

Safety of woodworking machines — Circular sawing machines —

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

ICS 79.120.10

National foreword

This British Standard is the UK implementation of EN 1870-1:2007+A1:2009. It supersedes BS EN 1870-1:2007 which is withdrawn.

The start and finish of text introduced or altered by amendment is indicated in the text by tags. Tags indicating changes to CEN text carry the number of the CEN amendment. For example, text altered by CEN amendment A1 is indicated by **A1** **A1**.

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

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

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

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English Version

**Safety of woodworking machines - Circular sawing machines -
Part 1: Circular saw benches (with and without sliding table),
dimension saws and building site saws**

Sécurité des machines pour le travail du bois - Machines à
scier circulaires - Partie 1: Scies circulaires à table de
menuisier (avec ou sans table mobile), scies au format et
scies de chantier

Sicherheit von Holzbearbeitungsmaschinen -
Kreissägemaschinen - Teil 1: Tischkreissägemaschinen
(mit und ohne Schiebetisch), Formatkreissägemaschinen
und Baustellenkreissägemaschinen

This European Standard was approved by CEN on 24 February 2007 and includes Amendment 1 approved by CEN on 13 December 2008.

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Contents

Page

Foreword.....	4
Introduction	6
1 Scope	7
2 Normative references	7
3 Terms and definitions	10
4 List of significant hazards	17
5 Safety requirements and/or measures	25
5.1 General.....	25
5.2 Controls	25
5.2.1 Safety and reliability of control systems.....	25
5.2.2 Position of controls	27
5.2.3 Starting	30
5.2.4 Normal stopping	31
5.2.5 Emergency stop.....	32
5.2.6 Mode selection.....	32
5.2.7 Speed changing/monitoring/detection for circular saw benches and dimension saws	33
5.2.8 Power operated adjustment of the saw blade and/or fence(s) on circular saw benches or dimension saws	34
5.2.9 Interlocking of guards, movements and functions	35
5.2.10 Failure of the power supply	35
5.2.11 Failure of the control circuits	36
5.3 Protection against mechanical hazards	36
5.3.1 Stability	36
5.3.2 Hazard of break up during operation.....	36
5.3.3 Tool holder and tool design.....	37
5.3.4 Braking.....	40
5.3.5 Devices to minimise the possibility or the effect of kickback	41
5.3.6 Workpiece supports and guides	48
5.3.7 Prevention of access to moving parts.....	53
5.3.8 Powered workpiece clamping	67
5.3.9 Safety appliances.....	67
5.4 Protection against non-mechanical hazards	68
5.4.1 Fire	68
5.4.2 Noise	69
5.4.3 Emission of chips and dust.....	70
5.4.4 Electricity.....	71
5.4.5 Ergonomics and handling.....	71
5.4.6 Pneumatics.....	72
5.4.7 Hydraulics.....	73
5.4.8 Electromagnetic compatibility.....	73
5.4.9 Laser	73
5.4.10 Static electricity	73
5.4.11 Errors of fitting.....	73
5.4.12 Supply disconnection (Isolation)	74
5.4.13 Maintenance	74
6 Information for use	74
6.1 General.....	74
6.2 Marking	75

6.2.1	Marking of the machine	75
6.2.2	Marking of riving knives	76
6.3	Instruction handbook.....	76
Annex A	(normative) Test for rigidity of building site saws.....	81
Annex B	(normative) Saw spindle dimensional tolerances.....	82
Annex C	(normative) Riving knife mounting strength test.....	83
Annex D	(normative) Riving knife lateral stability test	84
Annex E	(normative) Minimum dimensions of the machine table, extension table and insert	85
Annex F	(normative) Saw blade guard stability test	88
F.1	General	88
F.2	Separately from riving knife mounted saw blade guards	88
F.2.1	Saw blade guards with lead-in	88
F.2.2	Saw blade guards with in-feed rollers.....	89
F.3	Riving knife mounted saw blade guards.....	90
Annex G	(normative) Impact test method for guards	92
G.1	General	92
G.2	Test method	92
G.2.1	Preliminary remarks	92
G.2.2	Testing equipment.....	92
G.2.3	Projectile for guards.....	92
G.2.4	Sampling.....	92
G.2.5	Test procedure.....	92
G.3	Results.....	93
G.4	Assessment	93
G.5	Test report.....	93
G.6	Test equipment for impact test	93
Annex H	(informative) Use of well tried components.....	95
Annex I	(normative) Braking tests	96
I.1	Conditions for all tests.....	96
I.2	Tests	96
I.2.1	Un-braked run-down time	96
I.2.2	Braked run-down time.....	96
Annex J	(normative) Use of electronic components.....	97
J.1	General	97
J.2	SRECS	97
J.2.1	Components, Hardware	97
J.2.2	Safety related software	98
Annex ZA	(informative) Relationship between this European Standard and the Essential Requirements of EU Directive 98/37/EC.....	100
Annex ZB	(informative)  Relationship between this European Standard and the Essential Requirements of EU Directive 2006/42/EC 	103
Bibliography		107

Foreword

This document (EN 1870-1:2007+A1:2009) 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 July 2009, and conflicting national standards shall be withdrawn at the latest by December 2009.

This document includes Amendment 1, approved by CEN on 2008-12-13.

This document supersedes A1 EN 1870-1:2007 A1.

The start and finish of text introduced or altered by amendment is indicated in the text by tags A1 A1.

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 and Outdoor Noise Directive.

A1 For relationship with EU Directive(s), see informative Annexes ZA and ZB, which are integral parts of this document. A1

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

A1 *deleted text* A1

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

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

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

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

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

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

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

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

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

Part 12: Pendulum cross-cut sawing machines

Part 13: Horizontal beam panel sawing machines

Part 14: Vertical panel sawing machines

Part 15: Multiblade 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)

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

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 12100-1:2003 for a description of A, B and C standards).

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and 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 12100-1:2003.

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

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

The requirements of this document are directed to manufacturers and their authorised representatives of circular saw benches (with and without sliding table), dimension saws and building site saws. They are also useful for designers.

This document also includes provisions and examples of information to be provided by the manufacturer to the user.

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

1 Scope

This document deals with the significant hazards, hazardous situations and events as listed in Clause 4 which are relevant to stationary and displaceable circular saw benches (with or without sliding table and/or demountable power feed unit), dimensions saws and building site saws, hereinafter referred to as “machines”, designed to cut solid wood, chipboard, fibreboard, plywood and also these materials, if they are covered with plastic edging and/or plastic/light alloy laminates, when they are used as intended and under the conditions foreseen by the manufacturer.

NOTE 1 For the definition of stationary and displaceable machine see 3.13 and 3.14.

NOTE 2 Circular saw benches, and dimension saws are used for ripping, cross cutting, dimensioning and grooving. Building site saws are used for ripping, cross cutting and dimensioning.

The requirements of this document apply also to machines designed for grooving with a width not exceeding 20 mm in one pass by using a milling tool.

