BS EN 1870-8:2012

BSI Standards Publication

Safety of woodworking machines — Circular sawing machines

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

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National foreword

This British Standard is the UK implementation of EN 1870-8:2012. It supersedes BS EN 1870-8:2001+A1:2009 which is withdrawn.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.

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Safety of woodworking machines - Circular sawing machines - Part 8: Single blade edging circular rip sawing machines with power driven saw unit and manual loading and/or unloading

Sécurité des machines pour le travail du bois - Machines à scies circulaires - Partie 8: Déligneuses mono-lames à déplacement mécanisé du groupe de sciage et à chargement et/ou déchargement manuel

Sicherheit von Holzbearbeitungsmaschinen - Kreissägemaschinen - Teil 8: Einblattbesäum- und Leistenkreissägemaschinen mit kraftbetätigtem Sägeaggregat und Handbeschickung und/oder Handentnahme

This European Standard was approved by CEN on 1 September 2012.

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This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

Management Centre: Avenue Marnix 17, B-1000 Brussels

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Foreword

This document (EN 1870-8:2012) 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of an identical text or by endorsement, at the latest by May 2013, and conflicting national standards shall be withdrawn at the latest by May 2013.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 1870-8:2001+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 the Machinery Directive.

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

The main modifications to the previous version concern inclusion of performance levels (PL).

Organisations contributing to the preparation of this European Standard 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* (the present document);

— *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 (manual radial arm saws);*

— *Part 18: Dimension saws* (at Formal Vote 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 covered are indicated in the scope of this document.

The requirements of this document are directed to manufacturers and their authorised representatives of single blade edging circular rip sawing machines with power driven saw unit and manual loading and/or unloading. This document is also useful for designers and importers.

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 according to the provisions of this type C standard.

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 edging circular rip sawing machines with power driven saw unit and manual loading and/or unloading, hereinafter referred to as “machines”, designed to cut solid wood, chipboard, fibreboard and plywood when they are used as intended and under the conditions foreseen by the manufacturer including reasonably foreseeable misuse.

This document applies to machines where the workpiece is stationary, the vertical and horizontal movements of the saw unit are power driven, and where the machine is provided with workpiece clamping. The workpiece may or may not be clamped during cutting.

This document does not apply to machines:

— where the workpiece is fed to the saw blade during cutting;

— designed for cutting veneers;

— provided with a device situated behind the line of cut, which moves in a direction parallel to the line of cut, for automatically unloading the workpiece during the return of the saw unit to the rest position.

This document is not applicable to machines manufactured before its date of 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 349:1993+A1:2008, *Safety of machinery —Minimum gaps to avoid crushing of parts of the human body*

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 286-2:2010, *Geometrical product specifications (GPS) — ISO code system for tolerances on linear sizes — Part 2: Tables of standard tolerance classes and limit deviations for holes and shafts (ISO 286-2:2010)*

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)*

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.

EN ISO 3745:2009, *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)*

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)*

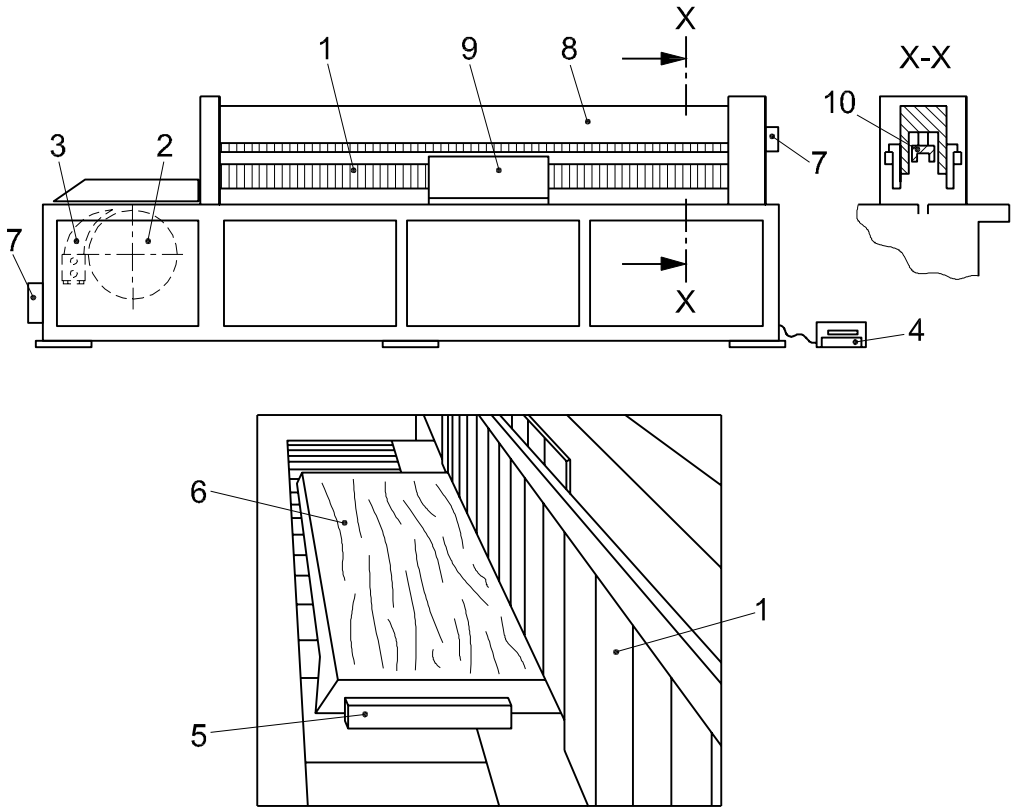
EN ISO 13857:2008, *Safety of machinery — Safety distances to prevent hazard zones being reached by upper and lower limbs (ISO 13857:2008)*

ISO 79601995, *Airborne noise emitted by machine tools — Operating conditions for woodworking machines*

3 Terms and definitions

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

NOTE The main parts of manually loaded and/or unloaded single blade edging circular rip sawing machines with power driven saw unit and their terminology are illustrated in Figure 1.



Key
1 sectional safety curtain
2 saw blade in rest position
3 riving knife
4 foot-pedal
5 workpiece end stop
6 workpiece
7 extraction outlet
8 sectional safety curtain support
9 front deterring/impeding device (on machines with raising and lowering of the saw unit at alternative positions)
10 workpiece clamping device (pressure beam) (optional)

Figure 1 — Terminology of machine parts

3.1
single blade edging circular rip sawing machines with power driven saw unit and manual loading and/or unloading
machine where the workpiece is supported in the horizontal plane during cutting, the saw unit is mounted below the workpiece and the cutting stroke is power driven

Note 1 to entry: The saw blade is automatically raised through the slot in the worktable and is retracted from the workpiece for the return stroke. The machine is designed to cut against the feed in a single straight line only (see Figure 1).

The machine may have any of the following features:

- adjustment of the height of the saw unit;
- limitation of the cutting stroke length;
- workpiece clamping;

- the facility to vary the feed speed;
- powered movement of the fence;
- the facility to allow raising and lowering of the saw unit at alternative positions;
- the facility for multiple cutting.

3.2
workpiece end stop
adjustable end stop to hold the workpiece in the direction of the line of cut

Note 1 to entry: See Figure 1.

3.3
saw unit rest position
position to which the saw unit returns at the end of each cutting cycle

Note 1 to entry: See Figure 1.

3.4
sectional safety curtain
device to prevent inadvertent access to the saw blade during the cutting stroke

Note 1 to entry: See Figure 1.

3.5
workpiece clamping device
optional device which extends over the full cutting length of the machine

Note 1 to entry: Clamping can be achieved either by a pressure beam between the sectional safety curtains (see Figure 1) or the sectional safety curtain support is designed to also be the clamping device.

3.6
multiple cutting
cutting where the fence position is controlled so as to allow several cutting strokes for the same workpiece

3.7
machine actuator
power mechanism used to effect motion of the machine

3.8
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.

