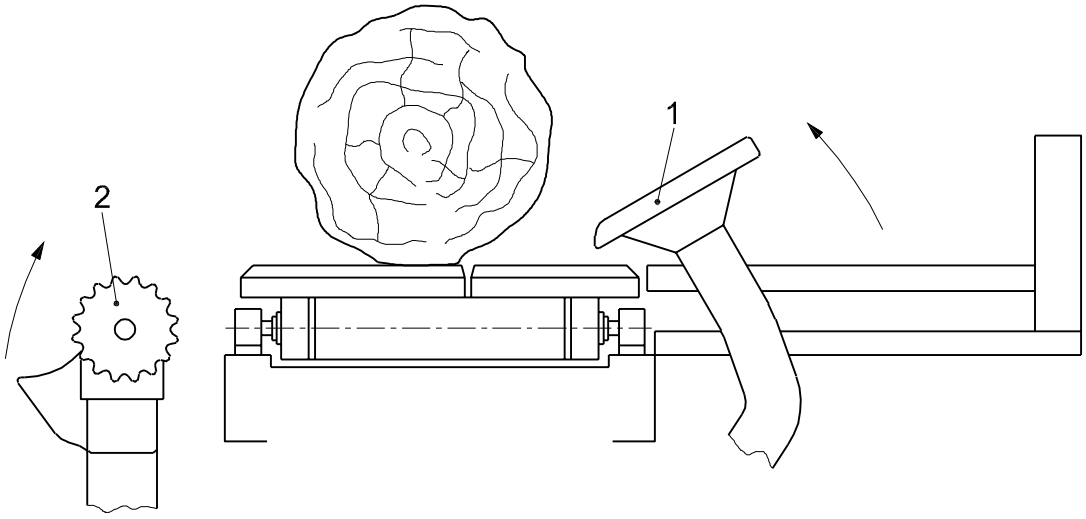


Figure 3 — Example of log lifter

3.3.13
log positioner
device for horizontal (adjusting) and rotational positioning of the log/workpiece prior to sawing

Note 1 to entry: See Figure 4.



Key
1 log adjuster
2 log rotator

Figure 4 — Example of log adjuster and rotator

3.3.14
log delivery device
device for loading the log onto the integrated feed table

Note 1 to entry: See Figure 5.

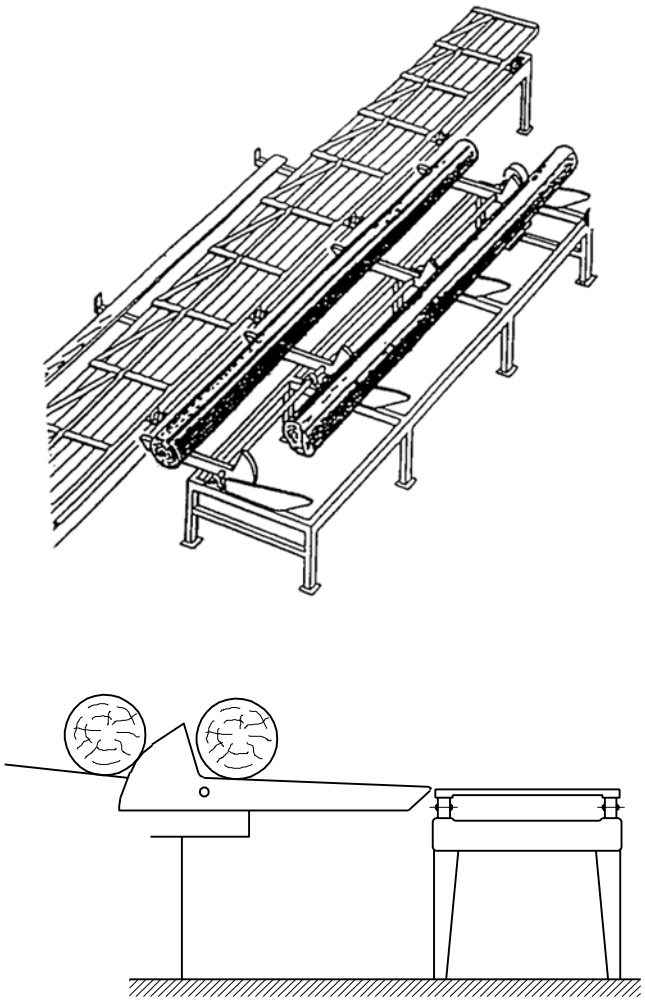


Figure 5 — Example of log delivery device

3.3.15
log clamp
device for holding the log in position at the front end of the integrated feed table during sawing

Note 1 to entry: See Figure 6.

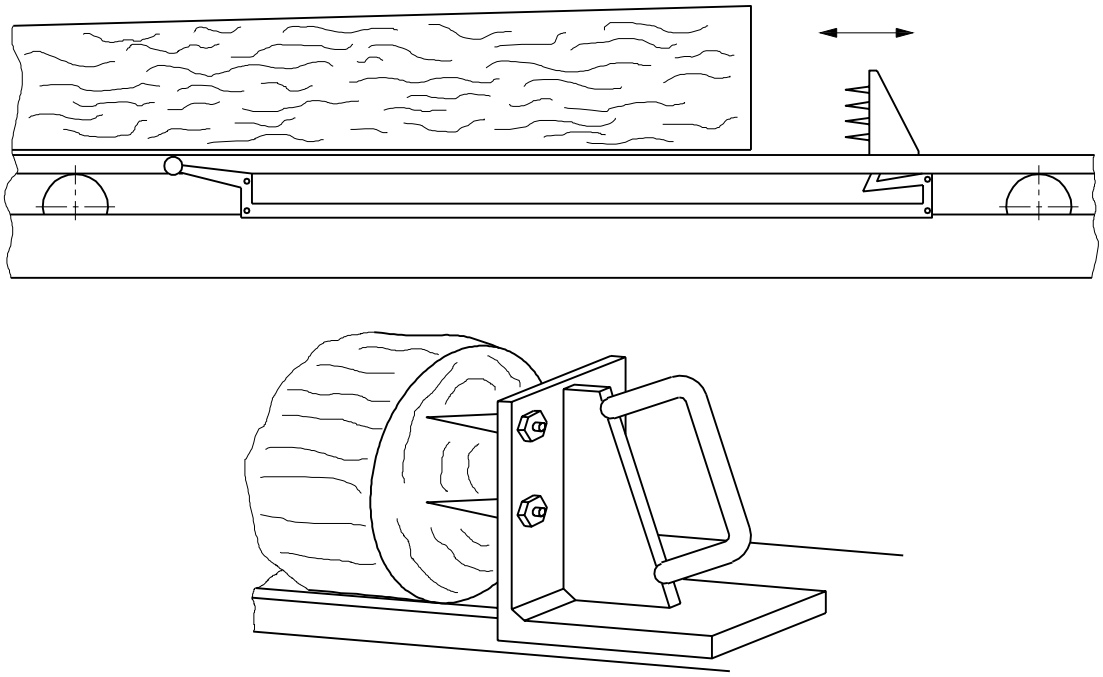


Figure 6 — Example of log clamp

3.3.16
log hook
device to hold the long axis of the log stable during feeding

Note 1 to entry: See Figure 7.

Dimensions in millimetres

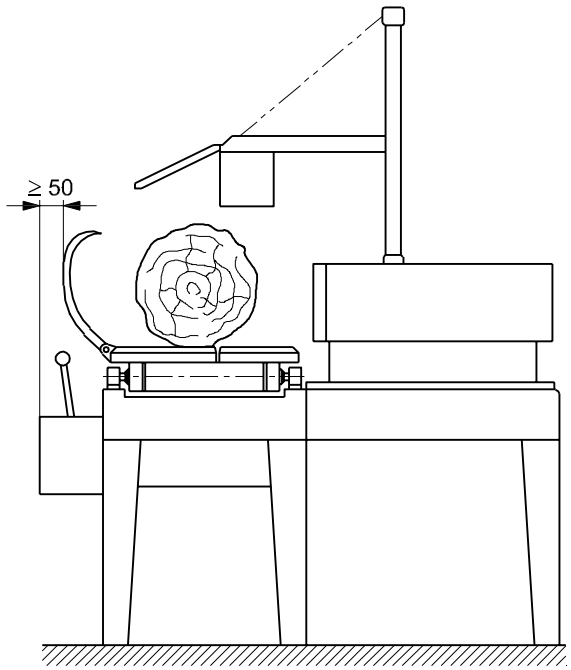
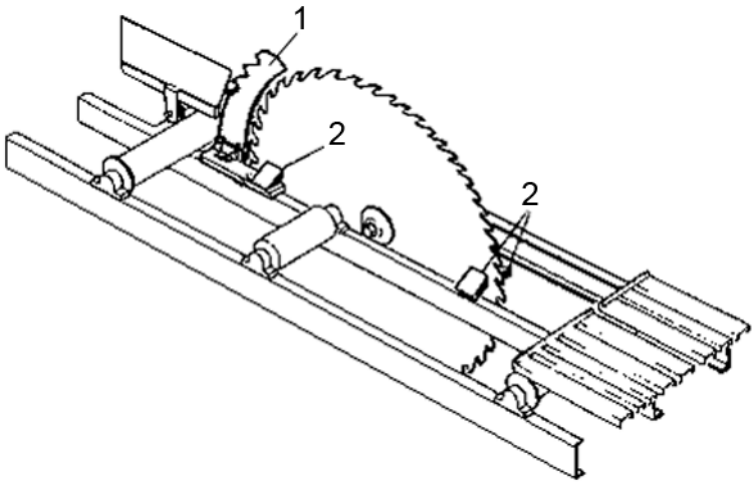


Figure 7 — Example of log hook

3.3.17
saw blade guide
device to prevent lateral deflection of the saw blade during cutting

Note 1 to entry: See Figure 8.

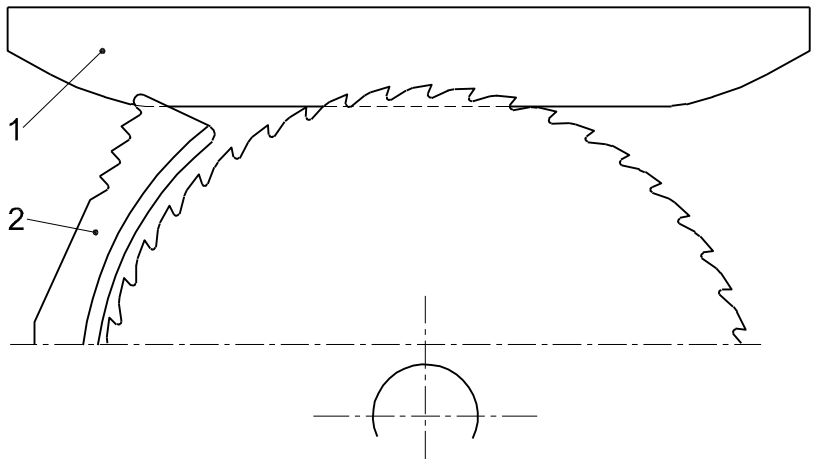


Key
1 riving knife
2 saw blade guide

Figure 8 — Example of saw blade guide

3.3.18
holding down device
adjustable device situated over the saw blade to minimise the risk of uplifted cut-offs from contacting the uppermost teeth of the saw blade

Note 1 to entry: See Figure 9.



Key
1 holding down device
2 riving knife

Figure 9 — Example of holding down device over the saw blade

3.3.19
information from the supplier
statements, sales literature, leaflets or other, whereby a manufacturer (supplier) declares either the characteristics of e.g. a material or product or the compliance of the material or product to a relevant standard

3.3.20
performance level
PL
discrete level used to specify the ability of safety-related parts of control systems to perform a safety function under foreseeable conditions

[SOURCE: EN ISO 13849-1:2008, 3.1.23]

4 List of significant hazards

This clause contains all significant hazards, hazardous situations and events (see EN ISO 12100:2010), identified by risk assessment as significant for the machines as defined in the scope and which require action to eliminate or reduce the risk. This document deals with these significant hazards by defining safety requirements and/or measures or by reference to relevant standards.

These hazards are listed in Table 1.