This document does not apply to:

- a) machines set up on a bench or a table similar to a bench, which are intended to carry out work in a stationary position, capable of being lifted by one person by hand. The bench can also be an integrated part of the machine if it consists of hinged legs which can be extended down;
- b) hand held woodworking machines including any adaptation permitting their use in a different mode, i.e. bench mounting.

NOTE 3 Transportable motor-operated electric tools are covered by the requirements of EN 61029-1:2000 together with EN 61029-2-1:2002; hand-held motor-operated electric tools and saw benches to form an integrated whole with a hand-held motor-operated electric tools are covered by EN 60745-1:2003 together with EN 60745-2-5:2003.

For the purpose of this document building site saws having a tiltable spindle are considered to be circular saw benches.

This document is not applicable to circular saw benches (with and without sliding table), dimensions saws and building site saws which are manufactured before the date of its publication as EN.

NOTE 4 Machines covered by this document are listed under A.1.1 of Annex IV of the Machinery Directive.

2 Normative references

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

 *deleted text* 

EN 349:1993, *Safety of machinery — Minimum gaps to avoid crushing of parts of the human body*

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

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

EN 847-3:2004, *Tools for woodworking — Safety requirements — Part 3: Clamping devices*

EN 894-1:1997, *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, *Safety of machinery — Ergonomics requirements for the design of displays and control actuators — Part 2: Displays*

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

EN 982:1996, *Safety of machinery — Safety requirements for fluid power systems and their components — Hydraulics*

EN 983:1996, *Safety of machinery — Safety requirements for fluid power systems and their components — Pneumatics*

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

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

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

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

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

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

EN 50178:1997, *Electronic equipment for use in power installations*

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/A1:2004, *Low voltage switchgear and controlgear assemblies — Part 1: Type-tested and partially type-tested assemblies (IEC 60439-1:1999)*

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

EN 60825-1:1994, *Safety of laser products — Part 1: Equipment classification, requirements and user's guide (IEC 60825-1:1993)*

EN 61310-1:2008, *Safety of machinery — Indication, marking and actuation — Part 1: Requirements for visual, acoustic and tactile signals (IEC 61310-1:2007) ^(A1)*

EN 61496-1:2004, *Safety of machinery — Electro-sensitive protective equipment — Part 1: General requirements and tests (IEC 61496-1:2004, modified)*

EN 61508-3:2001, *Functional safety of electrical/electronic/programmable electronic safety-related systems — Part 3: Software requirements (IEC 61508-3:1998 + Corrigendum 1999)*

EN 62061:2005, *Safety of machinery — Functional safety of safety-related electrical, electronic and programmable electronic control systems (IEC 62061:2005)*

EN ISO 3743-1:1995, *Acoustics — Determination of sound power levels of noise sources — Engineering methods for small, moveable sources in reverberant fields — Part 1: Comparison method for hard-walled test rooms (ISO 3743-1:1994)*

EN ISO 3743-2:1996, *Acoustics — Determination of sound power levels of noise sources using sound pressure — Engineering methods for small, moveable sources in reverberant fields — Part 2: Methods for special reverberation test rooms (ISO 3743-2:1994)*

EN ISO 3744:1995, *Acoustics — Determination of sound power levels of noise sources using sound pressure — Engineering method in an essentially free field over a reflecting plane (ISO 3744:1994)*

EN ISO 3745:2003, *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 3746:1995, *Acoustics — Determination of sound power levels of noise sources using sound pressure — Survey method using an enveloping measurement surface over a reflecting plane (ISO 3746:1995)*

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

EN ISO 9614-1:1995, *Acoustics — Determination of sound power levels of noise sources using sound intensity — Part 1: Measurement at discrete points (ISO 9614-1:1993)*

EN ISO 11202:1995, *Acoustics — Noise emitted by machinery and equipment — Measurement of emission sound pressure levels at a workstation and at other specified positions — Survey method in situ (ISO 11202:1995)*

EN ISO 11204:1995/AC:1997, *Acoustics — Noise emitted by machinery and equipment — Measurement of emission sound pressure levels at a workstation and at other specified positions — Method requiring environmental corrections (ISO 11204:1995)*

EN ISO 11688-1:1998/AC:1998, *Acoustics — Recommended practice for the design of low-noise machinery and equipment — Part I: Planning (ISO/TR 11688- 1:1995)*

EN ISO 12100-2:2003, *Safety of machinery — Basic concepts, general principles for design — Part 2: Technical principles (ISO 12100-2:2003)*

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

EN ISO 13849-2:2003, *Safety of machinery — Safety-related parts of control systems — Part 2: Validation (ISO 13849-2:2003)*

EN ISO 13850:2006, *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 7960:1995, *Airborne noise emitted by machine tools — Operating conditions for woodworking machines*

HD 22.4 S4:2004, *Cables of rated voltages up to and including 450/750 V and having crosslinked insulation — Part 4: Cords and flexible cables*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN ISO 12100-1:2003 and the following apply.

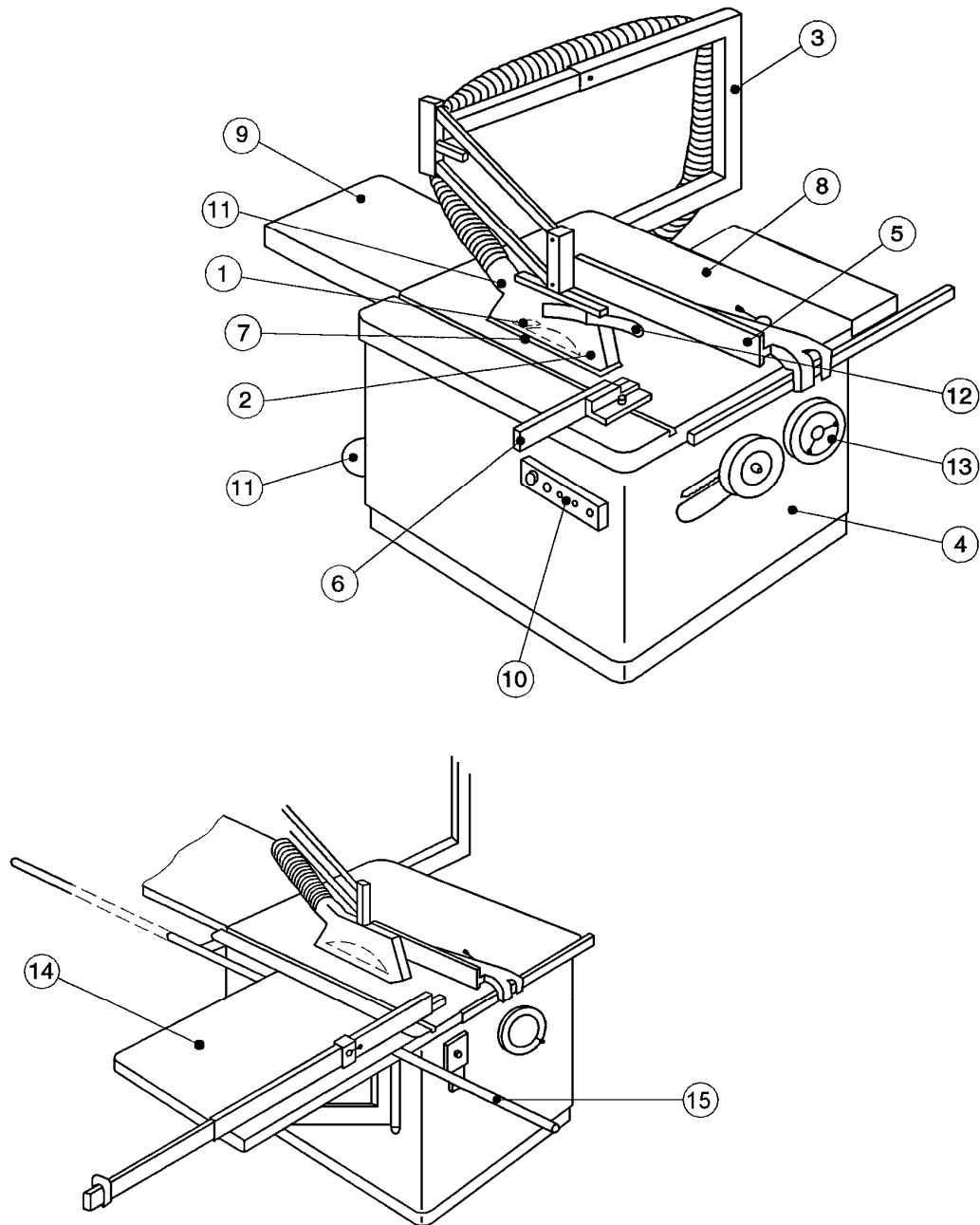
3.1
circular saw bench
hand fed machine fitted with a single circular saw blade which is fixed during the cutting operation, and a horizontal table, all or part of which is fixed during operation.