3.9
ejection
unexpected movement of the workpiece or parts of it or part of the machine from the machine during processing

3.10
run-up time
time elapsed from the actuation of the start control device until the spindle reaches the intended speed

3.11
run-down time
time elapsed from the actuation of the stop control device up to spindle standstill

3.12
manual loading of edging circular rip saws
operation, where the operator positions the workpiece on the workpiece support at the cutting position i.e. there is no intermediate loading device to receive and transfer the workpiece from the operator to the cutting position

3.13
manual unloading of edging circular rip saws
operation, where the operator removes the workpiece from the workpiece support at the cutting position, i.e. there is no intermediate unloading device to transfer the workpiece from the cutting position to the operator

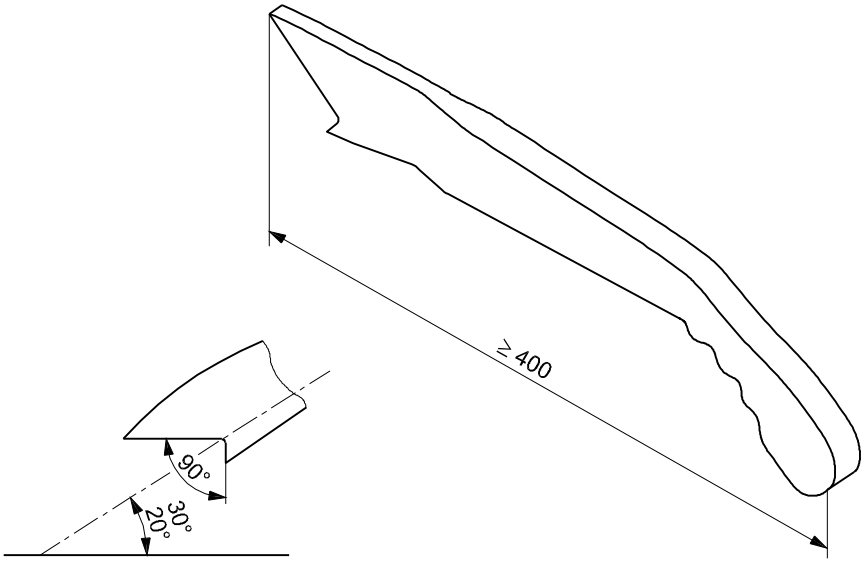
3.14
speed range
range of speeds for which the saw spindle or integrated feed are designed to operate

3.15
information from the supplier
statements, sales literature, leaflets or other documents where the manufacturer (or supplier) declares either the characteristics or the compliance of the material or product to a relevant standard

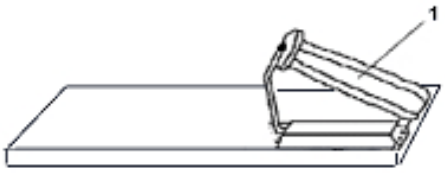
3.16
safety appliance
additional device which is not an integral part of the machine but which assists the operator in the safe feeding of the workpiece

Note 1 to entry: See Figure 2.

Dimensions in millimetres



a) Example of push stick



b) Example of push block

Key

1 push block handle

Figure 2 — Example of push stick and push block

3.17
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	5.2.11, 5.3.3, 5.3.5, 5.3.7, 5.3.8, 5.3.9
	b) relative location;		5.2.2, 5.2.3, 5.3.5, 5.3.7, 5.3.8
	c) mass and stability (potential energy of elements which may move under the effect of gravity)		5.3.6
	d) mass and velocity (kinetic energy of elements in controlled or uncontrolled motion);		5.3.6
	e) mechanical strength.		5.3.2, 5.3.3, 5.3.5, 5.3.6
	- accumulation of energy inside the machinery:		
	f) elastic elements (springs), or	6.2.10, 6.3.5.4	5.3.8
	g) liquids and gases under pressure;	6.2.10, 6.3.5.4	5.4.7, 5.4.8
1.1	Crushing hazard		5.2.8, 5.2.11, 5.3.7, 5.3.8
1.2	Shearing hazard		5.3.7
1.3	Cutting or severing hazard		5.3.4, 5.3.7, 5.3.8, 5.3.9
1.4	Entanglement hazard		5.3.7
1.5	Drawing-in or trapping hazard		5.3.7, 5.3.9
1.9	High pressure fluid injection or ejection hazard	6.2.10, 6.3.5.4	5.3.7, 5.3.8
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
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
4.2	Interference with speech communication, acoustic signals.		5.4.2
6	**Hazards generated by radiation**		
6.5	Lasers	6.3.4.5	5.4.11

Table 1 *(continued)*

No	Hazards, hazardous situations and hazardous events	EN ISO 12100:2010	Relevant subclause of this document
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, 5.4.3, 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
9	**Combination of hazards**	6.3.2.1	5.2.7
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, 5.2.11
10.2	Restoration of energy supply after an interruption	6.2.11.4	5.2.10, 5.2.11
10.3	External influences on electrical equipment	6.2.11.11	5.2.1, 5.4.4, 5.4.10
10.6	Errors made by the operator (due to mismatch of machinery with human characteristics and abilities, see 8.6 above)	6.2.8, 6.2.11.8, 6.2.11.10, 6.3.5.2, 6.4	5.2.1, 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	5.2.2, 5.2.4, 5.2.5
13	**Failure of the power supply**	6.2.11.1, 6.2.11.4	5.2.10
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	5.4.12
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, 5.3.8
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 the requirements of at least 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 5.2.6, 5.2.7, 5.2.8, 5.2.11, 5.3.7 and 5.3.8);

— interlocking with guard locking: PL=c (see 5.3.7);

— hold-to-run control device: PL= c (see 5.2.8 and 5.2.11);

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

— the trip bar: PL=c (if provided) (see 5.3.8);

— clamping: PL=c (if provided) (see 5.3.8);

— infinitely variable speed changing: PL=c (if provided) (see 5.2.9);

— speed limitation of powered fence movement (if provided): PL=c (see 5.3.6.1).

For all components exposed to environmental conditions, e.g. dust, fumes and/or gases, these conditions shall be taken into account.

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 EN 1088:1995+A2:2008, 6.3, 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

Hand operated controls shall be situated in the shaded area *Y* or *Z* shown in Figure 3. Where the control for the cutting stroke is situated in the shaded area *Z*, it shall not be positioned behind the saw cutting line.

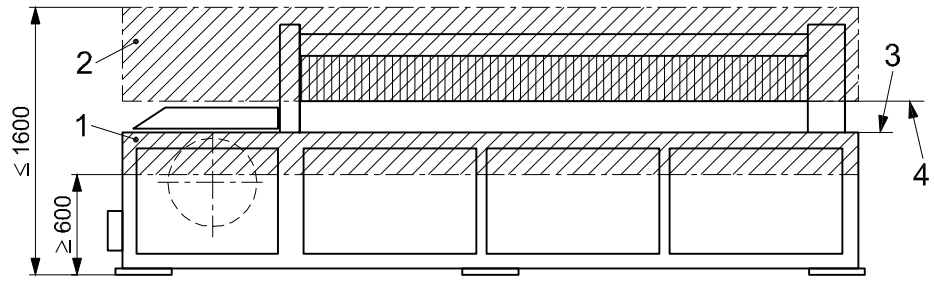
An emergency stop control shall be positioned on the main control panel.

In addition, emergency stop controls shall be provided every 2 m, or a pull cord operated switch shall be provided along the full length of the machine. These controls shall be located in the area shaded *Z* in Figure 3 and not behind the saw cutting line.

For positioning of the control for the cutting stroke on machines designed for multiple cutting, see 5.2.11.

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

Dimensions in millimetres



Key
1 area *Y*
2 area *Z*
3 table surface
4 bottom edge of sectional safety curtain in its highest position

Figure 3 — Position of controls

5.2.3 Starting

See EN 60204-1:2006, 9.2.5.2, first and second sentence and in addition:

For the purposes of this document "all the safeguards in place and functional" is achieved by the interlocking arrangements described in 5.3.7 and "operation" means rotation and/or powered adjustment of any saw spindle and/or any workpiece holding device and/or saw unit cutting stroke.

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

The cutting stroke shall be under manual control. This control shall be a hold-to-run control device and protected against inadvertent operation e.g. by a shrouded control device.

See also 5.2.6 for initiation of the cutting stroke

The sequence of the cutting stroke shall be as follows:

— the sectional safety curtain shall be lowered to its lowest position before the cutting stroke can be initiated;

— the saw blade shall have reached its retracted position below the table before the upward movement of the sectional safety curtain is initiated;

— the saw blade shall have reached its retracted position below the table before the return stroke of the saw unit is initiated.

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

A new cycle shall only be capable of being started when the previous cycle is complete and the hold-to-run control is released.

The safety related part of the control circuits (see also 5.2.1) for starting including the hold-to-run control 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

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

NOTE 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.

This stop control shall be of category 1 in accordance with the requirements of EN 60204-1:2006, 9.2.2.

When initiated the stopping sequence shall be:

a) stop the saw unit traversing movement and lower the saw blade below the table;

b) stop saw blade rotation (the saw unit may return to its rest position) and activate the brake if fitted;

c) release clamp where fitted;

d) return the sectional safety curtain to its upper position;

e) maintain guard locking until the saw blade is stationary;

f) cut power to all machine actuators.

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

The safety related part of the control circuits (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 positioned in accordance with the requirements of 5.2.2, 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. 10.7.4 of EN 60204-1:2006 does not apply (see also 5.2.11).

NOTE 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.

The stop function shall be of category 1 in accordance with 9.2.2 of EN 60204-1:2006, and the stopping sequence shall be:

a) stop the saw blade traversing movement and lower the saw blade below the table;

b) stop saw blade rotation and activate the brake (if fitted);

c) maintain guard locking until the saw blade is stationary;

d) cut power to all machine actuators.

The stopping sequence shall be satisfied at the level of the control circuits. 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. Either the time delay shall be fixed, or the time delay adjustment device shall be sealed.

The safety related part of the control circuits (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 the relevant drawings and/or circuit diagrams, inspection and relevant functional testing of the machine.