Table 1 — List of significant hazards

No	Hazards, hazardous situations and hazardous events	EN ISO 12100:2010	Relevant subclause of this document
1	**Mechanical hazards** related to:		
	- machine parts or workpieces:		
	a) shape;	6.2.2.1, 6.2.2.2, 6.3	5.3.2, 5.3.3, 5.3.5, 5.3.6, 5.3.7, 5.3.8
	b) relative location;		5.3.2, 5.3.3, 5.3.5
	c) mass and stability (potential energy of elements which may move under the effect of gravity)		5.2.2, 5.3.8
	d) mass and velocity (kinetic energy of elements in controlled or uncontrolled motion);		5.2.3, 5.3.1, 5.3.5
	e) mechanical strength.		5.3.3, 5.3.5
	- accumulation of energy inside the machinery:		
	g) liquids and gases under pressure;	6.2.10, 6.3.5.4	5.4.7, 5.4.8
1.1	Crushing hazard		5.3.7, 5.3.8
1.2	Shearing hazard		5.3.7, 5.3.8
1.3	Cutting or severing hazard		5.3.2, 5.3.3, 5.3.4, 5.3.7
1.4	Entanglement hazard		5.3.3, 5.3.6, 5.3.7
1.5	Drawing-in or trapping hazard		5.3.7
1.6	Impact hazard		5.3.7, 5.3.8
1.9	High pressure fluid injection or ejection hazard	6.2.10	5.4.7, 5.4.8
2	**Electrical hazards** due to:		
2.1	Contact of persons with live parts (direct contact)	6.2.9, 6.3.5.4	5.4.4, 5.4.13
2.2	Contact of persons with parts which have become live under faulty conditions (indirect contact)	6.2.9	5.4.4, 5.4.13
2.4	Electrostatic phenomena	6.2.9	5.4.11
4	**Hazards generated by noise**, resulting in:		
4.1	Hearing loss (deafness), other physiological disorders (loss of balance, loss of awareness)	6.2.2.2, 6.3	5.4.2

Table 1 *(continued)*

No	Hazards, hazardous situations and hazardous events	EN ISO 12100:2010	Relevant subclause of this document
4.2	Interference with speech communication, acoustic signals.		5.4.2
6	**Hazards gene rated by radiation**		
6.5	Lasers	6.3.4.5	5.4.10
7	**Hazards generated by materials and substances** (and their constituent elements) processed or used by the machinery		
7.1	Hazards from contact with or inhalation of harmful fluids and dusts	6.2.3, 6.2.4	5.4.3
7.2	Fire hazard	6.2.4	5.4.1, 6.4
8	**Hazards generated by neglecting ergonomic principles in machinery design** related to:		
8.1	Unhealthy postures or excessive effort	6.2.7, 6.2.8, 6.2.11.12, 6.3.5.5, 6.3.5.6	5.2.2
8.2	Hand-arm or foot-leg anatomy	6.2.8.3	5.2.2
8.4	Local lighting	6.2.8.6	6.4
8.6	Human error, human behaviour	6.2.8, 6.2.11.8, 6.2.11.10, 6.3.5.2, 6.4	6.4
8.7	Design, location or identification of manual controls	6.2.8.7, 6.2.11.8	5.2.2
8.8	Design or location of visual display units	6.2.8.8, 6.4.2	5.2.2
10	**Unexpected start up, unexpected overrun/overspeed** (or any similar malfunction) from:		
10.1	Failure/disorder of the control system	6.2.11, 6.3.5.4	5.2.1, 5.2.7, 5.2.8
10.2	Restoration of energy supply after an interruption	6.2.11.4	5.2.7
10.3	External influences on electrical equipment	6.2.11.11	5.2.1, 5.4.4, 5.4.9
10.6	Errors made by the operator (due to mismatch of machinery with human characteristics and abilities, see 8.6)	6.2.8, 6.2.11.8, 6.2.11.10, 6.3.5.2, 6.4	5.2.1, 5.2.2, 5.4.5, 6.4
11	**Impossibility of stopping the machine in the best possible conditions**	6.2.11.1, 6.2.11.3, 6.3.5.2	5.2.4, 5.2.5
13	**Failure of the power supply**	6.2.11.1, 6.2.11.4	5.2.7
14	**Failure of the control circuit**	6.2.11, 6.3.5.4	5.2.1
15	**Errors of fitting**	6.2.7, 6.4.5	6.4
16	**Break-up during operation**	6.2.3	5.3.2
17	**Falling or ejected objects or fluids**	6.2.3, 6.2.10	5.3.2, 5.3.3, 5.3.5, 5.3.6, 5.3.7, 5.3.8
18	**Loss of stability / overturning of machinery**	6.3.2.6	5.3.1

5 Safety requirements and/or measures

5.1 General

The machine shall comply with the safety requirements and/or protective measures of Clause 5.

In addition, the machine should be designed in accordance with the requirements of the principles of EN ISO 12100:2010 for hazards relevant but not significant, which are not dealt with by this document (e.g. sharp edges of the machine frame).

For guidance in connection with risk reduction by design, see EN ISO 12100:2010, 6.2, and for safeguarding measures, see EN ISO 12100:2010, 6.3.

5.2 Controls

5.2.1 Safety and reliability of control systems

5.2.1.1 General

For the purpose of this document, safety related part of a control system means the system from the initial device, e.g. actuator or position detector or sensor up to and including the power control element of the final machine actuator, e.g. motor or brake. Safety related parts of the control system of this machine comprise parts concerning the following functions and they shall fulfil at least the requirements of the PL given below in accordance with the requirements of EN ISO 13849-1:2008:

— starting: PL=c (see 5.2.3);

— normal stopping: PL=c (see 5.2.4);

— emergency stopping: PL=c (see 5.2.5);

— interlocking: PL=c (see 5.2.3, 5.2.5, 5.3.7.1, 5.3.7.2, 5.3.7.4, 5.3.7.5);

— the braking system: PL=b or PL=c (see 5.2.4, 5.2.5, 5.3.4);

— limited movement control device: PL=c (see 5.3.7.3);

— hold to run control: PL=c (see 5.2.6);

— power operated movement of the fence: PL=c (see 5.2.3).

Verification: By checking the relevant drawings and/or circuit diagrams and inspection of the machine.

NOTE For components characteristics the information from the component supplier can be useful.

5.2.1.2 Use of protective devices

Protective devices shall be in accordance with the specific standards. For the devices listed below the following requirements apply:

a) magnetic/proximity switches shall be in accordance with the requirements of 6.3 of EN 1088:1995+A2:2008 and the related control system shall conform to at least PL=c in accordance with the requirements of EN ISO 13849-1:2008;

b) time delay shall be at least PL=c in accordance with the requirements of EN ISO 13849-1:2008.

Verification: By checking the relevant drawings and/or circuit diagrams, inspection of the machine and relevant functional testing of the machine.

NOTE For the components characteristics, confirmation from the components' manufacturers can be useful.

5.2.2 Position of controls

Emergency stop(s) and the controls for workpiece loading, handling, feeding and unloading etc. shall be within 850 mm of the operator position (see area marked *X* in Figure 10), as defined by the manufacturer, and at a height not exceeding 1 800 mm from the operator standing level.

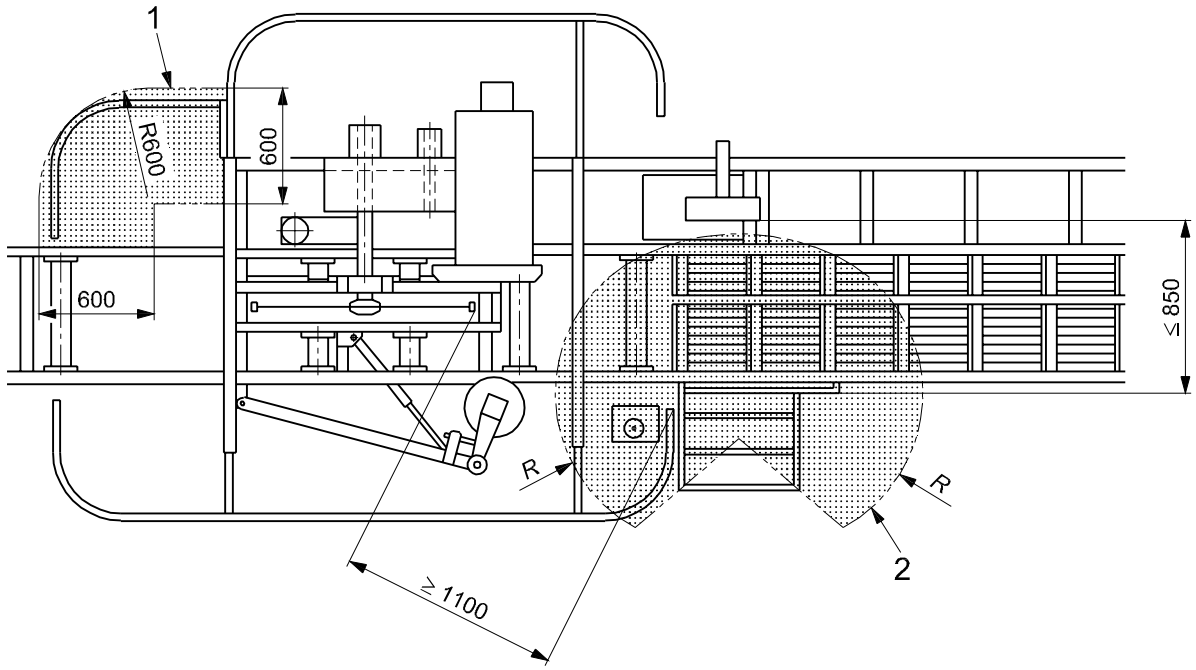
The start and normal stop controls may be at the position defined above, but in any case in a position from which the dangerous area is visible.

The additional emergency stop required by 5.2.5 shall be positioned at the unloading side of the machine and as defined by area *Y* in Figure 10.

If the machine is fitted with a movable control panel, this panel shall also be fitted with an emergency stop control device.

Verification: By checking the relevant drawings, measurement and inspection of the machine.

Dimensions in millimetres



Key

1 area *Y*

2 area *X*

R = 850 mm for both hands

Figure 10 — Position of controls

5.2.3 Starting

The requirements of EN 60204-1:2006, 9.2.5.2 apply and in addition:

For the purpose of this document "safeguards are in place and functional" is achieved by the interlocking arrangements described in 5.3.7 and "operation" means rotation of the saw spindle and/or any powered movement of any workpiece holding device and/or any machine element and/or any feed mechanism.

The exceptions described in 9.2.5.2 of EN 60204-1:2006 are not relevant.

Start or restart shall only be possible by actuation of the start control device provided for that purpose.

The initiation of the cutting stroke shall only be possible after saw-blade rotation has been initiated.

The closure of movable interlocked guards shall not lead to an automatic restart of hazardous movements.

The safety related part of the control systems (see also 5.2.1) for starting and the interlocking arrangements shall be at least PL=c in accordance with the requirements of EN ISO 13849-1:2008.

Verification: By checking the relevant drawings and/or circuit diagrams, inspection and relevant functional testing of the machine.

5.2.4 Normal stopping

A stop control shall be fitted which when actuated cuts power to all machine actuators unless STO or SS1 according to EN 61800-5-2:2007 is used. The actuation of the stop control device shall activate the brake (if provided).

For normal stopping of PDS(SR) (power drive system, safety related) see 4.2.2.2 "safe torque off (STO)" and 4.2.2.3 "safe stop 1 (SS1)" of EN 61800-5-2:2007.

Where a spring operated mechanical brake is provided this stop control shall be of category 0 in accordance with 9.2.2 of EN 60204-1:2006.

Where any other type of brake e.g. an electrical brake is provided this stop control shall be a category 1 stop in accordance with 9.2.2 of EN 60204-1:2006 and the stopping sequence shall be:

a) cut power to all machine actuators and actuate the brake;

b) cut power to brake after braking sequence is complete.

The stopping sequence shall be satisfied at the level of the control systems. If a time delay device is used, time delay shall conform to 5.2.1.2 b) and be at least the maximum run-down time and either time delay shall be fixed or the time delay adjustment shall be sealed.

The safety related part of the control systems (see also 5.2.1) for normal stopping shall be at least PL=c in accordance with the requirements of EN ISO 13849-1:2008.

Verification: By checking relevant drawings and/or circuit diagrams, inspection and relevant functional testing of the machine.

5.2.5 Emergency stop

The requirements of EN ISO 13850:2008 shall apply and in addition:

The machine shall be fitted with emergency stop control devices, which when actuated shall stop all machine actuators. The emergency stop control device shall be at any time of self latching type. On electric driven machines the emergency stop control system shall conform to 9.2.5.4 and 10.7 of EN 60204-1:2006.

For emergency stop of PDS(SR) see 4.2.2.2 "safe torque off (STO)" and 4.2.2.3 "safe stop 1 (SS1)" of EN 61800-5-2:2007.

On Power Take Off (PTO) driven machines it shall not be possible to operate the machine unless the emergency stop is functional e.g. by mechanical or electrical interlocking between the power source and movements of the machine.

Where a spring operated mechanical brake is provided this stop control shall be of category 0 in accordance with 9.2.2 of EN 60204-1:2006.

Where any other type of brake e.g. an electrical brake is provided this stop control shall be a category 1 stop in accordance with 9.2.2 of EN 60204-1:2006 and the stopping sequence shall be:

a) cut power to all machine actuators and actuate the brake;

b) cut power to brake after braking sequence is complete.

The stopping sequence shall be satisfied at the level of the control systems. If a time delay device is used, time delay shall conform to 5.2.1.2 b) and the time delay shall be at least the maximum run-down time and either time delay shall be fixed or the time delay adjustment shall be sealed.

The safety related part of the control systems (see also 5.2.1) for the emergency stop and interlocking arrangement shall be at least PL=c in accordance with the requirements of EN ISO 13849-1:2008.

Verification: By checking relevant drawings and/or circuit diagrams, inspection and relevant functional testing of the machine.

5.2.6 Integrated feed

The movement of the integrated feed table and infeed roller shall be controlled by one hand operated hold-to-run control device. The initiation of this hold-to-run control device shall only be possible after the manual release of e.g. a latch. The actuator of this hold-to-run control device shall be a lever.

Involuntary actuation of the hold-to-run control device by e.g. protruding branches or logs not placed carefully on the machine shall be avoided e.g. by means of positioning of the hold-to-run control device or a cover.

This is to prevent overhanging branches or a log which is not properly loaded from striking and holding the control device in the feed position, which would create hazards to the operator and others.

The control of the log delivery device, log adjuster and rotator, log lifter and log clamp and any additional devices associated with handling of the workpiece or parts of it, shall be hand operated hold-to-run control devices.

The safety related part of the control systems (see also 5.2.1) for hold-to-run control shall be at least PL=c in accordance with the requirements of EN ISO 13849-1:2008.