NOTE 1 The saw blade is mounted on a horizontal spindle below the table. The machine may have any of the following main features:

- a) facility for the saw blade to be raised and lowered through the table;
- b) facility to tilt the saw blade for angled cutting;
- c) machine frame below the table may be open (e.g. some building site saws), or closed in;
- d) additional, manually operated sliding table (not adjacent to the saw blade);
- e) facility for scoring;
- f) facility for grooving

NOTE 2 Circular saw benches without sliding table can be equipped with demountable power feed unit.

NOTE 3 An example of a circular saw bench and the terminology of its main parts are shown in Figure 1.



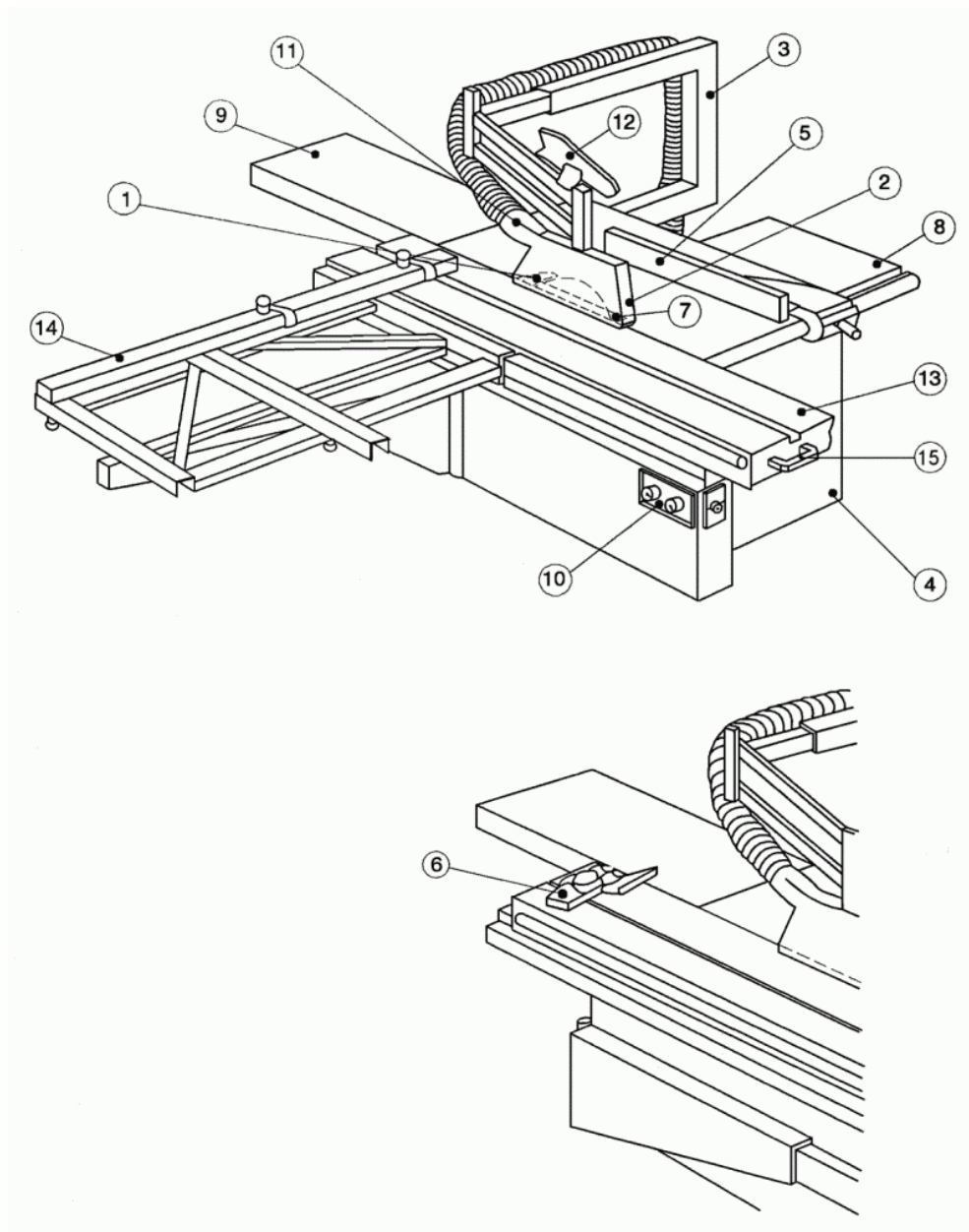
Key

- | | | | |
|---|---------------------------|----|-------------------------------|
| 1 | ripping knife | 9 | extension table |
| 2 | saw blade guard | 10 | controls |
| 3 | saw blade guard support | 11 | exhaust outlet |
| 4 | fixed guard beneath table | 12 | push stick |
| 5 | rip fence | 13 | cutting height adjustment |
| 6 | cross-cutting fence | 14 | sliding table |
| 7 | table insert | 15 | guiding bar for sliding table |
| 8 | machine table | | |

Figure 1 — Example of a circular saw bench

3.2 dimension saw
hand fed circular saw bench which has an integral sliding table adjacent to the saw blade which may have the facility for post-formed edge pre-cutting

NOTE An example of a dimension saw and the terminology of its main parts are shown in Figure 2.