5.2.6 Integrated feed

The cutting stroke of the saw unit shall not operate unless the rotation of the saw spindle is initiated. Initiation of the saw blade stop control shall also stop the integrated feed.

Where it is necessary to move the saw unit to its rest position with the guards open e.g. for the removal of jammed off-cuts, this shall be only possible using a hold-to run control device and with power removed from the saw spindle drive motor.

The safety related part of the control circuits (see also 5.2.1) for hold-to-run control and the interlocking arrangement 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 on the machine.

5.2.7 Saw blade changing

On machines where the saw blade can only be changed when the saw unit is in a defined position, a control device shall be provided to allow the movement of the saw unit. If the saw blade changing position is selected, no other machine actuator shall be capable of movement (see also 5.3.7.1).

The safety related part of the control circuits (see also 5.2.1) for saw blade changing position and the interlocking arrangement 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 on the machine.

5.2.8 Speed control

On machines fitted with a device (e.g. a frequency inverter) for infinitely variable speed control for the saw blade, the device shall be such that it does not allow the actual speed to exceed the selected speed by more than 10 %.

The selected speed shall be indicated at the control position.

The safety related part of the control system for speed control shall be at least PL=c in accordance with the requirements of EN ISO 13849-1:2008. The actual speed of the main saw blade spindle shall be compared with the selected speed continuously. If the actual speed exceeds the selected speed by more than 10 % the saw blade shall automatically stop rotating. The sensor for the actual speed shall be tested at selected speed –10 % at each starting of the saw unit. The processor used for this purpose shall have an external watch dog function. Upon negative test the saw blade shall be stopped.

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

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

5.2.9 Control duplication

The requirements of EN ISO 12100:2010, 6.2.11.8 shall apply.

Where the machine is fitted with control duplication provided for operation of the saw-blade drive motor and/or the integrated feed, the control circuits shall only allow one control to be effective at a given time.

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

5.2.10 Failure of the power supply

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

In the event of failure of the power supply the saw blade shall automatically drop below the table, except when the saw blade is in the upper position for saw blade changing.

The automatic restart of the machine shall be prevented after restoration in the case of supply interruption of the pneumatic or hydraulic energy (where fitted).

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 the relevant drawings and/or circuit diagrams, inspection and relevant functional testing on the machine.

5.2.11 Powered movement of the saw blade and/or fences

Any powered movement for adjusting the saw blade and/or the fence(s) i.e. rip fence shall be initiated by a start command from the operator.

Any powered movement of the fence toward the saw blade shall:

a) be controlled by a hold-to-run device (see EN 60204-1:2006, 9.2.5.6) except where the position of the fence is selected under numeric control;

b) not be possible during the cutting stroke.

Initiation of any powered movements for the saw blade and fence shall be via an initiation control device (e.g. push button or an enabling device) the control circuit of which conforms to at least PL=c in accordance with the requirements of EN ISO 13849-1:2008.

The control circuits for each powered movements speed shall conform to at least PL=b in accordance with the requirements of EN ISO 13849-1:2008.

Where powered movements are controlled by a hold-to-run control device only one powered movement shall be possible at a time and a stop control shall be positioned in the vicinity of the hold-to-run control device taking account of basic principles of 6.2.11.8 b) of EN ISO 12100:2010. The corresponding safety related part of the control system shall conform to at least PL=c in accordance with the requirements of EN ISO 13849 1:2008. Where the control circuit for the hold-to-run control device conforms to PL=c in accordance with the requirements of EN ISO 13849-1:2008 the hold-to-run control device and the enabling control device may be merged together.

Where powered movements are under pre-set electronic control more than one movement at a time is possible if the initiated movements do not lead to a collision between the moving machine parts or between the moving and fixed machine parts e.g. the direction of the moving machine part is out of the collision area.

For stopping the powered movements the following requirements shall be met:

1) on release of hold to run control devices (e.g. for + or – movements) the powered movement shall stop and power shall be cut to powered movements motors at least after a controlled delay;

2) for powered movements under pre-set electronic control the power shall automatically be cut off to powered movements motors when the target position is reached or when the powered movement stop control device is activated;

3) stopping of any powered movement shall conform to at least PL=c in accordance with the requirements of EN ISO 13849-1:2008, including a time delay (where necessary); the stopping action shall include disconnection from energy supply unless STO according to EN 61800-5-2:2007 is used.

The speed for the powered movement of the fence(s) shall be $\leq$ 25 m min^{-1}.

Where the position of the fence is selected under numeric control the following requirements shall be met:

i) the powered movement of the fence shall be initiated by a start command by the operator; this control shall be hard-wired up to the input to the fence positioning motor, i.e. the function shall not depend on the operation of programmable electronic equipment;

ii) the machine shall be designed so as to prevent crushing between the fence and fixed parts of the machine, as defined in EN 349:1993+A1:2008.

Machines designed for multiple cutting shall meet the following additional requirements:

— a selection switch for single/multiple cutting shall be provided and shall unambiguously indicate the type of cutting i.e. single or multiple cutting;

— the table, or table plus extension, at the front of the machine shall have a dimension, measured from the line of cut, which is at least equal to the full stroke of the fence movement;

— the position of the hold-to-run control device, e.g. foot pedal, shall be accessible from any position of the operator;

— if the emergency stop controls required in 5.2.2 are not accessible from any operator position, an additional accessible emergency stop control shall be provided.

The safety related part of the control circuits (see also 5.2.1) for the 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, measurement and relevant functional testing on the machine.

5.3 Protection against mechanical hazards

5.3.1 Stability

Machines and auxiliary equipment shall be provided with the facility, e.g. holes, for fixing them to the floor or other structure (see also 6.4).

Verification: By checking the relevant drawings and inspection.

5.3.2 Risk of break-up during operation

The guards for the saw blade, excluding the sectional safety curtain, 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 G;

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 G 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.

See also 6.4.

5.3.3.2 Geometrical performance

The saw blade spindle shall be manufactured to at least the requirements given in Annex A.

The part of the spindle upon which the saw blade is located shall have a tolerance of at least g6 in accordance with the requirements of EN ISO 286-2:2010.

Verification: By checking the relevant drawings and measurement.

5.3.3.3 Strength

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.

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

5.3.3.4 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.

5.3.3.5 Saw blade fixing

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

For saw blades with a diameter of ≤ 450 mm, the diameter of both flanges (or flange for flush mounting) shall be at least *D*/4 (where *D* = the diameter of the largest saw blade for which the machine is designed).

For saw blades with a diameter > 450 mm, the diameter of both flanges (or flange for flush mounting) shall be at least *D*/6, but not less than 125 mm.

For flanges other than those for flush mounted saw blades the clamping surface at the outside part of flange shall be at least 5 mm in width and the flange(s) shall be recessed to the centre (see Figure 4).

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

Precautions shall be taken to ensure that the saw blade does not come loose during start-up, running, run-down or braking e.g. by using a positive connection between the spindle and the saw blade (e.g. a key) or by using a positive connection between the front saw flange and the saw spindle.

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

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

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

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

Dimensions in millimetres

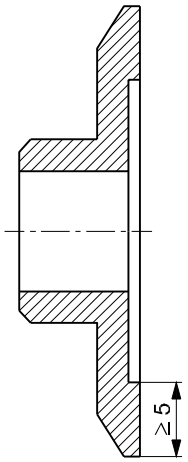


Figure 4 — Saw flange detail

5.3.4 Braking

5.3.4.1 General

An automatic brake shall be provided for the saw spindle where the un-braked run-down time is more than 60 s. The braking time shall be less than 60 s.

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

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

A PL_r 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 g)).

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

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 circuit for braking shall be tested periodically, e.g. by monitoring braked run down time. The feedback

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 %.

NOTE 1 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, 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 2 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 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 F apply.

5.3.4.2 Brake release

Where a control is provided to release the spindle brake in order to enable rotation by hand and adjustment of the saw blade, release of the brake shall only be possible when the spindle has stopped turning (e.g. by a time delay conform with 5.2.1.2 b) between control actuation and brake release).

It shall not be possible to start the machine before the control for the spindle brake has been reset. Reset of the control for brake shall not initiate a start-up of the machine.

The safety related part of the control systems for brake release and interlocking function shall be at least PL=b in accordance with the requirements of EN ISO 13849-1:2008.

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

5.3.5 Devices to minimise the possibility or the effect of ejection

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

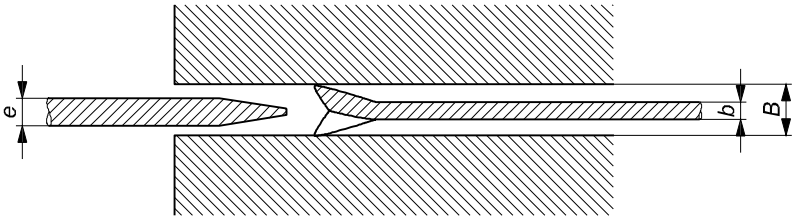
Verification: By checking the relevant drawings, instruction handbook and inspection of the machine.