Verification: By checking the relevant drawings and/or circuit diagrams, inspection and relevant functional testing of the machine.

5.2.7 Failure of the power supply

On electrically driven machines an automatic restart in the case of supply interruption after the restoration of the supply voltage shall be prevented in accordance with paragraphs 1 and 3 in 7.5 of EN 60204-1:2006.

Where the machine is fitted with pneumatic and/or hydraulic actuators the restoration of the energy supply shall not result in a restart of any machine actuator.

The safety related part of the control system to prevent automatic restart shall be at least PL=c in accordance with the requirements of EN ISO 13849-1:2008.

Verification: By checking relevant drawings and/or circuit diagrams, inspection and relevant functional testing of the machine.

5.3 Protection against mechanical hazards

5.3.1 Stability

Stationary machines and ancillary equipment shall be equipped with the facility to fix them to the floor or other stable structure, e.g. by providing fixing holes in the machine or equipment frame.

Displaceable machines shall be provided with a minimum of four stabilisers e.g. feet, stands or outriggers to ensure that the machine remains stable whilst in the working position. These devices shall have a bearing surface that transmits to the ground a pressure of maximum 400 kPa.

The stabilisers shall be locked in the transport position by two separate locking devices for each stabiliser, at least one of which operates automatically e.g. a gravity locking pin plus a detente. Hydraulically operated stabilisers are regarded to meet this requirement.

Where the stabilisers are power operated and project beyond the outline of the machine, it shall be possible for the driver/operator to verify that they are in the transport position e.g. by direct sight, mirrors or Closed Circuit TeleVision (CCTV).

Verification: By checking the relevant drawings, measurement, inspection and relevant functional testing of the machine.

5.3.2 Risk of break-up during operation

The guards for the saw blade shall be manufactured from materials with at least the following properties:

a) steel having an ultimate tensile strength of at least 350 N mm^{-2} and a wall thickness of at least 2 mm;

b) light alloy with characteristics in accordance with Table 2;

Table 2 — Light alloy saw blade guard thickness and tensile strength

Ultimate tensile strength N mm^{-2}	Minimum thickness mm
180	5
240	4
300	3

c) polycarbonate with a wall thickness of at least 5 mm or other plastic material passing the test in Annex F;

d) cast iron with an ultimate tensile strength of at least 200 N mm-2 and a wall thickness of at least 5 mm.

Verification: By checking the relevant drawings, measurement, for plastic materials with characteristics other than those given for polycarbonate in c) above by performing the test in Annex F and inspection on the machine.

NOTE For the ultimate tensile strength a confirmation from the manufacturer of the material can be useful.

5.3.3 Tool holder and tool design

5.3.3.1 General

Saw blades shall conform to EN 847-1:2005+A1:2007 and the following subclauses:

5.3.3.2 Saw blade fixing device

Saw flanges (or in the case of a flush mounted saw blade - a flange) shall be provided.

The outside diameter of the flanges shall be ≥ *D*/6 (where *D* is the largest saw blade diameter for which the machine is designed).

For flanges other than those for flush mounted saw blades the clamping surface at the outside of the flange shall be at least 5 % of the flange outside diameter but not less than 5 mm in width and the flange(s) shall be recessed to the centre.

Where two flanges are provided, both outside diameters shall be within a tolerance of ± 1 mm.

To ensure that the saw blade does not come loose during start-up, running or braking, there shall be a positive connection between the spindle and the saw blade, or between the front saw flange and the spindle.

Run-out of the saw spindle and camming of the saw flanges shall be within the tolerances given in Annex A.

The saw blade spindle shall be manufactured from steel with a minimum ultimate tensile strength of 580 N mm-2.

Verification: By checking the relevant drawings, measurement, inspection and relevant functional testing of the machine.

The flanges shall be manufactured from steel with an ultimate tensile strength of 350 N mm^{-2}.

Verification: By checking the relevant drawings, measurement and inspection on the machine.

NOTE For the ultimate tensile strength a confirmation from the manufacturer of the material can be useful.

5.3.3.3 Spindle locking

When it is necessary to hold a spindle stationary for tool changing, a spindle holding device shall be provided, e.g. this may be a double spanner arrangement, or an integral locking bar to each saw unit to be inserted through the spindles. These bars shall be a minimum diameter of 8 mm and be made from steel with an ultimate tensile strength of at least 350 N mm-2.

Locking bars shall prevent spindles from rotating if a spindle drive motor is inadvertently switched on.

Verification: By checking the relevant drawings, inspection, measurement and relevant functional testing of the machine. Alternatively on machines with locking bars, by the following test: After starting the spindle drive motor and with the locking bar in place the spindle shall remain stationary.

NOTE For the ultimate tensile strength a confirmation from the manufacturer of the material can be useful.

5.3.3.4 Saw blade guiding

The machine shall be fitted with saw blade guiding devices on the infeed and outfeed side of the saw blade (see Figure 8).

These devices shall be provided with radial and axial adjustment.

The radial adjustment shall accommodate the maximum and minimum diameters of the saw blade for which the machine is designed.

The axial adjustment shall permit the guide to be adjusted to between a minimum of 1 mm and a maximum of 4 mm from the saw blade plate.

Adjustment of the axial movement of the guides located at the infeed of the saw blade shall be possible during saw blade running. This adjustment shall be from a position of safety, i.e. outside of the machine guards.

The guides shall be manufactured from a material that will not create a hazard if in contact with the rotating saw blade; e.g. plastic, ceramic or a wood based material.

Verification: By checking the relevant drawings, measurement, inspection and relevant functional testing of the machine.

5.3.4 Braking

An automatic brake shall be provided for the saw blade spindle.

The braking time shall be less than 10 s or, where the run-up time exceeds 10 s, less than the run-up time but shall in no case exceed 30 s.

The braking torque shall not be applied directly to the saw blade plate or the saw blade flange(s).

A PL of at least c for the braking function shall be achieved.

Where a spring operated mechanical brake or any other type of brake not using electronic components is fitted the last paragraph of 9.3.4 of EN 60204-1:2006 does not apply (see 6.4 w)).

For electrical braking, reverse current injection braking shall not be used.

On electrical brakes in the case of failure of electrical power supply this run-down time may be exceeded.

As an exception where an electrical brake with electronic control system is fitted, its control system shall be designed, as a minimum, in PL=b in accordance with the requirements of EN ISO 13849-1:2008 and be designed in category 2 in accordance with the requirements of EN ISO 13849-1:2008 with the exception that the test rate requirement in 4.5.4 of EN ISO 13849-1:2008 is not applicable. The safety related part of the control system for braking shall be tested periodically, e.g. by monitoring braked run down time. The feed back shall come from either the encoder fitted to the spindle motor or from the measurement of the residual current in the wires powering the motor.

The test shall:

a) be independent from the basic control system for braking or an internal watch dog shall be provided in the control system for braking;

b) be independent from the intention of the operator;

c) be performed at each spindle stop.

Where the test result is negative more than three times in succession, it shall not be possible to operate the machine. A negative test result shall be indicated.

The diagnostic coverage (DC_{avg}) shall be ≥ 60 %.

See Annex E of EN ISO 13849-1:2008 for DC estimation.

As an exception, a simple electronic brake (using simple electronic parts like rectifiers, transistors, triacs, diodes, resistors or thyristors) may be PL=b and designed in category 1 in accordance with the requirements of EN ISO 13849-1:2008 if the "mean time to a dangerous failure" (MTTFd) according to Table 5 of EN ISO 13849-1:2008 reaches a value of "high" (at least 30 years).

NOTE Complex electronic components like e.g. microprocessors or PLCs cannot be considered as well tried under the scope of EN ISO 13849-1:2008 and do therefore not fulfil the requirements of category 1.

For calculating the probability of a dangerous failure (PFH) for a simple electronic brake component with no fault detection (no DC) and no testing capability (category 1), the procedure described in Annex D of EN ISO 13849-1:2008 can be used.

Verification: By checking the relevant drawings and/or circuit diagrams, inspection of the machine and relevant functional testing of the machine. For the determination of un-braked run-down time and braked run-down time, if relevant, the appropriate tests given in Annex E apply.

5.3.5 Devices to minimise the possibility or the effect of ejection

5.3.5.1 Riving knife

Every machine shall be supplied with a riving knife / riving knives to accommodate the range of saw blades that are intended for use with the machine as indicated in the instruction handbook.

Verification: By checking relevant drawings and inspection of the machine.

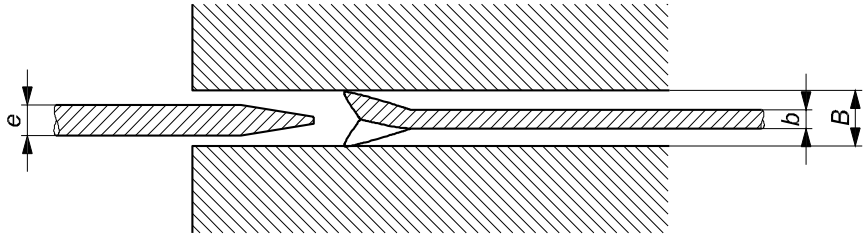
The riving knife and its mounting arrangement shall meet the following requirements:

a) riving knives shall be manufactured from steel with an ultimate tensile strength of at least 580 N mm^{-2}, or of a comparable material, have flat sides (within 0,2 mm in 100 mm) and shall have a thickness *e* between the width of the saw blade plate *b* and the kerf *B* (width of saw teeth) (see Figure 11);

Verification: By checking the relevant drawings and measurement.

NOTE For the ultimate tensile strength a confirmation from the manufacturer of the material can be useful.

Dimensions in millimetres



Key
e riving knife thickness
B width of cut
b width of saw blade

Figure 11 — Thickness of riving knife in relation to saw blade dimensions

b) the leading edge of the riving knife shall be chamfered to provide a "lead-in" (see Figure 12) and the riving knife shall be of constant thickness (within ± 0,2 mm) throughout its working length.

Verification: By checking the relevant drawings, inspection and measurement.

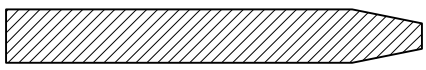
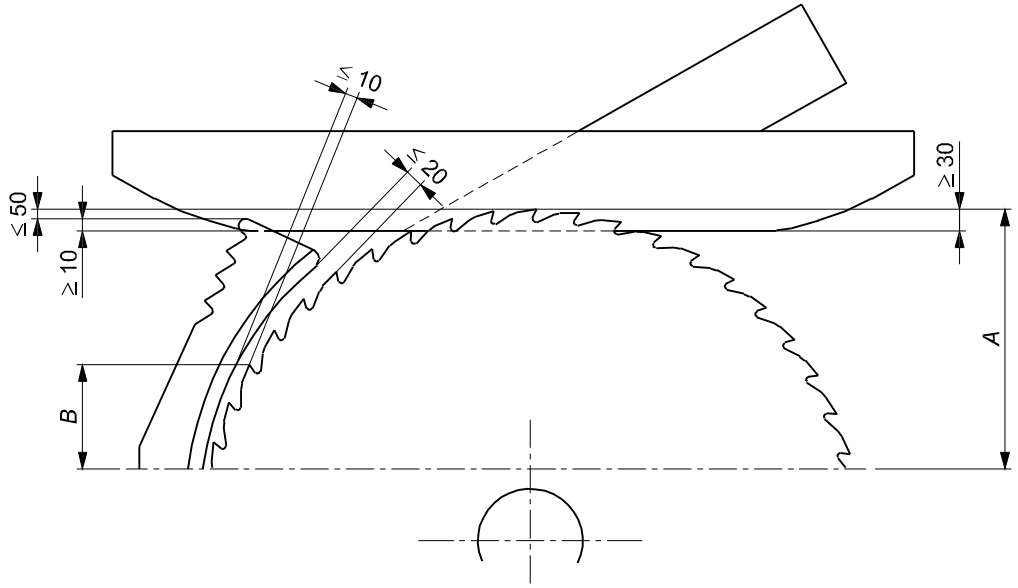


Figure 12 — Chamfered leading edge of riving knife

c) the riving knife shall be capable of vertical adjustment so that its uppermost point can be set level with the highest point on the periphery of the maximum saw blade for which the machine is designed or a maximum of 50 mm below the highest point on the periphery of the maximum saw blade for which the machine is designed (see Figure 13).

Verification: By checking relevant drawings, inspection and measurement.

Dimensions in millimetres



Key

A maximum cutting height

B 1/3 maximum cutting height

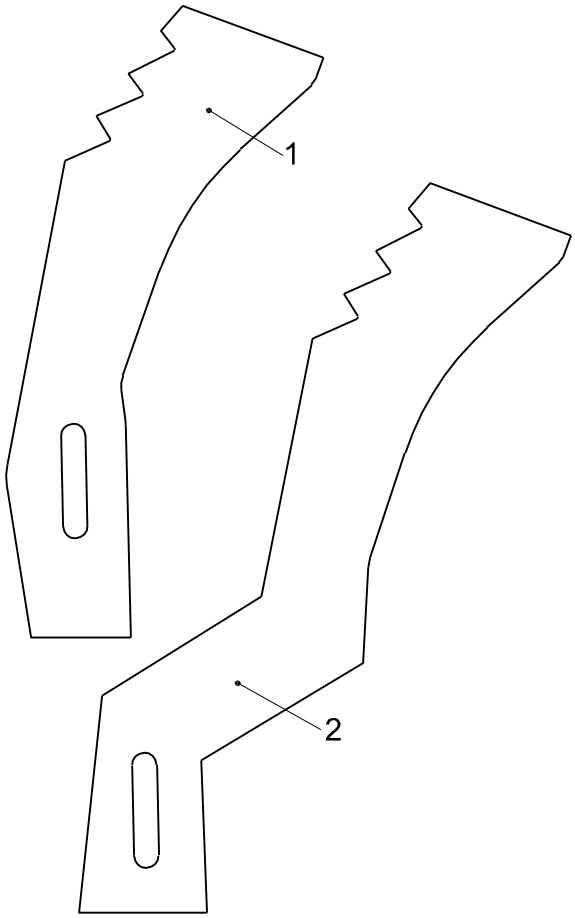
Figure 13 — Riving knife and holding-down device adjustment

d) the riving knife shall be designed so that when it is mounted and adjusted the distance between the riving knife and the saw blade measured at 1/3 of the maximum cutting height shall not exceed 10 mm measured radially through the centre of the saw blade and at no place shall this distance exceed 20 mm (see Figure 13).