Key

- | | | | |
|---|---------------------------|----|---------------------------------|
| 1 | living knife | 9 | extension table |
| 2 | saw blade(s) guard | 10 | controls |
| 3 | saw blade guard support | 11 | exhaust outlet |
| 4 | fixed guard beneath table | 12 | push stick |
| 5 | rip fence | 13 | integrated sliding table |
| 6 | clamping shoe | 14 | cross-cutting fence |
| 7 | table insert | 15 | integrated sliding table handle |
| 8 | machine table | | |

Figure 2 — Example of a dimension saw

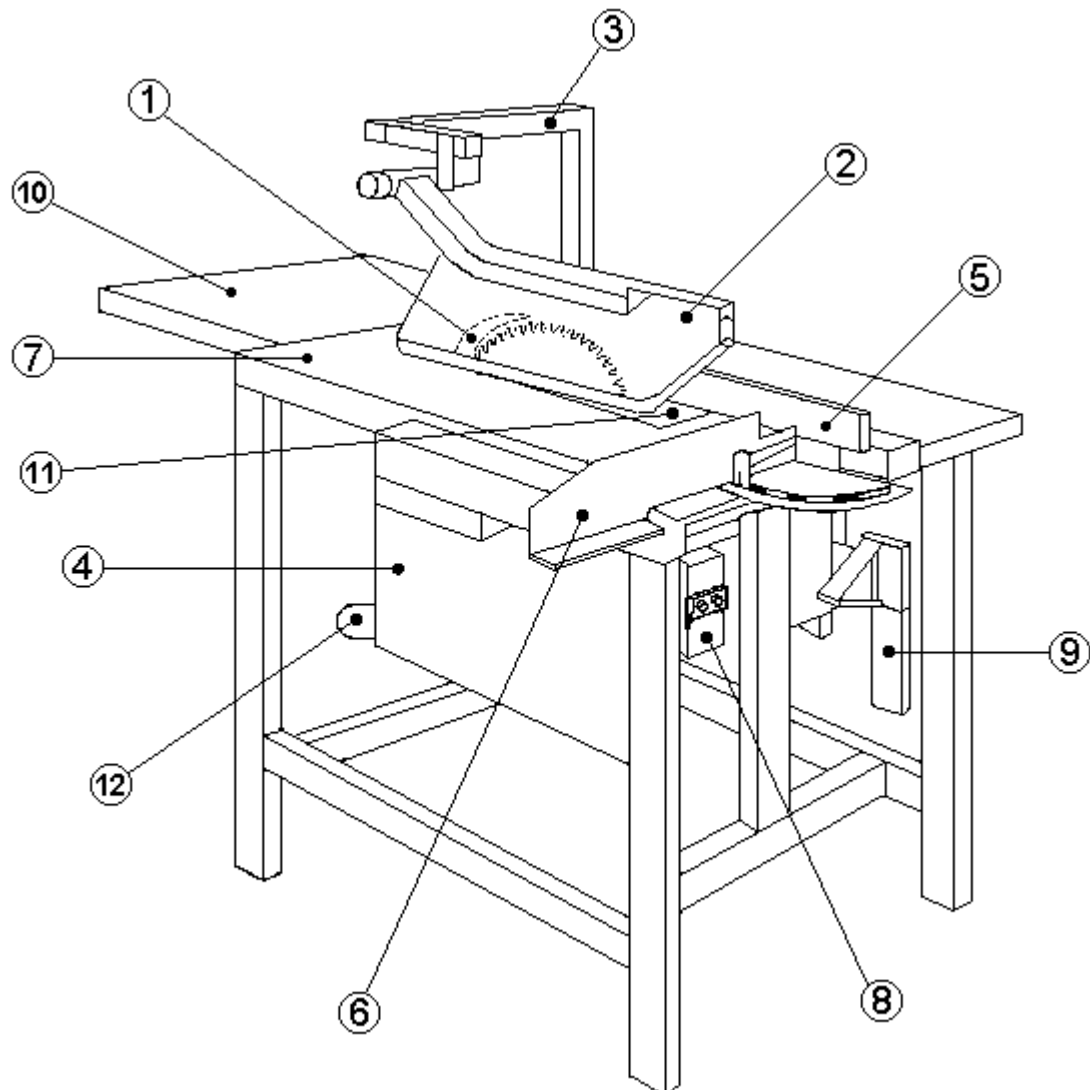
3.3

building site saw

hand fed circular saw bench, (without the facilities listed in b), e) and f) in 3.1) generally open type, with integrated lifting facilities (e.g. lifting eyes), designed for use on a building site at outside position not protected from atmospheric agents

NOTE 1 An example of a building site saw and the terminology of its main parts is shown in Figure 3

NOTE 2 In Nordic countries the term "building site saw" refers to a machine covered by EN 1870-5:2002.



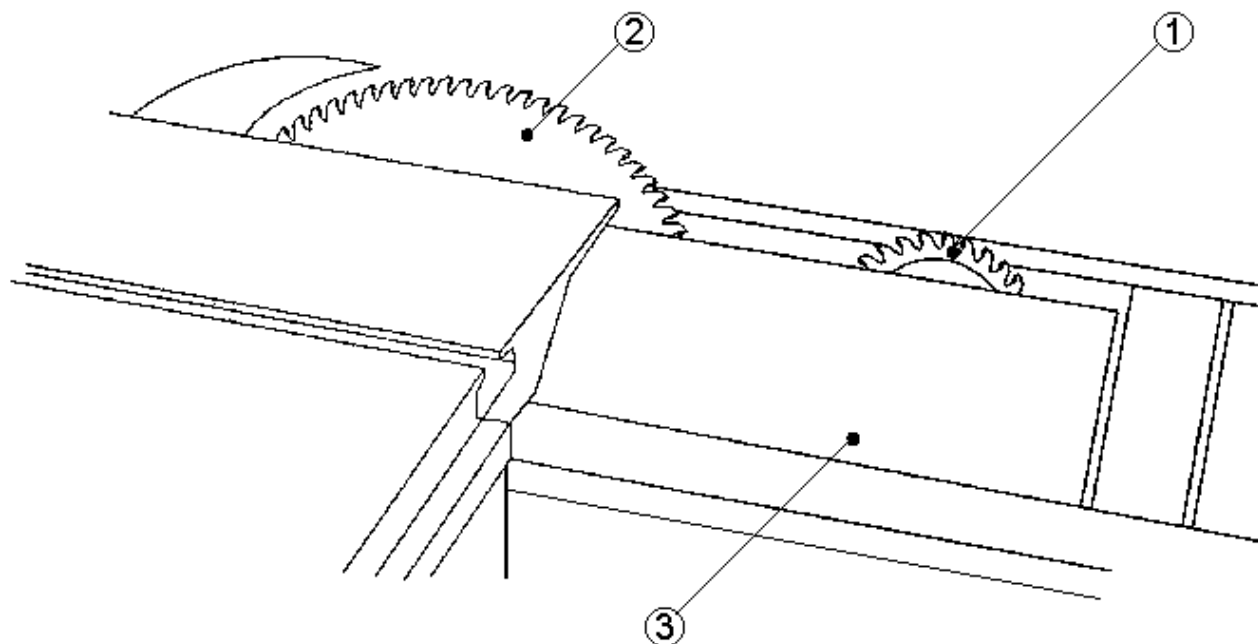
Key

- | | | | |
|---|---------------------------|----|-----------------|
| 1 | riving knife | 7 | machine table |
| 2 | saw blade guard | 8 | controls |
| 3 | saw blade guard support | 9 | push block |
| 4 | fixed guard beneath table | 10 | extension table |
| 5 | rip fence | 11 | table insert |
| 6 | cross-cutting fence | 12 | exhaust outlet |