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 0,1 mm in 100 mm) and shall have a thickness between the width of the saw blade plate and the kerf (width of saw teeth) (see Figure 5).

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.



Key
e Riving knife thickness
B Width of cut
b Width of saw blade

Figure 5 — 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 6) and the riving knife shall be of constant thickness (within ± 0,05 mm) throughout its working length.

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

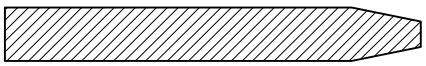


Figure 6 — Chamfered leading edge of riving knife

c) the riving knife shall be capable of vertical adjustment so that its tip reaches a point level with or higher than the highest point on the periphery of the saw blade when set in accordance with the requirements of this document (see Figure 7).

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

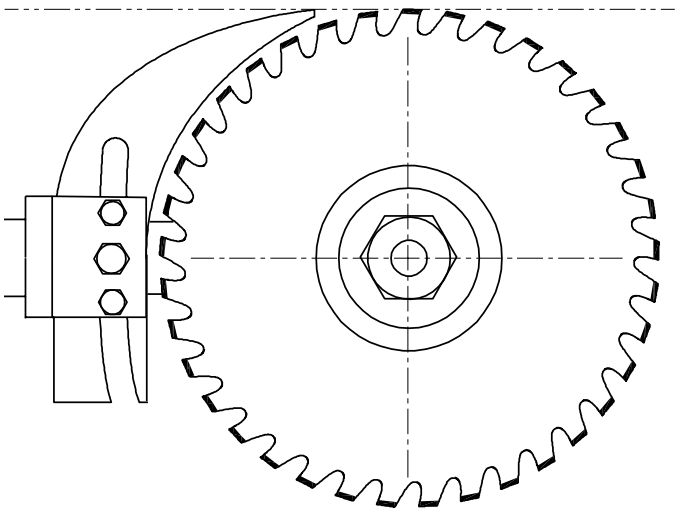


Figure 7 — Riving knife height adjustment

d) the riving knife shall be so designed that when it is mounted and adjusted so that its closest point to the saw blade is 3 mm, then at no point shall the gap between the saw blade and the riving knife exceed 8 mm measured radially through the centre of the saw blade spindle (see Figure 8).

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

Dimensions in millimetres

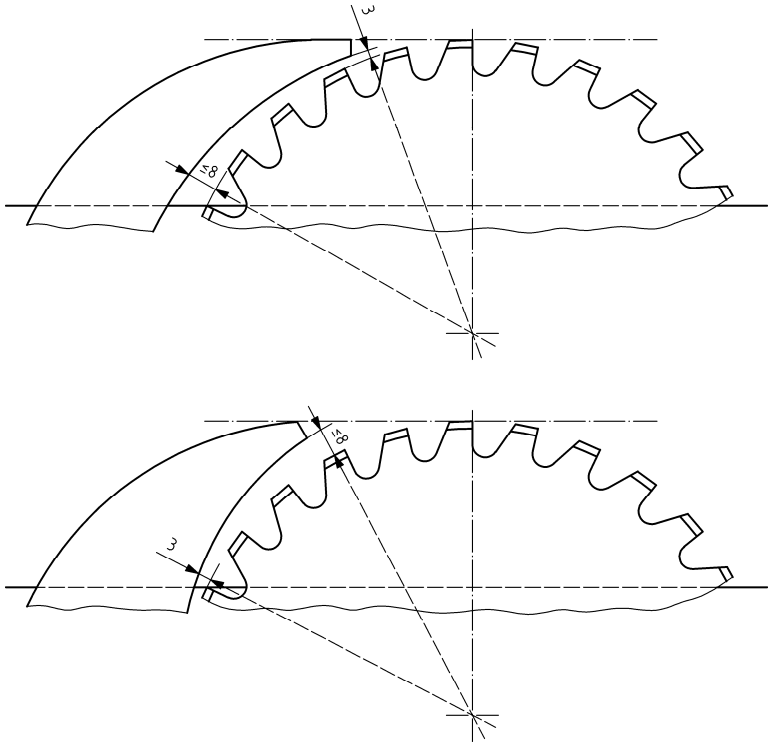
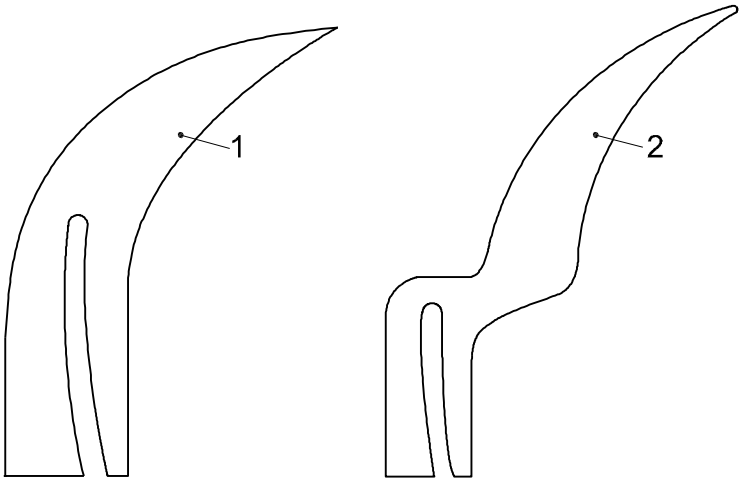


Figure 8 — Riving knife positioning limits

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 9).

Verification: By checking the relevant drawings and inspection.

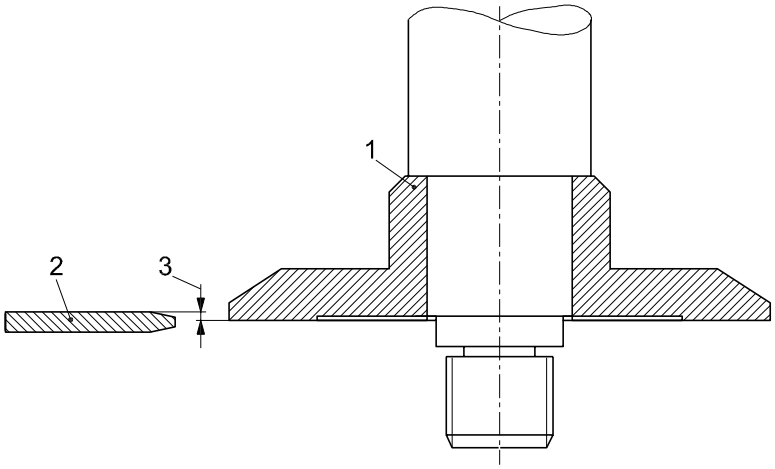


Key
1 example of acceptable riving knife shape
2 example of unacceptable riving knife shape

Figure 9 — 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 is in accordance with the tolerance shown in Figure 10; the relative position of the riving knife and the fixed saw blade flange shall be maintained with the rise, fall and tilt of the saw blade.

Verification: By checking the 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 10 — Position of riving knife in relation to the fixed saw flange

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

Verification: By checking the relevant drawings and carrying out the test in accordance with Annex B;

h) the riving knife shall either conform with the lateral stability test shown in Annex C or the width of the riving knife on each side of the riving knife slot within the fixing area shall be designed in accordance with the requirements of the following formula:

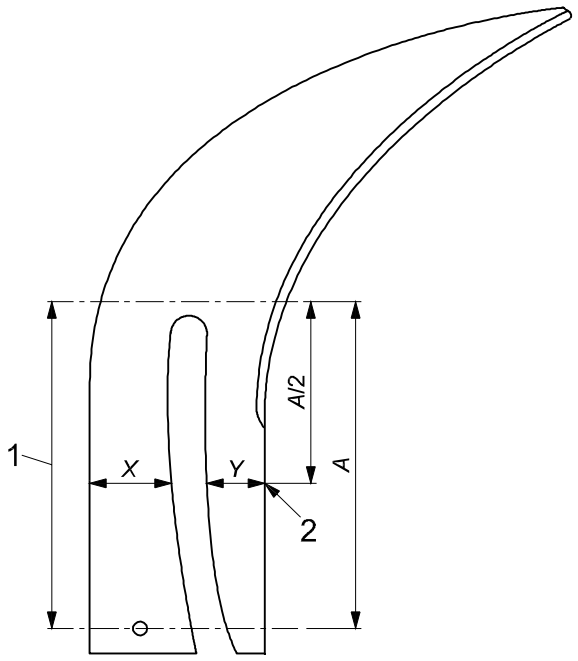
$$X + Y \geq \frac{D_{\max}}{6}$$

where: $X = Y \pm 0{,}5Y$

D_{max} is the largest saw blade diameter for which the machine is designed.

X and Y shall be measured midway along the riving knife fixing slot in the fixing area (see Figure 11).

Verification: Carry out, as appropriate, the test at Annex C or check relevant drawings, inspection and measurement;



Key
1 fixing area
2 measuring point

Figure 11 — Width of riving knife at fixing slot

i) the riving knife shall be held in position by guiding elements e.g. guiding pins (see Figure 12); the riving knife fixing slot shall be no more than 0,5 mm wider than the guiding elements.