Verification: By checking relevant drawings, inspection and measurement.

e) the front and rear contours of the riving knife shall be continuous curves or straight lines, without any flexure which would weaken it (for example see Figure 14) with the exception of the provision described at j).

Verification: By checking relevant drawings and inspection.



Key

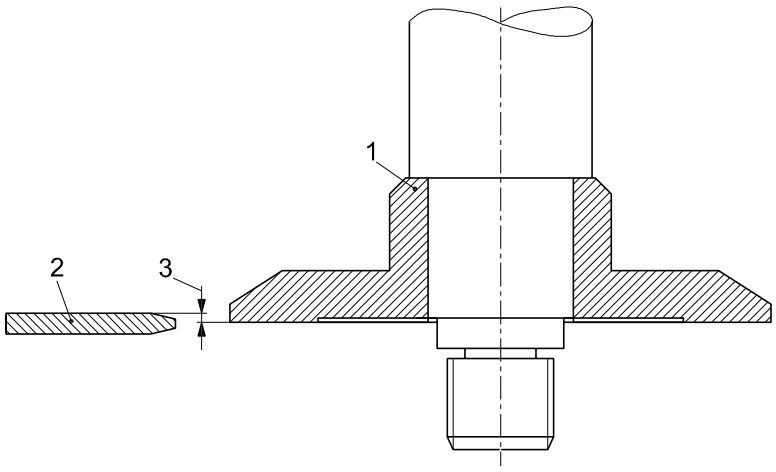
1 example of acceptable riving knife shape

2 example of unacceptable riving knife shape

Figure 14 — Examples of riving knife shape

f) the riving knife fixing arrangement shall be such that the relative position of the riving knife and the fixed saw flange can be maintained within the tolerance shown in Figure 15.

Verification: By checking relevant drawings, inspection, measurement and relevant functional testing of the machine.



Key

1 fixed saw flange

2 riving knife

3 maximum tolerance 0,2 mm

Figure 15 — Position of riving knife in relation to fixed saw blade flange

g) the arrangement for fixing the riving knife shall be such that its stability is able to satisfy the requirements laid down in Annex B.

Verification: Carry out test at Annex B.

h) the riving knife shall conform to the requirements of the lateral stability test laid down in Annex C.

Verification: Carry out test at Annex C.

i) the riving knife shall be held in position by guiding elements, e.g. guiding pins (see Figure 16). The riving knife fixing slot shall be no more than 2.0 mm wider than the guiding elements.

Verification: By checking relevant drawings, inspection, measurement and relevant functional testing of the *machine.*

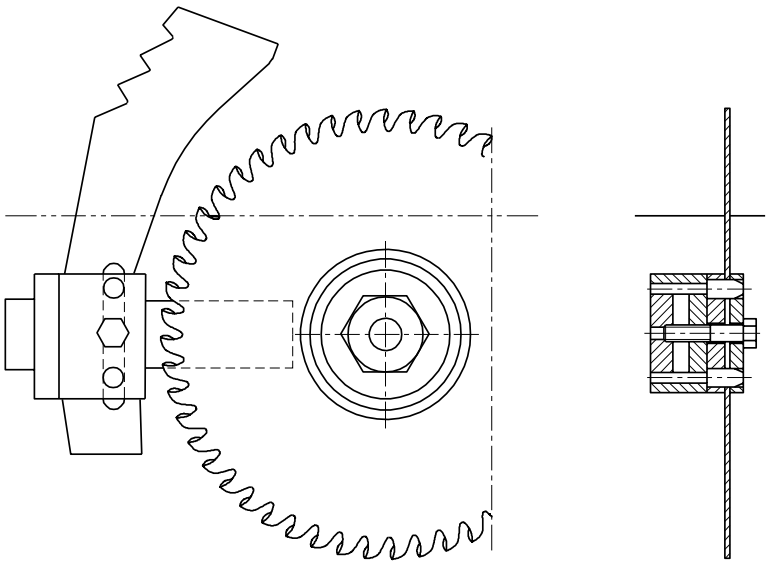


Figure 16 — Example of riving knife fixing

j) to prevent workpieces lifting on the return stroke, the edge of the riving knife remote from the saw blade shall, for example, be notched for at least one third of the length of the edge, measured from the highest point (see Figure 16);

Verification: By checking relevant drawings, inspection, measurement and relevant functional testing of the machine.

5.3.5.2 Hold-down device

A hold-down device shall be provided above the saw blade, which shall be adjustable to maintain the dimensions shown in Figure 13. When in its normal operating position this device shall not move vertically more than 2 mm measured at the centre (measured in both directions) of the device when an upward force on the lower edge of F = 150 N is applied at the centre of the device (see Figure 17). Or, a device providing equivalent protection shall be provided.

Dimensions in millimetres

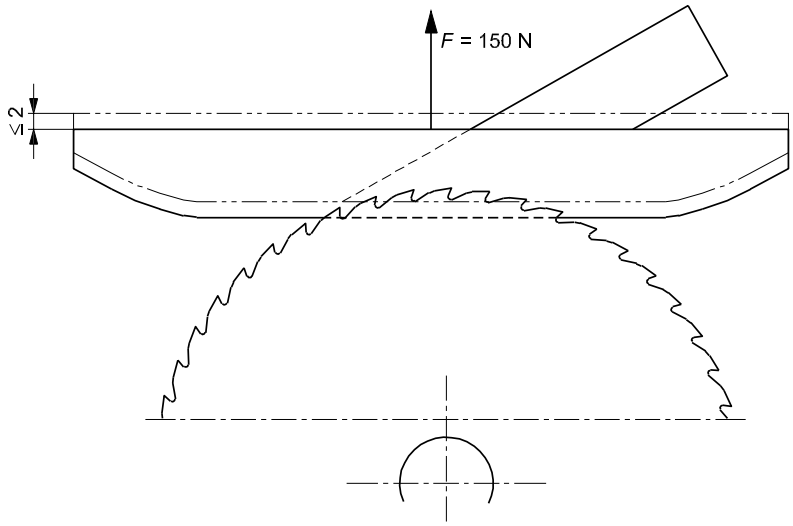


Figure 17 — Stability of hold-down device

The underside of the infeed and outfeed ends of the hold-down device shall be provided with a lead-in to permit the feeding of 'oversized' workpieces.

The device shall be made of a material that does not damage the saw blade in the event of contact i.e. plastic, aluminium, wood or wood based material.

Verification: By checking relevant drawings, inspection and measurement.

5.3.6 Workpiece supports and guides

All machines shall be fitted with a fence (dimension guide) for positioning the workpiece relative to the saw blade.

The height of the fence shall be at least 1/3 of the cutting height for which the machine is designed.

The effective length of the fence shall be at least 2/3 of the cutting height for which the machine is designed.

Power re-positioning of the fence shall not be possible during operation of the cutting stroke of the workpiece feed mechanism.

The safety related part of the control circuits (see also 5.2.1) for interlocking function between fence movement and cutting stroke shall be PL = c in accordance with the requirements of EN ISO 13849-1:2008.

Verification: By checking the relevant drawings, inspection and measurement.

5.3.7 Prevention of access to moving parts

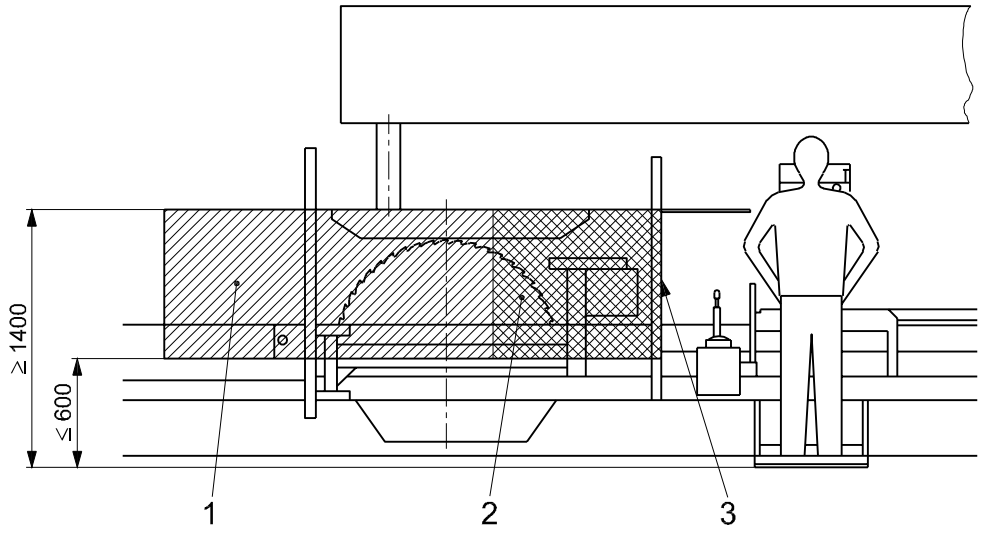
5.3.7.1 Guarding of cutting area of the saw blade

Access to the cutting area of the saw blade shall be prevented by a deterring/impeding device of a minimum height of 1,4 m measured from the floor level and sited at a horizontal distance *D* of at least 1,1 m from the saw blade (see Figures 18 and 19). The deterring/impeding device shall be a moveable guard or have movable section(s) which are interlocked with the power supply of the machine.

Where the saw blade rundown time exceeds 10 s the moveable deterring /impeding device or its sections shall be interlocked with guard locking with the power supply of the machine in accordance with EN 1088:1995+A2:2008.

Verification: By checking relevant drawings and/or circuit diagrams, measurement and inspection of the machine.

Dimensions in millimetres



Key

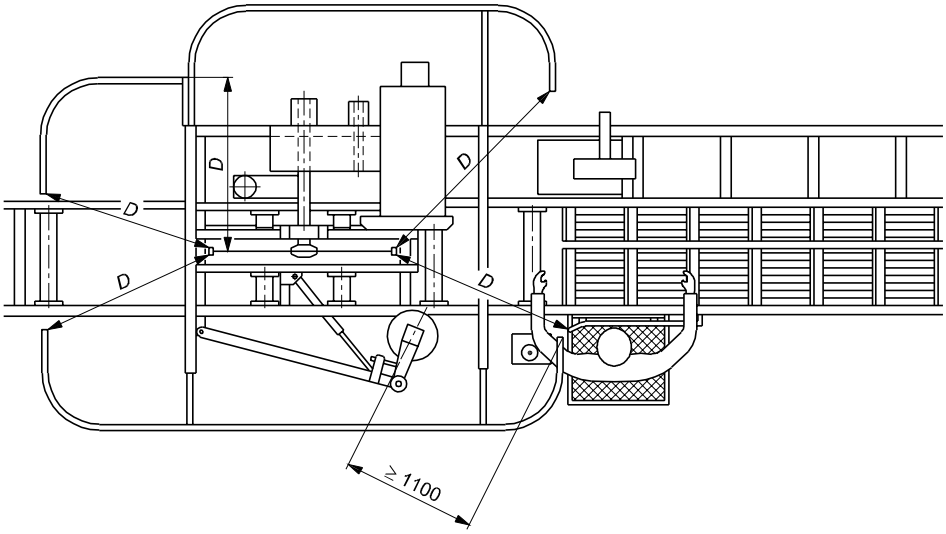
1 this area: Protective structure – distance between protective pipes or equivalent ≤ 120 mm

2 this area: Wire mesh or equivalent – gap size max 30 mm x 60 mm

3 part of the protective structure between operator and danger zone – gap size max 30 mm x 60 mm

Figure 18 — Example of saw blade guarding etc. (front elevation)

Dimensions in millimetres



Key

D ≥ 1 100

Figure 19 — Example of saw blade guarding etc. (plan view)

The safety related part of the control circuits (see also 5.2.1) for interlocking function shall be at least PL=c in accordance with the requirements of EN ISO 13849-1:2008.

Verification: By checking the relevant drawings and/or circuit diagrams, measurement and inspection of the machine.

5.3.7.2 Guarding of the non cutting area of the saw blade

Access to the saw blade below the integrated feed table shall be prevented by a fixed guard.

If the fixed guard is to be demounted by the user e.g. for maintenance, its fixing systems shall remain attached to the guard or to the machinery when the guard is removed, e.g. fitted with unlosable screws, see 6.4 y).

Where frequent access, i.e. more than once per shift, to the saw blade is necessary, e.g. for saw blade changing or maintenance, this access shall be via a movable guard, which is interlocked with the power supply of the machine.

Where the saw blade rundown time exceeds 10 s the moveable deterring /impeding device or its sections shall be interlocked with guard locking with the power supply of the machine in accordance with EN 1088:1995+A2:2008.