Figure 3 — Example of a building site saw

3.4
scoring
 making of a shallow cut in the surface of a workpiece, deep enough to pass through any veneer or plastic facing on the workpiece so as to prevent surface damage when the main saw blade makes its cut

3.5
scoring saw blade
 saw blade mounted in front of the main saw blade which is used for scoring (see Figure 4)



Key
 1 scoring saw blade
 2 main saw blade
 3 saw blade guard below the machine table

Figure 4 — Main saw blade and scoring saw blade (upper saw blade guard not shown)

3.6
post-formed edge pre-cutting
 cut made in the rear profiled edge of the workpiece deep enough to prevent surface damage when the main saw blade makes its cut

3.7
post-formed edge pre-cutting saw blade
 saw blade used for post-formed edge pre-cutting

NOTE This may be the scoring saw blade or a separate saw blade specifically for this purpose.

3.8
quick saw blade clamping device
 device where the saw spindle with the saw blade fixing device is de-mountable and fitted to the machine spindle e.g. by a cone system

NOTE Clamping and un-clamping is powered e.g. spring-loaded or by pneumatic or hydraulic energy and can be performed without the aid of a tool

3.9**grooving**

making of a cut in the surface of the workpiece not deep enough to pass through using the saw blade or a milling tool

3.10**machine actuator**

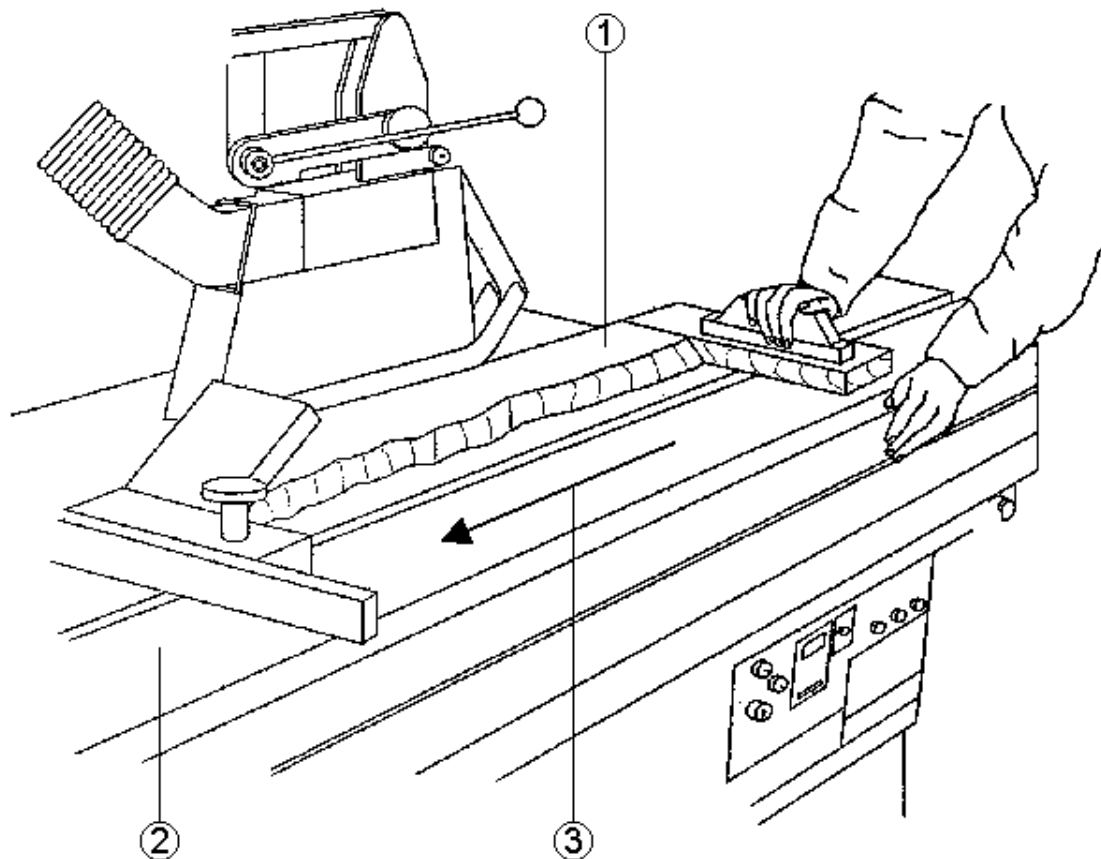
power mechanism used to effect motion of the machine

3.11**hand feed**

manual holding and/or manual guiding of the workpiece

NOTE 1 Hand feed may include the use of a hand operated carriage on which the workpiece is placed manually or clamped, and the use of a demountable power feed unit

NOTE 2 An example of hand feed on a dimension saw is shown in Figure 5.

**Key**

- 1 workpiece
- 2 integrated sliding table
- 3 feed direction

Figure 5 — Hand feed on a dimension saw

3.12

de-mountable power feed unit

feed mechanism which is mounted on the machine so that it can be moved from the working position without the use of a spanner or similar additional device