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

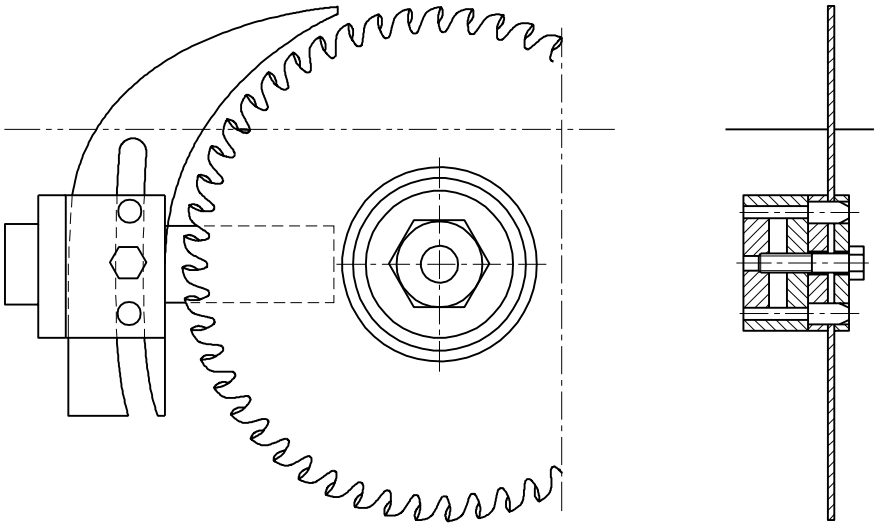


Figure 12 — Example of riving knife fixing arrangement

j) where it is necessary to change the riving knife to accommodate different widths of saw blade, the riving knife fixing slot shall be open ended.

Verification: By checking relevant drawings and inspection.

5.3.6 Workpiece supports and guides

5.3.6.1 Fence

Where a fence is provided, it shall meet the following requirements:

a) where the guiding part of this fence has a possibility to contact the saw blade, this part of the fence shall be made of easily machinable material, e.g. plastic, light alloy, wood or wood based materials;

b) manual adjustment of the fence position shall be possible without the aid of a tool;

c) any powered movement of the fence shall be restricted to a maximum operating speed of 25 m min^{-1}.

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

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

5.3.6.2 Workpiece end stop

The machine shall be provided with an (adjustable) workpiece end stop (see Figure 1) which shall meet the following requirements:

— it shall be fixed to the table, to prevent movement of the workpiece during sawing. Fixing shall be possible without the aid of a tool;

— parts of this end stop which are capable of contact with the saw blade shall be made from easily machinable material, e.g. plastic, light alloy, wood or wood based materials.

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

5.3.7 Prevention of access to moving parts

5.3.7.1 Guarding of the saw blade below the table

When the saw blade is in the rest and saw blade changing positions, access to it shall be prevented by using fixed guards.

If the fixed guards are to be demounted by the user e.g. for maintenance, cleaning purposes their fixing systems shall remain attached to the guard or to the machine when the guard is removed e.g. fitted with un-losable screws (see 6.4 u)).

Where access to the saw blade is required for maintenance or servicing, the access component shall be a moveable interlocked guard with guard locking.

The interlocking device with guard locking shall be:

a) at least of the manually operated delay device type if the braked run-down time of the saw blade is ≤ 10 s in accordance with Annex N of EN 1088:1995+A2:2008;

b) of the spring applied/power released guard locking device type if the braked run-down time of the saw blade is > 10 s in accordance with Annex M of EN 1088:1995+A2:2008.

Any gaps in the guards shall be designed in accordance with safety distances given in Table 4 of EN ISO 13857:2008. In the rest position and during the return stroke the saw blade shall not be accessible through the table slot.

The safety related part of the control circuits (see also 5.2.1) for interlocking with guard locking 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, inspection and relevant functional testing on the machine.

5.3.7.2 Access to the saw blade above the table

Sectional safety curtains shall be provided on both the operator's side and the rear side of the machine, which shall be fitted to a support extending along the full cutting length for which the machine is designed. These safety curtains shall meet the following requirements:

a) each section of the curtain shall be manufactured from polycarbonate and its rigidity shall be in accordance with the requirements of Annex D;

b) they shall permit viewing of the cutting line from the operator's side;

c) the maximum effective width of each section shall be 50 mm (see Figure 13);

d) intermediate end stops shall be provided so that the cumulative clearance of the safety curtain does not exceed the width of a section;

e) the bottom edge of the curtain shall rest on the table when its support is in its lowest position;

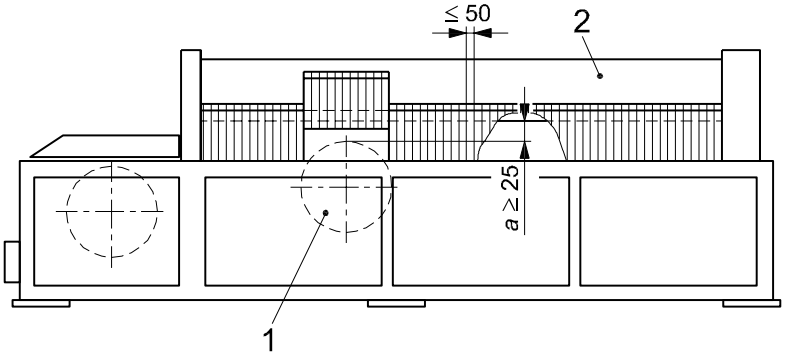
f) each section of the curtain shall, when lifted by the workpiece, return automatically to the lower position (e.g. under its own weight) when the sectional safety curtain support is raised;

g) each section of the curtain shall be individually replaceable (for renewal);

h) the vertical distance *a* between the top of the maximum cutting height for which the machine is designed and the bottom edge of the safety curtain support shall be more than 25 mm (see Figure 13).

The sectional safety curtain shall remain up in the case of failure of the power supply to the actuators of the sectional safety curtain rise and fall. On pneumatic or hydraulic systems, where non-return valves are used to achieve this, these valves shall be fitted to the actuating cylinders.

Dimensions in millimetres



Key

a	distance between bottom edge of sectional safety curtain support and maximum cutting heith
1	saw blade in its maximum cutting height position
2	sectional safety curtain support

Figure 13 — Detail of sectional safety curtain

Access to the saw blade outside the sectional safety curtains shall be prevented by fixed guards. Where access to the saw blade is required for maintenance or servicing, the access component shall be a moveable interlocked guard with guard locking.

The interlocking device with guard locking shall be:

1) at least of the manually operated delay device type if the braked run-down time of the saw blade is ≤ 10 s in accordance with Annex N of EN 1088:1995+A2:2008;

2) of the spring applied/power released guard locking device type if the braked run-down time of the saw blade is > 10 s in accordance with Annex M of EN 1088:1995+A2:2008.

Any gaps in the guards shall be designed in accordance with safety distances given in Table 4 of EN ISO 13857:2008.

Where the machine is designed to allow rise and fall movement of the saw unit at alternative positions along the length of the cutting line (i.e. for short length cutting), this rise and fall movement shall only be possible where a front deterring/impeding device is provided (see Figure 14). An interlocking device shall ensure that the rise and fall of the saw blade is in the same position as the front deterring impeding device and that the sectional safety curtain is lowered to its lowest position before the saw unit can be raised for the cutting stroke. The front deterring impeding device shall meet the following requirements:

— it shall be positioned outside the sectional safety curtain but within 5 mm of it (see Figure 14);

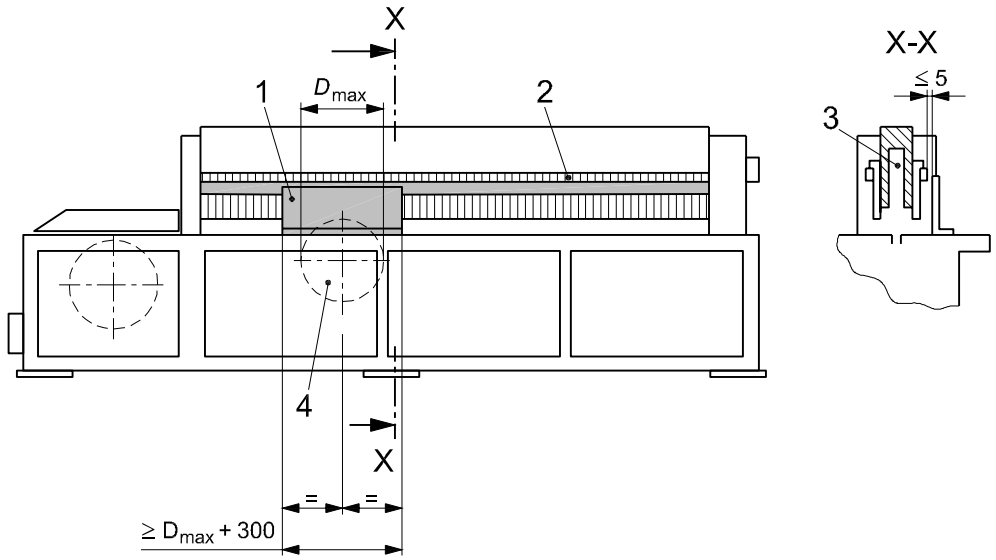
— its height shall be greater than the lowest point of the most protruding element of the sectional safety curtain when it is in its highest position;

— its length shall be at least equal to the maximum saw blade diameter for which the machine is designed plus 150 mm on either side of the saw blade.