The safety related part of the control systems (see also 5.2.1) for interlocking function shall be at least PL=c in accordance with the requirements of EN ISO 13849-1:2008.

Verification: By checking relevant drawings and/or circuit diagrams, measurement and inspection of the machine.

5.3.7.3 Guarding the integrated feed table

Access to the in-running nips created by cable or chain drives or similar devices which move integrated feed tables, shall be prevented by a fixed guard.

If the fixed guard is to be demounted by the user e.g. for maintenance, its fixing systems shall remain attached to the guard or to the machinery when the guard is removed, e.g. fitted with unlosable screws, see 6.4 y).

A limiting device or mechanical restraint device to prevent the integrated feed table going beyond its extreme limit, shall be provided.

The integrated feed table shall be automatically held in position, in any loading position, e.g. by the hydraulic drive.

Access to the in-running nips and drawing-in points created by the table rollers and between the table rollers and the ends of the integrated feed table shall be minimised for example by the following measures (see Figure 20):

a) any gap between the bottom edge of the table and the machine frame (at the front and rear of the machine) shall be ≤ 8 mm;

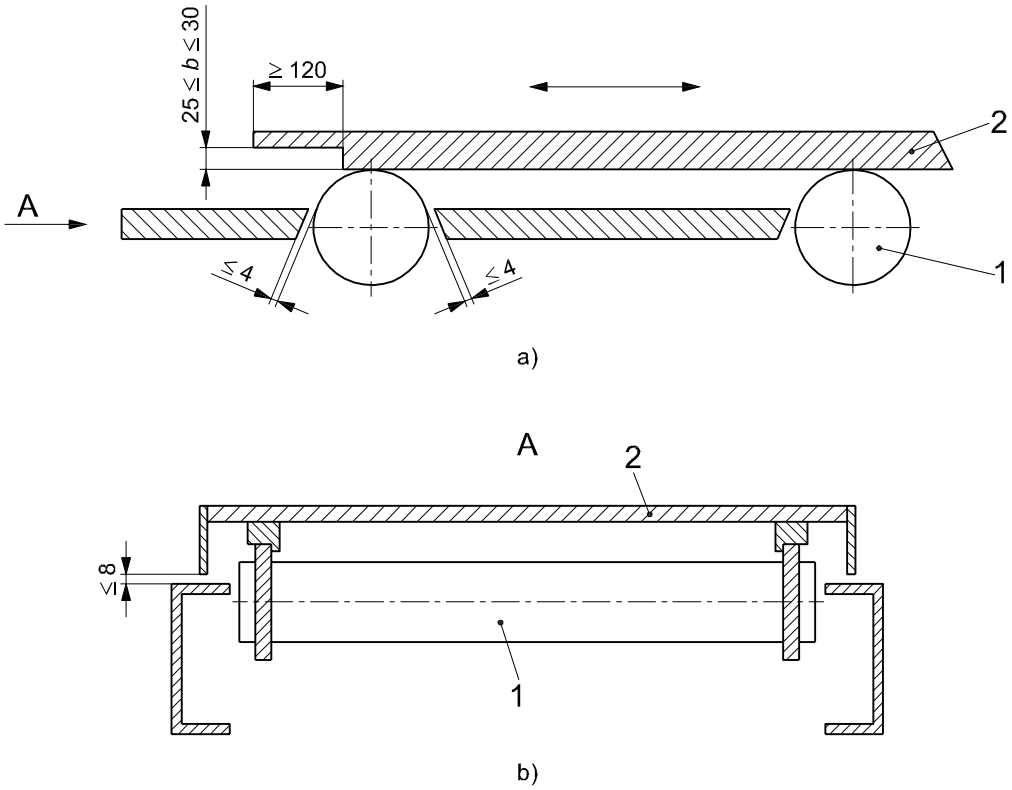
b) in the working area of the operator(s), which is determined by the operators free hand reaching distance with a radius R = 850 mm, the space between the table rollers shall be filled in with filling-in pieces. The gap between the filling-in piece and the roller shall be ≤ 4 mm. To minimise e.g. snow, ice and bark piling on the filling-in pieces, adequate design and proper material shall be used.

NOTE The other hand of the operator controls the movement of the integrated feed table by the hold-to-run control device required in 5.2.6.

c) the leading and trailing ends of the integrated feed table at the bearing point with the table rollers shall be shaped as shown in Figure 20.

Verification: By checking relevant drawings and/or circuit diagrams, inspection, measurement and functional testing of the machine.

Dimensions in millimetres



View in direction of arrow A

Key

1	roller
2	integrated feed table
b	25 ≤ *b* ≤ 30
A	direction of feed table movement

Figure 20 — Example of guarding the integrated feed table

5.3.7.4 Guarding of infeed feed roller

Access to the in-running nip at the infeed feed roller shall be prevented by e.g.:

a) the deterring/impeding device required at 5.3.7.1 which shall ensure that a horizontal distance of 1,1 m is maintained (see Figure 19); or

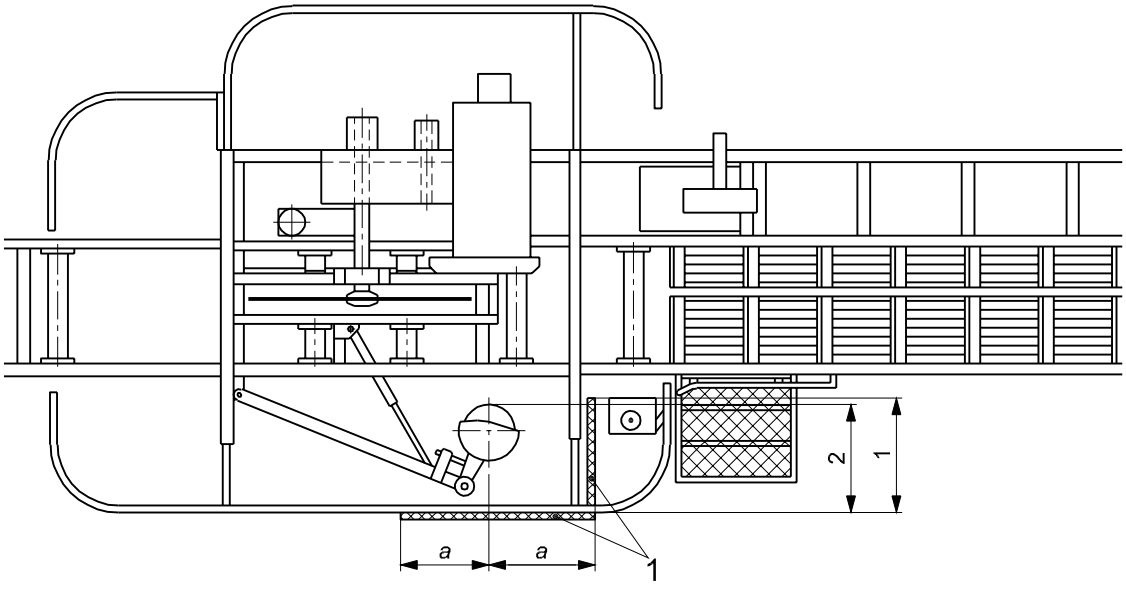
b) protective structures which are in accordance with the dimensions given in Figure 21, consisting of wire mesh with gap size of maximum 30 mm x 60 mm or equivalent material (see also Figure 18);

and by a fixed guard which is in accordance with the dimensions given in Figure 22.

If the fixed guard is to be demounted by the user e.g. for maintenance, its fixing systems shall remain attached to the guard or to the machinery when the guard is removed, e.g. fitted with unlosable screws, see 6.4 y).

Verification: By checking relevant drawings, inspection and measurement of the machine.

Dimensions in millimetres



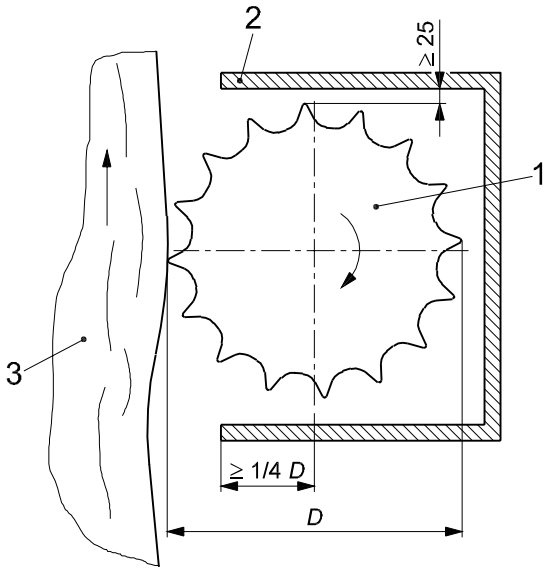
Key

a ≥ 550
1 > 2

1 protective structure to prevent access to the infeed feed roller danger zone
2 distance between protective structure and deterring/impeding device

Figure 21 — Example of infeed feed roller guarding

Dimensions in millimetres



Key

1 infeed feed roller
2 fixed guard
3 log
D feed roller diameter

Figure 22 — Fixed guard at the infeed feed roller

5.3.7.5 Guarding of drives

5.3.7.5.1 Drive to feed rollers

Access to the drive of the feed rollers shall be prevented by a fixed guard.

If the fixed guard is to be demounted by the user e.g. for maintenance, its fixing systems shall remain attached to the guard or to the machinery when the guard is removed, e.g. fitted with unlosable screws, see 6.4 y).

Verification: By checking relevant drawings, and inspection of the machine.

5.3.7.5.2 Drive to saw blade

Access to the drive to the saw blade shall be prevented by a fixed guard or a movable interlocked guard.

If the fixed guard is to be demounted by the user e.g. for maintenance, its fixing systems shall remain attached to the guard or to the machinery when the guard is removed, e.g. fitted with unlosable screws, see 6.4 y).

Where the saw blade rundown time exceeds 10 s the moveable guard shall be interlocked with guard locking with the power supply of the machine in accordance with EN 1088:1995+A2:2008.

The safety related part of the control systems (see also 5.2.1) for interlocking function shall be at least PL=c in accordance with the requirements of EN ISO 13849-1:2008.

Verification: By checking relevant drawings and/or circuit diagrams, inspection and relevant functional testing of the machine.

5.3.7.5.3 Drive to the extraction fan

Where an extraction fan, integral with the machine is provided, access to the fan and its drive, shall be prevented by a fixed guard or a movable interlocked guard.

The safety related part of the control systems (see also 5.2.1) for interlocking function shall be at least PL=c in accordance with the requirements of EN ISO 13849-1:2008.

If the fixed guard is to be demounted by the user e.g. for maintenance, its fixing systems shall remain attached to the guard or to the machinery when the guard is removed, e.g. fitted with unlosable screws, see 6.4 y).

Verification: By checking relevant drawings and/or circuit diagrams, inspection and relevant functional testing of the machine.

5.3.8 Positioning and holding devices

5.3.8.1 General

Stability of the log during operation of the cutting stroke shall be achieved at least by the provision of log hooks. Log clamps may also be provided.

Verification: By checking relevant drawings, inspection and relevant functional testing of the machine.

5.3.8.2 Log hook

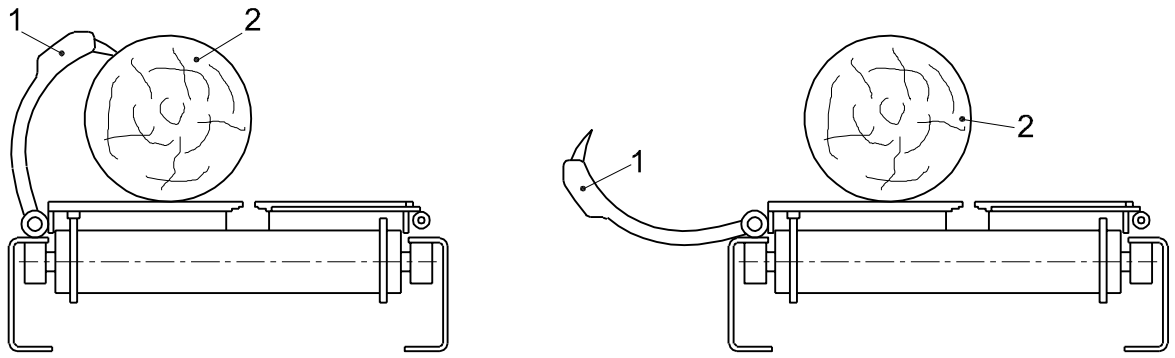
Log hooks shall fulfil the following requirements:

a) the hooks shall not be in-line with or across the saw line;

b) in their rest (open) position the hooks shall be at least 50 mm from the foremost edge of the integrated feed table hold-to-run control support (see Figure 7);

c) the movement of the log hooks shall either, be restricted to the 50 mm position shown in Figure 7, or the design shall be such that the log hook falls away from the table when it is released from the log (see Figure 23).

Verification: By checking relevant drawings, measurement and inspection of the machine.



Key

1 log hook

2 log

Figure 23 — Example of clamping position and rest position of the log hook

5.3.8.3 Log lifter

During lifting the log shall be maintained in stable position e.g. by limitation of the lifting speed, anti slip and anti roll surfaces or clamping elements.

On machines where the log lifter is moved under hydraulic power, the log lifter, shall in the event of rupture of a hydraulic hose or sudden loss of pressure, be prevented from falling, e.g. by the provision of non-return valves fitted at the actuating cylinders.

Verification: By checking relevant drawings and/or circuit diagrams, inspection, and relevant functional testing of the machine.