3.13

stationary machine

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

3.14

displaceable machine

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

3.15

safety appliance

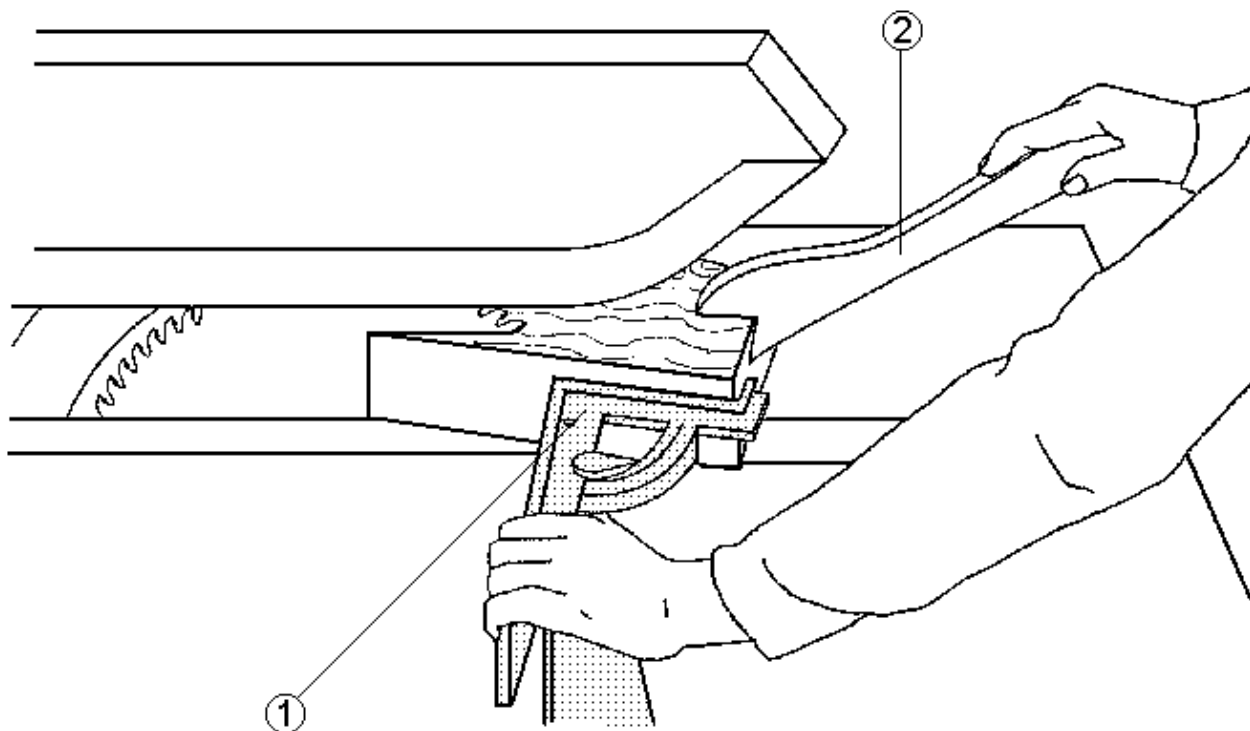
additional device which is not an integral part of the machine but which assists the operator in the safe feeding of the workpiece e.g. push block or push stick

3.16

wedge cutting device

integral device for building site saws to cut wedges with different angles

NOTE An example of a wedge-cutting device is shown in Figure 6



Key

- 1 wedge cutting device
- 2 push stick

Figure 6 — Example of wedge cutting device

3.17**kickback**

unexpected sudden movement of the workpiece or parts of it opposite to the direction of feed during processing

3.18**un-braked run-down time**

time elapsed from the actuation of the stop control, but not the braking device (if fitted) up to spindle standstill

3.19**braked run-down time**

time elapsed from the actuation of the stop control and the brake device up to spindle standstill

3.20**safety programmable logic controller (PLC)**

programmable logic controller dedicated to safety related application designed in the required category according to EN ISO 13849-1:2006

3.21**safety related electrical control system (SRECS)**

electrical part of a control system whose failure can result in an immediate increase of the risk(s) (3.4 of EN 62061:2005)

3.22**embedded software**

software that is part of the system supplied by the manufacturer that is not normally accessible for modification

NOTE 1 Firmware or system software are synonymous with embedded software (see 3.2.47 of EN 62061: 2005).

NOTE 2 Manufacturer means manufacturer of the system.

NOTE 3 For example the operating system of a speed monitoring device.

3.23**application software**

software specific to the application that is specifically implemented by the designer of the SRECS generally containing logic sequences, limits and expressions that control the appropriate inputs, outputs, calculations and decisions necessary to meet SRECS functional requirements (see 3.2.46 of EN 62061:2005)

NOTE For example the PLC program to run a machine.

3.24**information of the supplier**

statements, sales literature, leaflets or other documents, in which a manufacturer (supplier) declares either the characteristics of e.g. a material or product or the conformity of the material or product to a relevant standard

4 List of significant hazards

This clause contains the significant hazards, hazardous situations and events (see EN 1050:1996) as far as they are dealt with in this document, 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 Tables 1 to 3 in accordance with Annex A of EN 1050:1996.

Table 1 — List of significant hazards – Circular saw benches

No	Hazards, hazardous situations and hazardous events	EN ISO 12100		Relevant sub-clause of this document
		Part 1: 2003	Part 2: 2003	
1	Mechanical hazards related to: - machine parts or workpieces: a) shape; b) relative location; d) mass and velocity (kinetic energy of elements in controlled or uncontrolled motion); e) mechanical strength.	4.2	4.2.1, 4.2.2, 5	5.3.3, 5.3.5, 5.3.7
				5.2.2, 5.2.7, 5.2.8, 5.3.2, 5.3.5
				5.2.3, 5.2.4, 5.2.8, 5.3.4, 5.3.7
				5.3.2, 5.3.3, 5.3.4, 5.3.5, 5.3.6, 5.3.7, 5.3.9, Annex C, Annex D, Annex F, Annex G
	- accumulation of energy inside the machinery: f) liquids and gases under pressure;	4.2	4.10, 5.5.4	5.3.3, 5.3.8
	1.1 Crushing hazard	4.2.1		5.2.3, 5.2.4, 5.2.5, 5.2.8, 5.3.4, 5.3.6, 5.3.7, 5.3.8, 5.3.9, 5.4.13, 6.3
	1.2 Shearing hazard			5.2.3, 5.2.4, 5.2.5, 5.2.8, 5.3.4, 5.3.6, 5.3.7, 5.3.8, 5.3.9, 5.4.13, 6.3
	1.3 Cutting or severing hazard			5.2.3, 5.2.4, 5.2.5, 5.2.8, 5.3.4, 5.3.5, 5.3.7, 5.4.13, 6.3
	1.4 Entanglement hazard			5.2.3, 5.2.4, 5.2.5, 5.2.8, 5.3.4, 5.3.6, 5.3.7, 5.4.13, 6.3