The safety related part of the control circuits (see also 5.2.1) for interlocking with guard locking 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, inspection and relevant functional testing on the machine.

Dimensions in millimetres



Key
1 front deterring/impeding device
2 sectional safety curtain
3 sectional safety curtain support
4 saw blade

Figure 14 — Front deterring/impeding device for machines with short length cutting

5.3.7.3 Guarding of drives

Access to drive mechanisms shall be prevented by a fixed guard(s).

If the fixed guards are to be demounted by the user e.g. for maintenance, cleaning purposes their fixing systems shall remain attached to the guard or to the machine when the guard is removed e.g. fitted with unlosable screws (see 6.4 u)).

Any access door required for maintenance purposes shall be a moveable interlocked guard. Where fitted with a movable interlocked guard and where it is possible to gain access to the saw blade or other hazardous points, e.g. drives with this guard open, the guard shall be in accordance with the requirements of 5.3.7.1 and 5.3.7.2.

The safety related part of the control circuits (see also 5.2.1) for interlocking and interlocking with guard locking 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, inspection and relevant functional testing on the machine.

5.3.8 Workpiece clamping

Where powered workpiece clamping is provided by a pressure beam (see Figure 1), the pressure beam shall meet the following requirements:

a) it shall be positioned between the sectional safety curtains;

b) it shall only operate when the sectional safety curtain is in its lowest position;

c) it shall operate a maximum of 1 s after the sectional safety curtain has reached its lowest position.

Where the machine is equipped with a work piece clamping device, a trip bar shall be provided on the operator's side of the pressure beam, and at the rear side of the pressure beam if operator access is not prevented.

The mechanically actuated trip device (trip bar) shall be in accordance with the following requirements:

1) it shall extend over the full width of the loading/unloading aperture;

2) it shall have dimensions in accordance with Figure 15;

3) when operated, it shall stop and reverse the downward movement of the pressure beam and cause the saw blade to retract beneath the table;

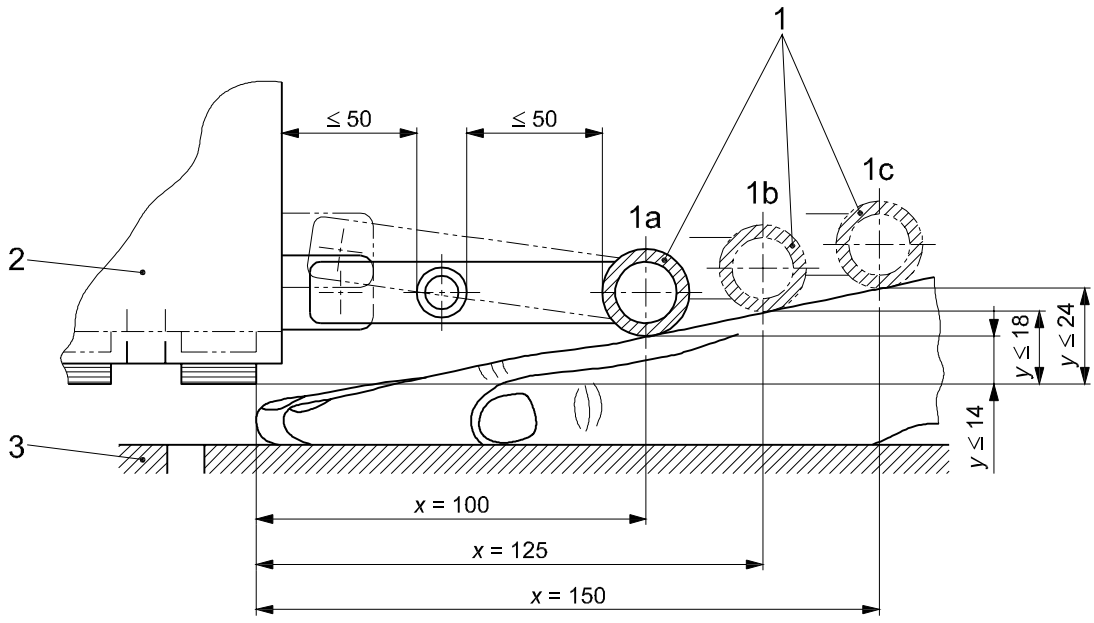
4) the force to actuate the trip bar shall not exceed 50 N wherever applied over the full width of the trip bar.

During vertical movement, the underside of the pressure beam shall remain parallel to the table within 20 mm over its length.

The safety related part of the control circuits (see also 5.2.1) for the trip bar action 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, measurement and relevant functional testing on the machine.

Dimensions in millimetres



Key

1 trip bar
2 pressure beam
3 sectional safety curtain

Figure 15 — Trip bar dimensions

5.3.9 Safety appliances

Where a fence is provided, a push block handle or a push stick (see Figure 2) shall also be provided to avoid working with the hands close to the saw blade and to hold the workpiece against the fence. Provision shall be made for locating the push block handle and/or push stick on the machine.

Where the push block is provided with the machine, this block shall be made from plastic, wood or plywood and shall have a minimum length of 400 mm (see Figure 2).

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

Fire risk is not present where electrical power circuits are protected against over current in accordance with 7.2.2 of EN 60204-1:2006.

Verification: By checking the relevant drawings, measurement 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 E of this document.

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 K2A 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 m from the reference surface;

d) where the distance from the machine to an auxiliary unit is less than 2 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 E.

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 K2A and local environmental factor K3A 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 K3A 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 p) shall be met.

5.4.3 Emission of chips and dust

Provision shall be made for the extraction of chips and dust from the machine, either by an integral extraction and collection system or by providing outlet(s) to enable the machine to be connected to a separate chip and dust collection system.

The opening of the capture device 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 chips and dust extracted from the point of origin are conveyed to the collection system, the design of the hoods, ducts and baffles should 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).

NOTE 2 A low dust emission can be expected if the air flow rate ≥ 1 800 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 3 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

The requirements of EN 60204-1:2006 with the exception of 6.3 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 t)).

The degree of protection of all electric components out of the enclosure(s) and the enclosure(s) for electrical components itself/themselves shall be at least IP 54 in accordance with the requirements of EN 60529:1991[3)] with the following exceptions:

a) for three phase motors the degree of protection shall be at least IP 5X in accordance with EN 60529:1991[3)];

b) the last sentence of 11.3 does not apply.

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

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

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 and 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.

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

If the machine is fitted with a movable control panel the requirements of EN 894-2:1997+A1:2008 shall apply, and the panel shall be fitted with a facility to move it in the desired position.

For the position of controls see 5.2.2 (see also EN 894-3:2000+A1:2008).

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, 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

Where lighting is fitted it shall be provided in accordance with EN 60204-1:2006, 16.2, and with EN 1837:1999+A1:2009. See also 6.4 d).

Verification: By checking the relevant drawings and/or circuit diagrams and inspection 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, 5.4.12 of this document and EN ISO 12100:2010, 6.2.10.

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, 5.4.13 of this document and EN ISO 12100:2010, 6.2.10.

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[4)], 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.

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

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 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.

5.4.12 Isolation

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

Electrical isolators shall be in accordance with EN 60204-1:2006, 5.3, except that the isolator shall not be of type d) in 5.3.2 of EN 60204-1:2006.

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. 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 EN 1037:1995+A1:2008, 5.2.

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.

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

5.4.13 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 danger zones and 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 relevant drawings, instruction handbook, inspection and functional testing of the machine.

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 Warnings 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 following shall be permanently marked on the riving knife:

a) width of its mounting slot;

b) the thickness and range of saw blade diameters for which it is designed.

Permanently marked means for example engraving or etching.

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

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

i) direction of rotation of the saw spindle;

j) the width of the riving knife guiding elements adjacent to the mounting position of the riving knife.

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.

On machines where speed changing is achieved by changing the position of the drive belts on the drive pulleys, a diagram shall be affixed to the machine adjacent to the pulleys showing the relevant speed selected for each combination of pulleys.

Verification: By checking the relevant drawings and/or circuit diagrams, inspection and functional testing of the 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 correct choice of saw blades especially use of saw blades designed to reduce the emitted noise;

        ii) optimum speed selection;

        iii) saw blade and machine maintenance;

        iv) workpiece support;

        v) the proper use of ear protection.