5.4 Protection against non-mechanical hazards

5.4.1 Fire

To minimise fire hazards, the requirements of 5.4.3 and 5.4.4 shall be fulfilled (see also 6.4).

If the machine is fitted with an integral extraction fan the components of it shall be designed in such a way that ignition sources are not generated during normal use and reasonably foreseeable malfunction.

Verification: By checking the relevant drawings and inspection of the machine.

5.4.2 Noise

5.4.2.1 Noise reduction at the design stage

When designing machinery, the information and technical measures to control noise at source given in EN ISO 11688-1:2009 shall be taken into account. The most relevant noise source is the rotating saw blade.

5.4.2.2 Noise emission measurement

Operating conditions for noise measurement shall comply with Annex D.

Mounting and operating conditions of the machine shall be identical for the determination of emission sound pressure levels at the work-station and sound power levels.

Emission sound power levels shall be measured in accordance with the enveloping surface measuring method EN ISO 3746:2010 with the following modifications:

a) the environmental indicator K_{2A} shall be equal to or less than 4 dB;

b) the difference between the background sound pressure level and the machine sound pressure level at each measuring point shall be equal to or greater than 6 dB. The correction formula for this difference is given in 8.3.3, Formula (12) of EN ISO 3746:2010;

c) only the parallelepiped measurement surface shall be used at 1,0 m from the reference surface;

d) where the distance from the machine to an auxiliary unit is less than 2,0 m the auxiliary unit shall be included in the reference surface;

e) the accuracy of the test method shall be better than 3 dB;

f) the number of microphone positions shall be nine in accordance with Annex D.

On large machines the reference box shall be as close to the noise source as possible but shall not exclude any part of the structure which radiates noise.

Alternatively, where the facilities exist and the measurement method applies to the machine type, emission sound power levels may also be measured in accordance with a method with higher precision i.e. EN ISO 3743-1:2010, EN ISO 3743-2:2009, EN ISO 3744:2010 and EN ISO 3745:2009 without the preceding modifications.

For determination of sound power level by sound intensity method, use EN ISO 9614-1:2009 (subject to agreement between the supplier and the purchaser).

Emission sound pressure level at the workstation shall be measured in accordance with EN ISO 11202:2010 with the following modifications:

1) the environmental indicator K_{2A} and local environmental factor K_{3A} shall be equal to or less than 4 dB;

2) the difference between the background emission sound pressure level and the workstation sound pressure level shall be equal to or greater than 6 dB in accordance with EN ISO 11202:2010, 6.4.1, accuracy grade 2 (Engineering);

3) the correction of the local environmental factor K_{3A} shall be calculated in accordance with A.2 of EN ISO 11204:2010 with reference restricted to EN ISO 3746:2010 instead of the method given in Annex A of EN ISO 11202:2010, or in accordance with EN ISO 3743-1:2010, EN ISO 3743-2:2009, EN ISO 3744:2010 or EN ISO 3745:2009 where one of these standards has been used as the measuring method.

For noise declaration 6.4 t) shall be met.

5.4.3 Emission of chips and dust

That part of the saw blade which is situated below the table shall be enclosed by an extraction hood.

The holding down device shall be designed to be fitted with an extraction hood.

The opening of the capture devices shall be large enough to capture the chips and dust projected.

NOTE 1 The size of the opening of the capture device depends on the emission pattern and the distance between the emission source and the opening of the capture device.

The capture device shall be designed in order to minimise pressure drop and material build up e.g. by avoiding abrupt change of direction of extracted chips and dust, sharp angles and obstacles causing a risk for hanging of chip and dust.

The conveying of chips and dust between the capture device and the machine connection to the CADES (chip and dust extraction system), especially flexible connections of moving units, shall follow the requirements to minimise pressure drop and material build up.

To ensure that the chips and dust extracted from the point of origin are conveyed to the collection system, the design of the hoods, ducts and baffles shall be based on a conveying velocity of extracted air in the duct of 20 m s^{-1} for dry chips and 28 m s^{-1} for wet chips (moisture content 18 % or above).

The pressure drop between the inlet of all capture devices and the connection to the CADES should be maximum 1 500 Pa (for the nominal air flow rate).

A low dust emission can be expected if the air flow rate ≥1 500 m^3 h^{-1} is ensured:

Verification: By checking of drawings, visual inspection and the following procedure:

— Measure the pressure drop at the chosen air flow rate by measurement under the condition given for noise measurement in the relevant C-standard or ISO 7960:1995.

— Run the machine (without processing a work piece) under the conditions for noise measurement in the relevant C-standard or ISO 7960:1995. The CADES shall be disconnected. Check if the machine creates an air flow from the inlet(s) of the capture device(s) to the connection outlet(s) to the CADES by use of smoke at the connection outlet(s).

NOTE 2 For measurement of chip and dust extraction system performance two standardised methods are useful: concentration method (EN 1093-9:1998+A1:2008) and index method (EN 1093-11:2001+A1:2008).

5.4.4 Electricity

With the exception of 6.3 the requirements of EN 60204-1:2006 apply unless stated otherwise in this document.

See 6.2 of EN 60204-1:2006 for the prevention of electric shock due to direct contacts and Clause 7 of EN 60204-1:2006 for protection against short circuits and overloading.

The protection of people against electrical shock due to indirect contacts should be normally ensured by automatic isolation of the electrical power supply of the machine by the operation of a protective device installed by the user in the line powering the machine (see the information provided by the manufacturer in the instruction handbook (see 6.4 x)).

The minimum degree of protection of all electrical components shall be IP 54 in accordance with EN 60529:1991 and EN 60529:1991/A1:2000.

The power supply cord of transportable machines shall be of type H0 7 in accordance with the requirements of HD 22.4 S4:2004.

In accordance with 18.2 and 18.6 of EN 60204-1:2006 the test 1 for the continuity of the protective bonding circuit and functional tests apply.

Verification: By checking the relevant drawings and/or circuit diagrams, inspection of the machine and relevant tests (specified in test 1 of 18.2 and 18.6 of EN 60204-1:2006).

5.4.5 Ergonomics and handling

The requirements of EN 614-1:2006+A1:2009 shall apply and in addition:

The machine and its controls shall be designed according to ergonomic principles in accordance with EN 1005-4:2005+A1:2008 for work posture which is not fatiguing.

The positioning, marking and illumination (if necessary) of control devices, and facilities for materials and tool set handling shall be in accordance with ergonomic principles in accordance with EN 894-1:1997+A1:2008, EN 894-2:1997+A1:2008, EN 894-3:2000+A1:2008, EN 1005-1:2001+A1:2008, EN 1005-2:2003+A1:2008, EN 1005-3:2002+A1:2008.

Tanks containing compressed air drainers and oilers shall be placed or oriented in such a way that the filler and drain pipes can be easily reached.

Machine components with a mass exceeding 25 kg shall include necessary attachments to accommodate the fitting of a lifting device e.g. lugs positioned such as to avoid their overturn or fall or move in an uncontrolled way during transport, assembly, dismantling, disabling and scrapping.

If the machine is fitted with a movable control panel, this panel shall be fitted with a facility to move it in the desired position.

If graphical symbols related to the operation of actuators are used, they shall be in accordance with Table A.1 of EN 61310-1:2008.

Further guidance is given in EN 60204-1:2006, EN 614-1:2006+A1:2009 and EN 614-2:2000+A1:2008.

See also 5.2.2 for position of controls, 5.3.1, 6.4, EN 894-3:2000+A1:2008 and EN 1005-3:2002+A1:2008.

Verification: By checking the relevant drawings, inspection of the machine, measurement and relevant functional testing of the machine.

5.4.6 Lighting

Displaceable machines shall be provided with adequate lighting arrangements in accordance with EN 1837:1999+A1:2009.

Verification: By checking the relevant drawings and/or circuit diagrams, inspection and relevant functional testing of the machine.

5.4.7 Pneumatic

If the machine is fitted with pneumatic system the requirements of EN ISO 4414:2010 shall apply.

See also 5.2.1, 5.4.14 of this document and 6.2.10 of EN ISO 12100:2010.

Verification: By checking the relevant drawings and/or circuit diagrams and inspection on the machine.

5.4.8 Hydraulic

If the machine is fitted with hydraulic system the requirements of EN ISO 4413:2010 shall apply.

See also 5.2.1, 5.4.14 of this document and 6.2.10 of EN ISO 12100:2010

Verification: By checking the relevant drawings and/or circuit diagrams and inspection on the machine.

5.4.9 Electromagnetic compatibility

The machine shall have sufficient immunity to electromagnetic disturbances to enable it to operate correctly in accordance with EN 60439-1:1999 and EN 60439-1:1999/A1:2004, EN 50370-1:2005 and EN 50370-2:2003.

NOTE Machines which incorporate CE-marked electrical components and where such components and cabling are installed in accordance with their respective manufacturers instructions, are generally considered to be protected against external electromagnetic interference.

Verification: By checking the relevant drawings and/or circuit diagrams and inspection of the machine.

5.4.10 Laser

If the machine is fitted with a laser to indicate the cutting line, the laser shall be of category 2, 2M or a lower risk category in accordance with the requirements of EN 60825-1:2007.

The laser shall be fitted to the machine so that warnings on the laser itself remain visible.

All provisions from the laser manufacturer associated to the installation and the use of the laser shall be fulfilled. The instruction for use of the laser shall be repeated in the instruction manual. Warning label and advice on use of eye protection if any shall be provided on the machine near the operator's position.

Verification: By checking the relevant drawings and inspection of the machine.

NOTE For the laser characteristics the information from the manufacturer of the laser can be useful.

5.4.11 Static electricity

If the machine is fitted with an integral extraction fan and flexible hoses are provided the hoses shall be able to lead charge to ground potential.

Verification: By checking the relevant drawings and inspection of the machine.

5.4.12 Errors of fitting

The machine shall be designed so that it is not possible to mount saw blades with dimensions larger than those for which it has been designed.

See also 6.3 and 6.4.

Verification: By checking the relevant drawings and inspection of the machine.

5.4.13 Isolation

The requirements of Clause 5 of EN 1037:1995+A1:2008 apply and in addition:

Electrical isolators shall be in accordance with 5.3 of EN 60204-1:2006.

When fitted with a plug to connect the machine to a 3-phase electrical supply, this plug may incorporate a phase inverter.

If the machine is fitted with a Direct Current (DC) injection braking system the electrical isolator shall be either:

a) not be located on the same side of the machine or on the same side of the panel as the start and stop controls; or

b) equipped with a blocking device. It shall only be possible to switch-off the mains after manually actuating a de-blocking device. In this case the supply disconnection device shall not be equipped as emergency stopping device.

Where pneumatic energy is used, pneumatic isolators shall be provided with a device for locking the isolator in the isolated condition (e.g. a padlock). Where the pneumatic supply is used only for clamping, a quick action coupling in accordance with EN ISO 4414:2010 without the means for locking shall be acceptable when the

disconnected coupling can all the time easily be under the control of the person making some intervention on the disconnected machine in accordance with 5.2 of EN 1037:1995+A1:2008.

On electrically driven machines, where hydraulic energy is used, hydraulic isolation shall be achieved by isolation of the electrical supply to the hydraulic motor.

Where residual energy is stored, e.g. in a reservoir or pipe, means for dumping residual pressure shall be provided, for example using a valve. Dumping pressure shall not be by disconnection of a pipe.

If the machine is fitted with an electrical brake the electrical isolator shall either be:

1) equipped with a blocking device and it shall only be possible to switch off the isolator after manually overriding this blocking device; or

2) not on the same side of the machine or on the same side of the control panel with the start and stop controls.

Verification: By checking relevant drawings and/or circuit diagrams, inspection and relevant functional testing of the machine.

5.4.14 Maintenance

The basic principles of 6.2.15 of EN ISO 12100:2010 shall be observed and in addition at least the information for maintenance listed in 6.4.5.1 e) of EN ISO 12100:2010 shall be provided.

Provision shall be made for storing the tools necessary for changing the saw blade and for adjusting of the riving knife on the machine.

Where lubrication points are provided they shall be located outside of the saw blade guarding and easily accessible by the operator when standing on the floor.

The machine shall be so designed that maintenance and cleaning can be, if possible undertaken after disconnection of the machine from all energy sources (see also 6.4).

Verification: By checking the instruction handbook.

6 Information for use

6.1 General

The basic principles of 6.2.15 of EN ISO 12100:2010 shall be observed and - if fitted with saw blades - the requirements of Clause 8 of EN 847-1:2005+A1:2007 apply and in addition:

6.2 Warning and warning devices

If the machine is equipped with a pneumatic/hydraulic supply and isolation of the pneumatic/hydraulic energy is not achieved by the electrical isolation the machine shall be permanently marked with a warning label placed in proximity to the electrical supply disconnection device, warning that the pneumatic/hydraulic supply is not isolated by isolation of the electrical supply.

Permanently marked means for example engraving, etching, embossing or stamping or using a sticker.

The warnings shall either be in the language of the country in which the machine is to be used or wherever possible by using pictograms.

Where an electrical brake with a complex electronic control system is fitted the machine shall be equipped with a warning device e.g. a red warning lamp, indicating a negative test result of braking system (see Annex F).

Verification: By checking the relevant drawings, inspection and functional testing on the machine.

6.3 Marking

6.3.1 Marking of riving knives

The riving knife shall be permanently marked with:

a) its thickness;

b) the range of saw blade diameters for which it is intended;

c) the width of the mounting slot.

Permanently marked means for example, engraving, or etching.

Verification: By checking relevant drawings and visual inspection of the machine.