1.5	Drawing-in or trapping hazard			5.2.3, 5.2.4, 5.2.5, 5.2.8, 5.3.4, 5.3.6, 5.3.7, 5.4.13, 6.3
1.6	Impact hazard			5.2.3, 5.2.4, 5.2.5, 5.2.8, 5.3.4, 5.3.6, 5.3.7, 5.4.13, 6.3
1.8	Friction or abrasion hazard			5.2.3, 5.2.4, 5.2.5, 5.3.4, 5.3.7, 5.4.13, 6.3
1.9	High pressure fluid injection or ejection hazard			5.3.8, 5.4.6, 5.4.7
2	Electrical hazards due to:			
2.1	Contact of persons with live parts (direct contact)	4.3	4.9, 5.5.4	5.4.4, 5.4.12
2.2	Contact of persons with parts which have become live under faulty conditions (indirect contact)	4.3	4.9	5.4.4, 5.4.12
2.4	Electrostatic phenomena	4.3	4.9	5.4.10
4	Hazards generated by noise , resulting in:			
4.1	Hearing loss (deafness), other physiological disorders (loss of balance, loss of awareness)	4.5	4.2.2, 5	5.4.2
4.2	Interference with speech communication, acoustic signals.			6.3
6	Hazards generated by radiation			
6.5	Lasers	4.7		5.4.9
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	4.8	4.3b, 4.4	5.4.3, 6.3
7.2	Fire hazard	4.8	4.4	5.4.1
8	Hazards generated by neglecting ergonomic principles in machinery design related to:			
8.1	Unhealthy postures or excessive effort	4.9	4.7, 4.8.2, 4.11.12, 5.5.5, 5.5.6	5.2.2, 5.4.5
8.2	Hand-arm or foot-leg anatomy	4.9	4.8.3	5.4.5
8.4	Local lighting	4.9	4.8.6	6.3
8.5	Mental overload and underload, stress		4.8.5	6.3
8.6	Human error, human behaviour		4.8, 4.11.8, 4.11.10, 5.5.2, 6	6.3
8.7	Design, location or identification of manual controls		4.8.7, 4.11.8	5.2.2, 5.4.5
8.8	Design or location of visual display units		4.8.8, 6.2	5.2.2, 5.4.5
9	Combination of hazards	4.11		5.2.3, 5.2.5, 5.2.6, 5.2.7, 5.2.10, 5.3.5, 5.3.7, 5.4.10, 5.4.11
10	Unexpected start up, unexpected overrun/overspeed (or any similar malfunction) from:			

10.1	Failure/disorder of the control system		4.11, 5.5.4	5.2.1, 5.2.11, 5.4.13
10.2	Restoration of energy supply after an interruption		4.11.4	5.2.10, 5.4.6, 5.4.7
10.3	External influences on electrical equipment		4.11.11	5.4.8, Annex J
10.5	Errors in the software		4.11.7	Annex J
10.6	Errors made by the operator (due to mismatch of machinery with human characteristics and abilities, see 8.6)	4.9	4.8, 4.11.8, 4.11.10, 5.5.2, 6	5.4.5, 6.3
11	Impossibility of stopping the machine in the best possible conditions		4.11.1, 4.11.3, 5.5.2	5.2.4, 5.2.5, 5.4.12
12	Variations in the rotational speed of tools		4.2.2, 4.3	5.2.7
13	Failure of the power supply		4.11.1, 4.11.4	5.2.10
14	Failure of the control circuit		4.11, 5.5.4	5.2.11
15	Errors of fitting	4.9	4.7, 6.5	5.4.11
16	Break-up during operation	4.2.2	4.3	5.3.2
17	Falling or ejected objects or fluids	4.2.2	4.3, 4.10	5.3.5
18	Loss of stability / overturning of machinery	4.2.2	5.2.6	5.3.1

Table 2 — List of significant hazards – Dimension saws

No	Hazards, hazardous situations and hazardous events	EN ISO 12100		Relevant sub-clause of this document
		Part 1: 2003	Part 2: 2003	
1	Mechanical hazards related to: - machine parts or workpieces due to: a) shape; b) relative location; d) mass and velocity (kinetic energy of elements in controlled or uncontrolled motion); e) mechanical strength.	4.2	4.2.1, 4.2.2, 5	5.3.3, 5.3.5, 5.3.6, 5.3.7, 5.3.8, 5.4.5, 5.4.11 5.2.2, 5.2.6, 5.2.7, 5.2.8, 5.2.10, 5.3.6, 5.3.7, 5.3.8 5.2.3, 5.2.4, 5.2.6, 5.2.8, 5.3.4, 5.3.7, 5.4.5 5.3.2, 5.3.3, 5.3.4, 5.3.6, 5.3.7, 5.3.9, Annex C, Annex D, Annex F, Annex G

	- accumulation of energy inside the machinery:			
	f) liquids and gases under pressure;	4.2	4.10, 5.5.4	5.3.3, 5.3.8
1.1	Crushing hazard	4.2.1		5.2.3, 5.2.4, 5.2.5, 5.2.6, 5.2.8, 5.3.4, 5.3.5, 5.3.6, 5.3.7, 5.3.8, 5.3.9, 5.4.13, 6.3
1.2	Shearing hazard			5.2.3, 5.2.4, 5.2.5, 5.2.6, 5.2.8, 5.3.4, 5.3.5, 5.3.6, 5.3.7, 5.3.8, 5.3.9, 5.4.13, 6.3
1.3	Cutting or severing hazard			5.2.3, 5.2.4, 5.2.5, 5.2.6, 5.2.8, 5.3.4, 5.3.5, 5.3.6, 5.3.7, 5.3.9, 5.4.13, 6.3
1.4	Entanglement hazard			5.2.3, 5.2.4, 5.2.5, 5.2.6, 5.2.8, 5.3.4, 5.3.6, 5.3.7, 5.4.13, 6.3
1.5	Drawing-in or trapping hazard			5.2.3, 5.2.4, 5.2.5, 5.2.6, 5.2.8, 5.3.4, 5.3.6, 5.3.7, 5.4.13, 6.3
1.6	Impact hazard			5.2.3, 5.2.4, 5.2.5, 5.2.6, 5.2.8, 5.3.4, 5.3.6, 5.3.7, 5.4.13, 6.3
1.8	Friction or abrasion hazard			5.2.3, 5.2.4, 5.2.5, 5.3.4, 5.3.7, 5.4.13, 6.3
1.9	High pressure fluid injection or ejection hazard			5.3.8, 5.4.6, 5.4.7
2	Electrical hazards due to:			
2.1	Contact of persons with live parts (direct contact)	4.3	4.9, 5.5.4	5.4.4, 5.4.12
2.2	Contact of persons with parts which have become live under faulty conditions (indirect contact)	4.3	4.9	5.4.4, 5.4.12
2.4	Electrostatic phenomena	4.3	4.9	5.4.10
4	Hazards generated by noise , resulting in:			
4.1	Hearing loss (deafness), other physiological disorders (loss of balance, loss of awareness)	4.5	4.2.2, 5	5.4.2