2) information on factors that influence exposure to dust; this includes:

   i) type of material being machined;

   ii) saw blade and machine maintenance;

   iii) proper adjustment of hoods/baffles/chutes for optimising local extraction;

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 EN ISO 12100:2010, 6.4.5.1 d). 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. chips and off-cuts;

2) adequate general or localised lighting to be provided;

3) stock and finished workpieces to be located close to the operators normal working position;

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) 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) to select the correct riving knife, depending on the saw blade thickness and diameter;

10) instructions about the correct positioning of the riving knife in relation to the diameter of the saw blade.

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

12) to use correctly sharpened saw blades;

13) to ensure that saw blade flanges used are suitable for the purpose as stated by the manufacturer (see 5.3.3.3);

14) to refrain from removing any off-cut or other part of the workpiece from the cutting area until the saw blade has reached its retracted position below the table;

15) 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) if fitted with a laser:

   1) statement that no exchange with a different type of laser is permitted, that no additional optical equipment shall be used and that repair shall only be carried out by the laser manufacturer or authorised persons;

   2) repetition of the laser manufacturer instructions for setting and use of the laser (where appropriate);

g) installation and maintenance requirements including a list of those devices e.g. braking, sectional safety curtain, trip bar, interlocked guards, emergency stop, which should be verified, how frequently the verification shall be carried out and by what method (see also 6.4.5.1 e) of EN ISO 12100:2010);

h) the range of saw blade diameters and thicknesses for which the machine is designed;

i) the maximum length, width and thickness of the workpiece for which the machine is designed;

j) a statement that only saw blades in accordance with EN 847-1:2005+A1:2007 shall be used on the machine;

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

l) the method for the safe dissipation of residual energy;

m) where necessary, requirements for the need to fix the machine to the floor and how this is to be done;

n) nominal pressure for pneumatic circuits;

o) information concerning the requirements for chip and dust extraction including:

   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;

p) 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, 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;

q) 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;

r) 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;

s) 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);

t) 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;

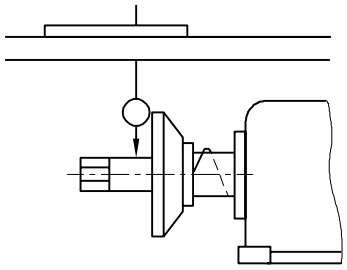
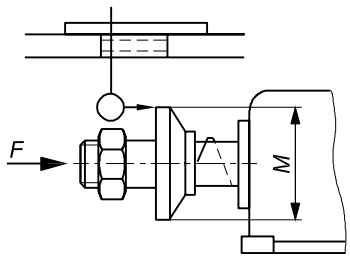
u) description of fixed guards which have to be removed by the user for maintenance and cleaning purposes (guards to be dismounted only by the manufacturer or personal charged by the manufacturer are excluded).

Verification: By checking the instruction handbook and relevant drawings.

Annex A
(normative)

Saw spindle dimensional tolerances

Table A.1 — Saw spindle dimensional tolerances

Diagram	Object	Permissible deviation mm	Measuring instrument
 Measurement as close as possible to the saw flange	Saw spindle run-out measurement	0,03	Dial gauge
 Apply axial pressure *F* as recommended by manufacturer	Measuring camming of the saw flange	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 mm.

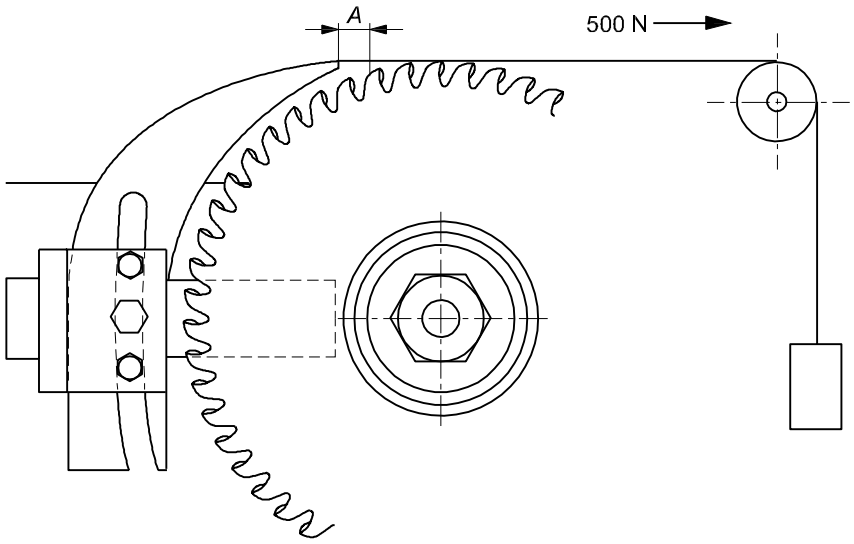


Figure B.1 — Riving knife mounting strength test

Annex C
(normative)

Lateral stability riving knife 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.

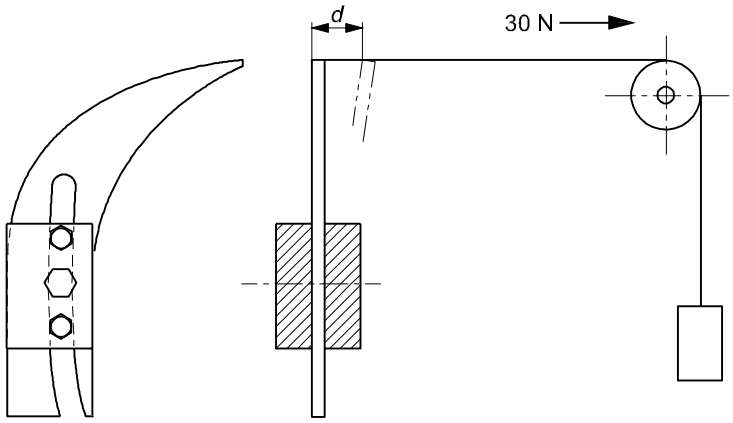


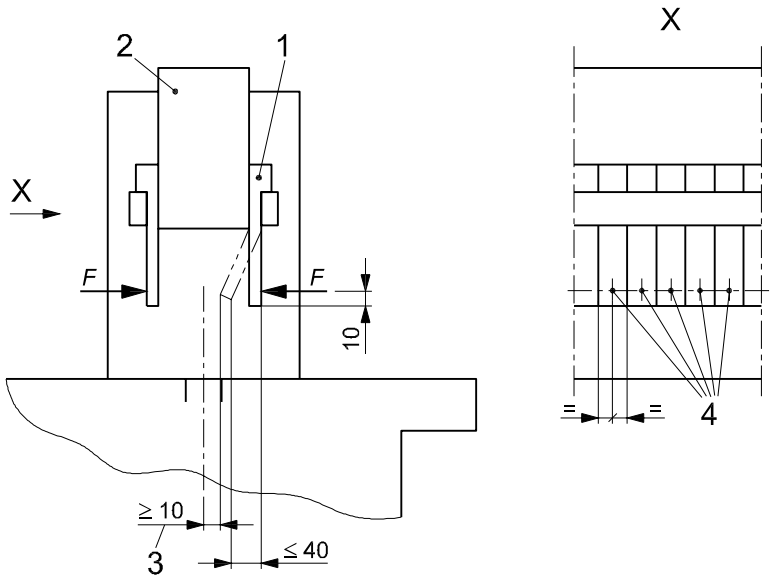
Figure C.1 — Riving knife lateral stability test

Annex D
(normative)

Sectional safety curtain material rigidity test

With the sectional safety curtain support in the highest working position and the sectional safety curtain in its lowest position, a horizontal force *F* = 10 N shall be applied perpendicular to, and in the direction of the cutting plane. The force shall be applied to the centre of one section, 10 mm above lower edge of the section (see Figure D.1).

The maximum horizontal displacement at any point of this section shall not exceed 40 mm and the displacement shall not permit any point of the section to move to within 10 mm of the cutting plane.



Key
1 sections of the safety curtain
2 sectional safety curtain support
3 cutting plane
4 points of application of force *F*

Figure D.1 — Sectional safety curtain material rigidity test

Annex E
(normative)

Operating conditions for noise emission measurement

E.1 General

This annex contains a series of standard operating conditions to be applied in connection with measurement of noise from manually loaded and/or unloaded single blade edging circular rip sawing machines with power driven saw unit. Microphone positions are specified in order to allow the measurement of sound pressure level at the work-station and for determining the sound power level of a machine of this type.

These standard conditions shall be complied with as closely as possible. If, in a specific situation, it is necessary to deviate from the standard conditions, the actual condition applied for the test shall be recorded where a blank space in the "Condition chosen within permitted range or conditions deviating from the standard" allows for such a situation.

Mandatory and standard safety attachments shall be mounted and in use during the tests.

The data sheet included in this annex may also be used to record operating condition information.

This annex may also be applied to the measurement of noise from machines having a similar construction and function.

E.2 Noise measurements

The machine shall be tested under the following conditions:

a) under no load with the saw blade in the rest position and saw blade and cutting data as specified in this annex;

b) under load as specified in this annex. The measurement period starts when the feed is actuated and is considered finished when the saw unit has reached the rest position provided.