6.3.2 Marking of the machine

The basic principles of 6.4.4 of EN ISO 12100:2010 shall be observed and in addition:

The following information shall be marked legibly and indelibly throughout the expected life of the machine either directly on the machine e.g. by engraving, etching or by using labels or stickers or a plate permanently affixed to the machine, e.g. by riveting:

a) business name and address of the machine manufacturer and, where applicable, of his authorised representative;

b) year of construction, that is the year in which the manufacturing process is completed;

c) designation of the machinery and designation of series or type;

d) machine identification or serial number (if any);

e) rating information (mandatory for electro-technical products: voltage, frequency, nominal current);

f) where the machine is fitted with a pneumatic system the nominal pressure for the pneumatic circuits;

g) where the machine is fitted with a pneumatic isolator its function, location and operational position(s) e.g. by a label or a pictogram;

h) the maximum and minimum diameter of saw blade and the bore diameter of the saw blade for which the machine is designed;

i) width of the riving knife guiding elements adjacent to the mounting position of the riving knife;

j) on PTO driven machines the speed of the PTO shaft for which the machine is designed.

The labels or pictograms for marking the nominal pressure and the isolators shall be fitted in a position in close proximity to the installed location of the isolators on the machine.

The markings shall either be in the language of the country in which the machine is to be used or wherever possible by using pictograms.

If the machine is equipped with scales the requirements of EN 894-2:1997+A1:2008 shall apply.

Verification: By checking relevant drawings and visual inspection of machine.

6.4 Instruction handbook

The principles of 6.4.5 of EN ISO 12100:2010 shall be observed and in addition the instruction handbook shall include at least:

a) repetition of the markings, pictograms and other instructions on the machine and, if necessary, information about their meaning as required in 6.2 and 6.3;

b) intended use of the machine including reasonably foreseeable misuse;

c) warning regarding residual risks as:

   1) instructions on factors that influence exposure to noise. This includes:

      i) the use of saw blades designed to reduce the emitted noise;

      ii) optimum speed selection;

      iii) saw blade and machine maintenance;

   2) information on factors that influence exposure to dust. This includes:

      i) type of material being machined;

      ii) importance of local extraction (capture at source);

      iii) proper adjustment of hoods/baffles/chutes;

   3) information that during use the machine shall be connected to an external chip and dust extraction system;

      External chip and dust extraction equipment with fixed installations are dealt with in EN 12779:2004+A1:2009;

d) instruction for safe use in accordance with 6.4.5.1 d) of EN ISO 12100:2010. This includes instructions on how the following points can be satisfied:

   1) the floor area around the machine to be level, well maintained and free from loose material e.g. off-cuts;

   2) adequate general or localised lighting to be provided;

   3) logs and sawn workpieces are located safely, but conveniently relative to the machine;

   4) the wear of suitable personal protective equipment when necessary; this may include:

      i) hearing protection to reduce the risk of induced hearing loss;

      ii) respiratory protection to reduce the risk of inhalation of harmful dust;

      iii) a head protector/helmet;

      iv) safety spectacles/eye protection;

      v) safety footware/boots;

      vi) gloves for handling saw blades (saw blades should be carried in a holder wherever practicable);

   5) to stop the machine running whilst unattended;

6) to report faults in the machine, including guards or saw blades, as soon as they are discovered;

7) to adopt safe procedures for cleaning, maintenance and remove chips and dust regularly to avoid the risk of fire;

8) to follow manufacturers instructions for use, adjustment and repair of saw blades;

9) instructions about the correct positioning of the riving knife in relation to the diameter of the saw blade;

10) to select the holding-down device and riving knife correctly to avoid kick-back;

11) take the necessary precautions when using log hooks;

12) to observe the maximum speed marked on the saw blades;

13) to use correctly sharpened saw blades;

14) avoid carrying out re-positioning of the fence toward the saw blade during the operation of the return stroke of the workpiece feed mechanism when a piece of timber is present on the machine table;

15) to ensure that flanges used are suitable for the purpose as stated by the manufacturer (see 5.3.3.1);

16) to refrain from removing any off-cut or other part of the workpiece from the cutting area whilst the machine is running except by using a push stick;

17) take care when removing sawn timber or slabs from the machine table;

18) to ensure that guards and other safety devices necessary for machine operation are in position, in good working order and properly maintained.

e) information that operators are adequately trained in the use, adjustment and operation of the machine;

f) the information described in 5.4.14;

g) the range of saw blade diameters and thicknesses which are suitable for the machine, and guidance to the user on the selection of the correct riving knife for particular saw blade dimensions;

h) a statement that only saw blades manufactured in accordance with EN 847-1:2005+A1:2007 shall be used;

i) that one piece saw blades made of High Speed Steel (HS) shall not be used;

j) the maximum dimensions of the logs which can be machined;

k) the need to ensure that the location of the machine is such that no additional trapping and crushing risk is created between any moving part and other fixed adjacent machine, part of the building or stock (pile) of material;

l) for displaceable (mobile) machines the need to locate and set up the machine correctly before operating;

m) nominal pressure for pneumatic circuits;

n) for machines fitted with a laser: information for the use of lasers together with a repetition of the laser manufacturer instructions for setting and use of the laser (where appropriate);

o) on PTO driven machines the PTO shaft rotational speed and in the case of tractor driven machines the necessary power of the tractor;

p) those safety devices which shall be tested by the user, how frequently the tests shall be carried out and the test method. This shall include at least the following:

   1) emergency stops: by functional testing;

   2) interlocked guards: by opening each guard in turn to stop the machine and by proving inability to start the machine with each guard in the open position;

   3) the brake: by functional testing to check braking is within the specified braking time; (information shall be included, on the braking time of the machine whether electrically, combustion engine or PTO driven);

q) a recommendation that a Residual Current Device (RCD) should be used with all electrically driven displaceable (mobile) machines;

r) information regarding the dust extraction equipment fitted to the machine as follows:

   1) required airflow in $m^3\ h^{-1}$;

   2) pressure drop at each dust extraction connection outlet;

   3) recommended conveying air velocity in the duct in m s-1;

   4) cross section dimensions and details of each connection outlet.

s) information that during indoor use the machine shall be connected to an external chip and dust extraction system;

   External chip and dust extraction equipment with fixed installations are dealt with in EN 12779:2004+A1:2009;

t) a declaration concerning airborne noise emissions by the machinery, either the actual value or a value established on the basis of measurements made on identical machinery, measured in accordance with the methods given in 5.4.2.2.

   1) A-weighted emission sound pressure levels at workstations;

   2) A-weighted sound power level emitted by the machinery;

The declaration shall be accompanied by a statement of the measuring method used and the operating conditions applied during the test and values for associated uncertainty *K* using the dual-number form of declaration in accordance with EN ISO 4871:2009 as follows:

4 dB when using EN ISO 3746:2010 and EN ISO 11202:2010;
2 dB when using EN ISO 3743-1:2010 or EN ISO 3743-2:2009 or EN ISO 3744:2010;
1 dB when using EN ISO 3745:2009

for example, for a sound power level: L_{WA} = xx dB (measured value)
Accompanied uncertainty *K* = 4 dB
Measurement made in accordance with EN ISO 3746:2010.

If the accuracy of the declared emission values is to be checked, measurements shall be made using the same method and the same operating conditions as those declared.

The noise declaration shall be accompanied by the following statement:

"The figures quoted are emission levels and are not necessarily safe working levels. Whilst there is a correlation between the emission and exposure levels, this cannot be used reliably to determine whether or not further precautions are required. Factors that influence the actual level of exposure of the workforce include the characteristics of the work room, the other sources of noise etc. i.e. the number of machines and

other adjacent processes. Also the permissible exposure level can vary from country to country. This information, however, will enable the user of the machine to make a better evaluation of the hazard and risk."

Information on noise emission shall also be provided in the sales literature when performance data are provided:

u) information on conditions necessary to ensure that throughout the foreseeable lifetime the machine including its components cannot overturn or fall or move in an uncontrolled way during transport, assembly, dismantling, disabling and scrapping;

v) the operating method to be followed in the event of accident or breakdown; if a blockage is likely to occur, the operating method to be followed so as to enable the equipment to be safely unblocked;

w) the identification data of the spare parts to be changed by the user, when these affect the health and safety of operators.(parts to be changed only by the manufacturer or personal charged by the manufacturer are excluded);

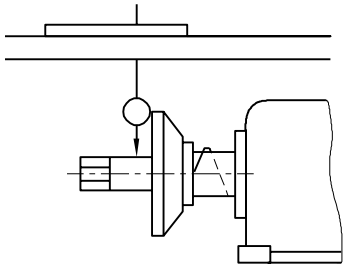
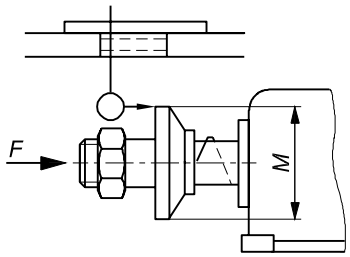
x) information on how to provide protection of people against electrical shock due to indirect contact in the machine by a device for automatic disconnection of the power supply to be installed by the user in the line powering the machine;

y) description of fixed guards which have to be removed by the user for maintenance and cleaning purposes. (guards to be dismounted only by the manufacturer or personal charged by the manufacturer are excluded).

Verification: By checking the instruction handbook and relevant drawings.

Annex A
(normative)

Saw spindle dimensional tolerances

Diagram	Object	Permissible deviation (mm)	Measuring instrument
 Measurement to be made as close as possible to the saw flange	Measuring saw spindle run-out	0,03	Dial gauge
 Apply axial pressure *F* as recommended by manufacturer	Measuring saw flange camming	0,03 for $M \leq 100$ 0,04 for $M > 100$	Dial gauge

Annex B
(normative)

Riving knife mounting Strength test

The machine shall be fitted with the largest saw blade for which it is designed set in its highest position. The riving knife shall be positioned so that its tip is at the same level as the highest point on the periphery of the saw blade and securely tightened with a tightening torque of 25 Nm. A horizontal load of 500 N is applied to the tip (see Figure B.1). In order to comply with this test, the deflection *A* shall not be greater than 2,0 mm.

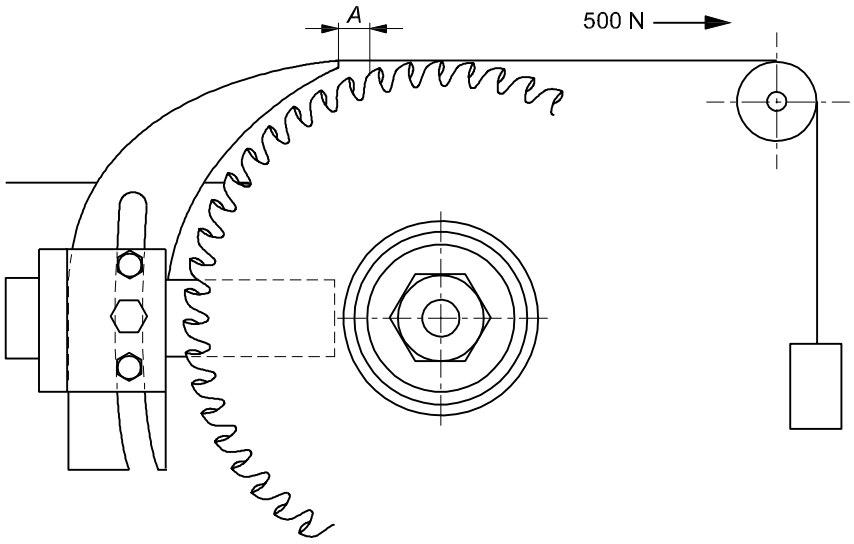


Figure B.1 — Riving knife mounting strength test

Annex C
(normative)

Riving knife lateral stability test

With the riving knife securely tightened in position to suit the maximum diameter saw blade for which the machine is designed, a horizontal load of 30 N is applied to the tip as shown in Figure C.1. The maximum deflection *d* shall not exceed 8 mm.