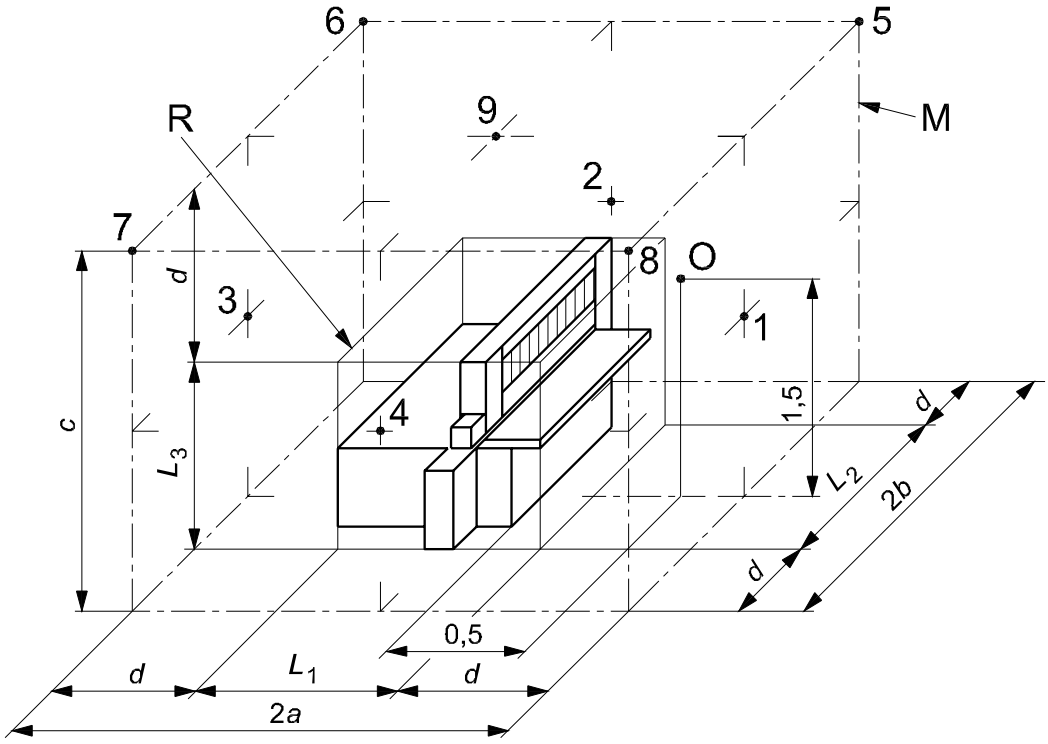
The use of integrating sound level meters is not mandatory but recommended.

The microphone used to measure the emitted noise shall be situated as follows (see also Figure E.1):

1) for determination of the emission sound pressure level at the workstation (operator microphone position for test purposes) 1,5 m above the floor level and 0,5 m in front of the middle of the reference box;

2) for determination of the sound pressure level at the measurement surface with a distance of d = 1 m from the reference box. The reference box excludes protruding parts in front of the machine.

Dimensions in metres



Key

M	measurement surface
O	operator position
R	reference box
1-9	microphone positions for sound power level measurement
d	distance to the reference box
L_1	width of the reference box
L_2	length of the reference box
L_3	height of the reference box

Figure E.1 — Microphone positions

E.3 General data sheet

NOTE The user of this form is allowed to copy this present form.

Machine data	Make: Model: Year of manufacture: Serial n°: Length L_1: mm[a] Width L_2: mm[1)] Height L_3: mm[1)]
	Saw blade Ø ……..... mm — Cutting length ……..... mm Flange Ø …… mm — Max. cutting height ……. mm ☐ Machine fitted with sectional safety curtain only — ☐ Machine fitted with sectional safety curtain and pressure beam ☐ Any other guard

[a] Those elements which protrude from the machine and which are not likely to contribute to the noise emission (e.g. hand wheels, levers) may be disregarded.

Machine installation	**Remarks/description**
	Machine installed yes ☐ according to manufacturer's recommendations no ☐ Machine installed with dust yes ☐ extraction according to manufacturer's specifications no ☐ Machine mounted on yes ☐ vibration damping/isolation material no ☐ Machine fitted with yes ☐ separate noise enclosure no ☐ Machine equipped with yes ☐ integral noise enclosure no ☐ Machine equipped with yes ☐ noise reducing hood no ☐ Other noise control yes ☐ ..... control measures no ☐ .....

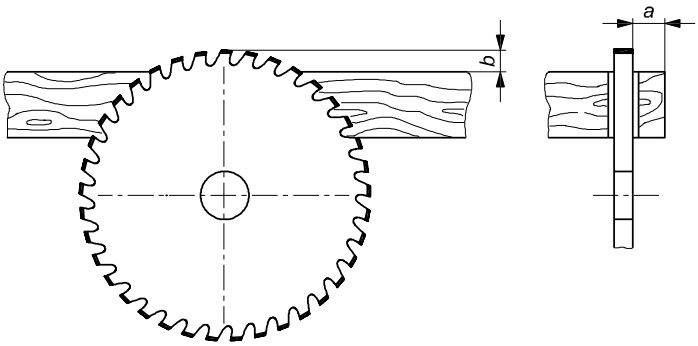
Testing operation **Operating arrangement**	Ripping of softwood-strips The board shall be placed in the middle of the machine table  **Figure E.2 — Cutting conditions** Width of strips - ***a*** …….mm Saw blade projection – ***b*** ……mm		Standard condition(s) ≥ 20 30	Condition chosen within permitted range or conditions deviating from standard
Tool and cutting data	Type of tool: Standard saw blade for length cutting – carbide tipped		Standard condition(s)	Condition chosen within permitted range or conditions deviating from standard
	Feed rate	m min^{-1}	30 ± 2	.....
	Spindle speed	min^{-1}	Peripheral speed 60 m s^{-1} to 70 m s^{-1}	.....
	Saw blade diameter	mm		.....
	Tooth width	mm		.....
	Actual saw blade thickness	mm		.....
Testing material	Material : Softwood, medium grade e.g. pine, spruce Moisture content : 8 % to 14 % Board thickness : 60 mm Board length : 2 000 mm (minimum) Board width : ≥ 200 mm, processed down to a final width of 150 mm 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 F
(normative)

Braking tests

F.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.

F.2 Tests

F.2.1 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 is the average of the three measurements taken.

F.2.2 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 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 is the average of the ten measurements taken.

Annex G
(normative)

Impact test method for guards

G.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.

G.2 Test method

G.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.

G.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 %.

G.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: Rm = 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.

G.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.

G.2.5 Test procedure

The impact test shall be executed with projectile indicated in G.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 on the centre of material sample.

G.3 Results

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.

G.4 Assessment

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 G.3.

G.5 Test 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;

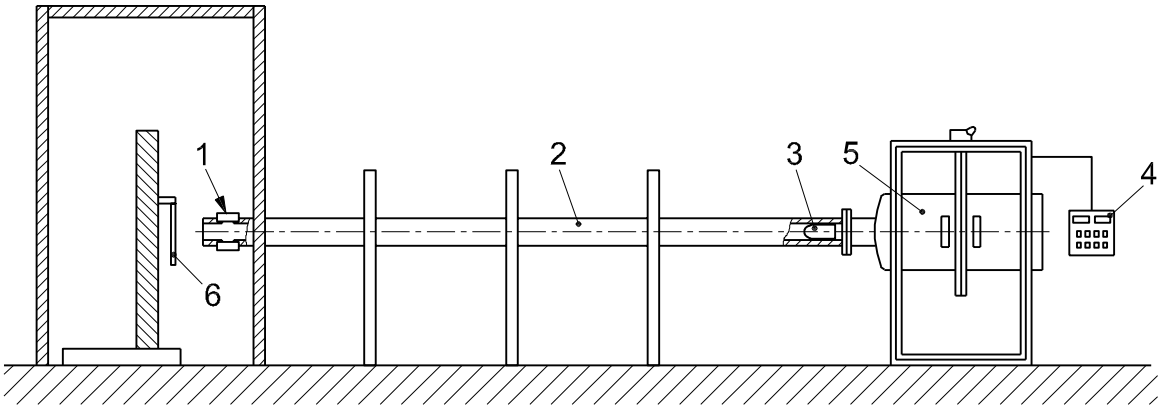
g) test result.

G.6 Test equipment for impact test

The propulsion device consists of a compressed air vessel with flanged gun barrel (see Figure G.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 G.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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[1] EN 1093-9:1998+A1:2008, *Safety of machinery — Evaluation of emission of airborne hazardous substances — Part 9: Pollutant concentration parameter, room method*

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[3] EN 60947-4-1:2001, *Low-voltage switchgear and controlgear — Part 4-1: Contactors and motor-starters — Electromechanical contactors and motor-starters (IEC 60947-4-1:2000)*

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[5] HD 21.1 S4:2002, *Cables of rated voltages up to and including 450/750 V and having thermoplastic insulation — Part 1: General requirements*

[6] 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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