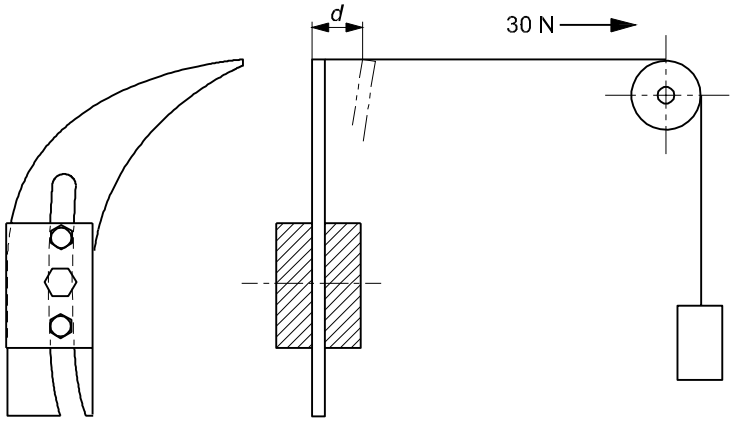


Figure C.1 — Riving knife stability test

Annex D
(normative)

Operating conditions for noise emission measurement

D.1 Operating conditions

The operating conditions for the measurement of airborne noise emitted by single blade circular log sawing machines with integrated feeding table and manual loading and/or unloading shall be typical for the type of work expected to be carried out on the machine and as follows (see also 5.4.2):

a) all integral auxiliary units, e.g. power feed, pneumatic clamping, shall be in operation during testing;

b) all relevant guards, safety devices, integral sound enclosures, etc shall be in position during testing;

c) extraction shall be 'on' during testing in the working condition, but the influence of the noise of the extraction plant shall be excluded or reduced as far as possible, e.g. by the use of baffles or taking into account, e.g. background noise correction;

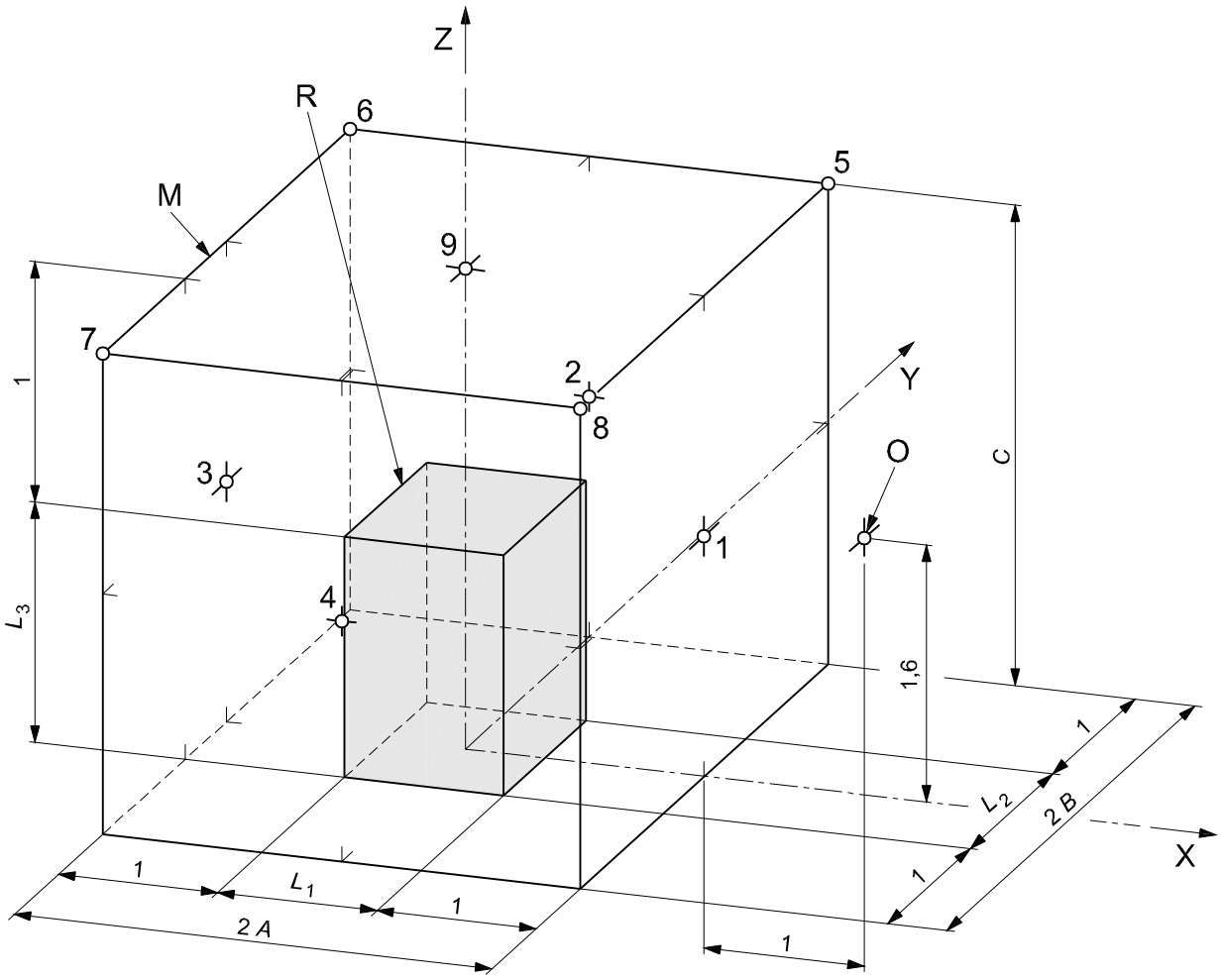
d) where the machine is greater than 7,0 m in length or width or 3,0 m in height, instead of the sound power level the equivalent continuous sound pressure level at specified positions around the machine shall be declared, at a distance of 1,0 m from the surface of the machine, and at a height of 1,6 m from the floor, or access platform;

e) the machine shall be fitted either with the saw blade delivered with the machine by the manufacturer or with a saw blade with the maximum dimensions for which the machine is designed;

f) on PTO-driven machines the saw blade shall run at the maximum speed corresponding to the speed of the PTO shaft indicated by the manufacturer;

g) the workpiece shall be a round log of spruce with a medium diameter of 300 mm $\pm$ 10 % and a length of at least 4 000 mm. The feed speed shall be the maximum for that workpiece;

h) the microphone positions 1 - 9 and the operator position shall be as shown Figure D.1 and declared.



Key

M	measurement surface
O	operator position
R	reference box
1-9	microphone positions for sound power level measurement

Figure D.1 — Microphone positions

D.2 General data sheet

Machine data	Make: ..... Model: ..... Year of manufacture: ..... Serial n°: ..... Overall dimensions of machine [5)] Length l_1: ..... mm Width l_2: ..... mm Height l_3: ..... mm		
Machine installation			Remarks/description
	Machine installed according to manufacturer's recommendations	yes ☐ no ☐	....
	Machine installed with dust extraction in accordance with manufacturer's specifications	yes ☐ no ☐	....
	Machine mounted on vibration damping/isolation material	yes ☐ no ☐	....
	Machine fitted with separate noise enclosure	yes ☐ no ☐	....
	Other noise control measures	yes ☐ no ☐	....

5) Those elements which protrude from the machine and which are not likely to contribute to the noise emission, e.g. handwheels, etc., may be disregarded.

Tool and cutting data		Standard condition(s)	Condition chosen within permitted range or conditions deviating from standard
	Saw blade diameter	mm	.....
	Saw blade rotational speed	min^{-1}	.....
	Saw blade cutting speed	$m\ s^{-1}$	.....
	Saw blade width	mm	.....
	Feed speed	$m\ min^{-1}$	.....
Testing material	Material : Softwood, medium grade e.g. spruce Moisture content : 14 - 25% Material diameter : 300 mm Material length : 4 000 mm (minimum) Previous processing : none		
Photo or detailed illustration of the machine tested			
Testing laboratory	Firm/Institution: ..... Address: ..... Telephone: ..... Date: ..... Signature: ..... Test carried out: Place: ..... Date:		

Annex E
(normative)

Braking tests

E.1 Conditions for all tests

a) The spindle unit shall be set in accordance with the manufacturer's instructions (e.g. belt tension);

b) when selecting the speed and the saw blade, conditions shall be chosen which create the greatest kinetic energy for which the machine is designed;

c) warm up the spindle unit for at least 15 min by running the machine under no load before beginning the test;

d) verify that the actual spindle speed is within 10 % of the intended speed;

e) the speed measuring equipment shall have an accuracy of at least ± 1% of full scale.

E.2 Tests

E.2.1 Run-up time

The run-up time shall be measured as follows:

a) cut power to the saw spindle drive motor and allow the spindle to come to a complete stop;

b) re-start the saw spindle drive motor and measure the run-up time;

c) repeat steps a) and b) twice more.

The run-up time of the saw spindle is the average of three measurements taken.

E.2.2 Un-braked run-down time

The un-braked run-down time shall be measured as follows:

a) start the saw spindle drive motor and run at the intended speed (no load) for 1 min;

b) cut power to the saw spindle drive motor and measure the un-braked run-down time;

c) repeat steps a) and b) twice more.

The un-braked run-down time of the saw spindle is the average of three measurements taken.

E.2.3 Braked run-down time

The braked run-down time shall be measured as follows:

a) start the saw spindle drive motor and run at the intended speed (no load) for 1 min;

b) cut power to the saw spindle drive motor and measure the braked run-down time;

c) allow the saw spindle to remain stationary for $\left(\frac{P}{7.5}\right)$2 min (where P is the motor power (rated input) in kW). The re-start interval shall not be less than 1 min;

d) repeat steps a) to c) nine times.

The braked run-down time of the saw spindle is the average of ten measurements taken.

Annex F
(normative)

Impact test method for guards

F.1 General

This annex defines tests for guards used in order to minimise risks of ejection of parts of saw blade or of work pieces out of the working zone.

This annex applies to guards as well as on samples of guards' materials.

F.2 Test method

F.2.1 Preliminary remarks

This test method reproduces the hazard of the ejection of cutter-blocks parts or of work pieces. The test allows to estimate the resistance/strength of guards and/or samples of guard materials against penetration and dislodgement from the machine by ejected parts from machine or work piece.

F.2.2 Testing equipment

The testing equipment comprises a propulsion device, a projectile, a support for the test object and a system that allows to measure or record the impact speed with an accuracy of ± 5 %.

F.2.3 Projectile for guards

The projectile shall be a ball of 8 mm diameter made from steel with the following properties:

a) tensile strength: R_m = 560 N mm^{-2} to 690 N mm^{-2};

b) yield strength: $R_{0,2} \geq 330$ N mm^{-2};

c) elongation at rupture: $A \geq 20$ %;

d) hardened to $56\,^{+4}_{0}$ HRC over depth of at least 0,5 mm.

F.2.4 Sampling

The test is carried out with the guard and/or a sample of the guard material. The guard support shall be equivalent to the guard mounting on the machine. For testing guard materials samples may be used, fixed on a frame with an inner opening of 450 mm × 450 mm. The frame shall be sufficiently rigid. The mounting of the sample shall be by non positive clamping.

F.2.5 Test procedure

The impact test shall be executed with projectile indicated in F.2.3 and an impact speed of 70 m s^{-1} ± 5 %.

Impact shall be as square to the material sample surface or the guard surface as possible. The targets for the projectiles shall be the weakest and most unfavourable spot on the guard or the centre on material sample.

F.3Results

After the impact, damages found on the guard or material shall be assessed as follows:

a) buckling/bulging (permanent deformation without crack);

b) incipient crack (visible only on one surface);

c) through crack (crack visible from one surface to the other);

d) penetration (projectile penetrating the test object);

e) guard window loosened from its fixing;

f) guard loosened from guard support.

F.4Assessment

The test is passed if there is no through crack or penetration of the test object and if there are no damages e) and f) in accordance with the requirements of F.3.

F.5Test report

The test report shall give the following minimum information:

a) date, place of the test and name of the testing institute;

b) projectile mass, dimensions, speed;

c) applicant identification;

d) design, material and dimensions of the test object;

e) clamping or fixing of the test object;

f) direction of shock, point of impact of the projectile;

g) test result;

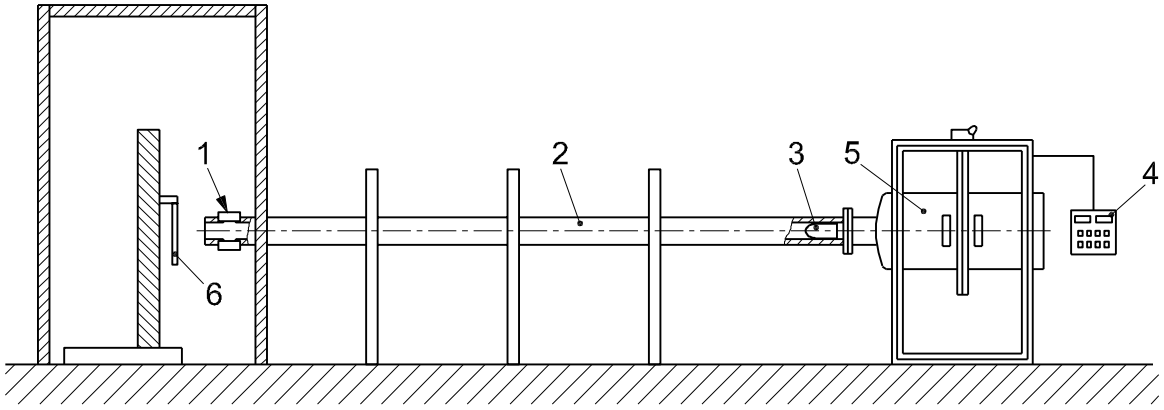
h) test according to EN 1870-7:2012, Annex F.

F.6Test equipment for impact test

The propulsion device consists of a compressed air vessel with flanged gun barrel (see Figure F.1). The compressed air may be released by a valve to accelerate the projectile toward the test object.

The air gun is fed by an air compressor. The speed of the projectile may be controlled by the pressure of the air.

The projectile speed is measured near the nozzle of the gun barrel by a suitable speedometer e.g. by proximity sensor or photocell.



Key

1 speedometer
2 gun barrel
3 projectile
4 control panel
5 compressed-air vessel
6 test object

Figure F.1 — Example of equipment for impact test

Annex ZA
(informative)

Relationship between this European Standard and the Essential Requirements of EU Directive 2006/42/EC

This European Standard has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association to provide one means of conforming to Essential Requirements of the New Approach Machinery Directive 2006/42/EC.

Once this standard is cited in the Official Journal of the European Union under that Directive, compliance with the normative clauses of this standard, confers, within the limits of the scope of this standard, a presumption of conformity with the relevant Essential Requirements of that Directive and associated EFTA regulations.

WARNING — Other requirements and other EU Directives may be applicable to the product(s) falling within the scope of this standard.

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[4] HD 22.1 S4:2002, *Cables of rated voltages up to and including 450/750 V and having cross-linked insulation — Part 1: General requirements*

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