4.2	Interference with speech communication, acoustic signals			6.3
6	Hazards generated by radiation			
6.5	Lasers	4.7		5.4.9
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	4.8	4.3b, 4.4	5.4.3, 6.3
7.2	Fire hazard	4.8	4.4	5.4.1
8	Hazards generated by neglecting ergonomic principles in machinery design:			
8.1	Unhealthy postures or excessive effort	4.9	4.7, 4.8.2, 4.11.12, 5.5.5, 5.5.6	5.2.2, 5.4.5
8.2	Hand-arm or foot-leg anatomy	4.9	4.8.3	5.4.5
8.4	Local lighting		4.8.6	6.3
8.5	Mental overload and underload, stress	4.9	4.8.5	6.3
8.6	Human error, human behaviour	4.9	4.8, 4.11.8, 4.11.10, 5.5.2, 6	6.3
8.7	Design, location or identification of manual controls		4.8.7, 4.11.8	5.2.2
8.8	Design or location of visual display units		4.8.8, 6.2	5.2.2
9	Combination of hazards	4.11		5.2.3, 5.2.5, 5.2.6, 5.2.7, 5.2.10, 5.3.5, 5.4.10, 5.4.11
10	Unexpected start up, unexpected overrun/overspeed (or any similar malfunction) from:			
10.1	Failure/disorder of the control system	4.9	4.11, 5.5.4	5.2.1, 5.2.11, 5.4.13
10.2	Restoration of energy supply after an interruption		4.11.4	5.2.10, 5.4.6, 5.4.7
10.3	External influences on electrical equipment		4.11.11	5.4.8, Annex J
10.5	Errors in the software		4.11.7	Annex J
10.6	Errors made by the operator (due to mismatch of machinery with human characteristics and abilities, see 8.6)		4.8, 4.11.8, 4.11.10, 5.5.2, 6	5.2.6, 6.3
11	Impossibility of stopping the machine in the best possible conditions		4.11.1, 4.11.3, 5.5.2	5.2.4, 5.2.5, 5.4.12
12	Variations in the rotational speed of tools		4.2.2, 4.3	5.2.7
13	Failure of the power supply		4.11.1, 4.11.4	5.2.10
14	Failure of the control circuit		4.11, 5.5.4	5.2.11
15	Errors of fitting	4.9	4.7, 6.5	5.4.11
16	Break-up during operation	4.2.2	4.3	5.3.2
17	Falling or ejected objects or fluids	4.2.2	4.3, 4.10	5.3.5
18	Loss of stability / overturning of machinery	4.2.2	5.2.6	5.3.1

Table 3 — List of significant hazards – Building site saws

No	Hazards, hazardous situations and hazardous events	EN ISO 12100		Relevant sub-clause of this document
		Part 1: 2003	Part 2: 2003	
1	Mechanical hazards related to: - machine parts or workpieces due to: a) shape; b) relative location; e) mechanical strength.			
		4.2	4.2.1, 4.2.2, 5	5.3.3, 5.3.5, 5.3.6, 5.3.7, 5.3.8, 5.4.5, 5.4.11
				5.2.2, 5.3.5, 5.3.6, 5.3.7, 5.3.8
				5.3.2, 5.3.3, 5.3.4, 5.3.5, 5.3.6, 5.3.7, 5.3.9, Annex A, Annex C, Annex D, Annex F, Annex G
	- accumulation of energy inside the machinery:			
	f) elastic elements (springs);	4.2	4.10, 5.5.4	5.3.3
	1.1 Crushing hazard	4.2.1		5.2.3, 5.2.4, 5.2.5, 5.3.4, 5.3.5, 5.3.7, 5.3.8, 5.3.9, 5.4.13, 6.3
	1.2 Shearing hazard			5.2.3, 5.2.4, 5.2.5, 5.3.4, 5.3.5, 5.3.7, 5.3.8, 5.3.9, 5.4.13, 6.3
	1.3 Cutting or severing hazard			5.2.3, 5.2.4, 5.2.5, 5.3.4, 5.3.7, 5.3.9, 5.4.13, 6.3
	1.4 Entanglement hazard			5.2.3, 5.2.4, 5.2.5, 5.3.4, 5.3.7, 5.4.13, 6.3
1.5	Drawing-in or trapping hazard			5.2.3, 5.2.4, 5.2.5, 5.3.4, 5.3.7, 5.4.13, 6.3
1.8	Friction or abrasion hazard			5.2.3, 5.2.4, 5.2.5, 5.3.4, 5.3.7, 5.4.13, 6.3

2	Electrical hazards due to:			
2.1	Contact of persons with live parts (direct contact)	4.3	4.9, 5.5.4	5.4.4, 5.4.12
2.2	Contact of persons with parts which have become live under faulty conditions (indirect contact)	4.3	4.9	5.4.4, 5.4.12
4	Hazards generated by noise, resulting in:			
4.1	Hearing loss (deafness), other physiological disorders (loss of balance, loss of awareness)	4.5	4.2.2, 5	5.4.2
4.2	Interference with speech communication, acoustic signals			6.3
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	4.8	4.3b, 4.4	5.4.3, 6.3
7.2	Fire hazard	4.8	4.4	5.4.1
8	Hazards generated by neglecting ergonomic principles in machinery design			
8.1	Unhealthy postures or excessive effort	4.9	4.7, 4.8.2, 4.11.12, 5.5.5, 5.5.6	5.2.2, 5.4.5
8.2	Hand-arm or foot-leg anatomy	4.9	4.8.3	5.4.5
8.4	Local lighting	4.9	4.8.6	6.3
8.5	Mental overload and underload, stress		4.8.5	6.3
8.6	Human error, human behaviour	4.9	4.8, 4.11.8, 4.11.10, 5.5.2, 6	6.3
8.7	Design, location or identification of manual controls		4.8.7, 4.11.8	5.2.2
8.8	Design or location of visual display units		4.8.8, 6.2	5.2.2
10	Unexpected start up, unexpected overrun/overspeed (or any similar malfunction) from:			
10.1	Failure/disorder of the control system	4.9	4.11, 5.5.4	5.2.1, 5.2.11, 5.4.13
10.2	Restoration of energy supply after an interruption		4.11.4	5.2.10, 5.4.6
10.3	External influences on electrical equipment		4.11.11	5.4.8
10.6	Errors made by the operator (due to mismatch of machinery with human characteristics and abilities, see 8.6)		4.8, 4.11.8, 4.11.10, 5.5.2, 6	6.3
11	Impossibility of stopping the machine in the best possible conditions		4.11.1, 4.11.3, 5.5.2	5.2.4, 5.2.5, 5.4.12
13	Failure of the power supply		4.11.1, 4.11.4	5.2.10
14	Failure of the control circuit		4.11, 5.5.4	5.2.11
15	Errors of fitting	4.9	4.7, 6.5	5.4.11
16	Break-up during operation	4.2.2	4.3	5.3.2
17	Falling or ejected objects or fluids	4.2.2	4.3, 4.10	5.3.5
18	Loss of stability / overturning of machinery	4.2.2	5.2.6	5.3.1, 6.3

5 Safety requirements and/or measures

5.1 General

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

NOTE 1 In addition, the machine should be designed according to the principles of EN ISO 12100:2003 for hazards relevant but not significant, which are not dealt with by this document (e.g. sharp edges of the machine frame).

NOTE 2 For guidance in connection with risk reduction by design, see Clause 4 of EN ISO 12100-2:2003, and for safeguarding measures, see Clause 5 of EN ISO 12100-2:2003.

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 the categories given below in accordance with the requirements of EN 13849-1:2006:

- a) starting and restarting: category 1 or 3 (see 5.2.3);
- b) prevention of unexpected start up: category 1 or 3 (see 5.2.3, 5.2.10);
- c) normal stopping: category 1 or 3 (see 5.2.4);
- d) emergency stop: category 1 or 3 (see 5.2.5);
- e) interlocking of guards: category 1 or 3 (see 5.3.7.2, 5.3.7.3);
- f) interlocking of functions: category 1 or 3 (see 5.2.3, 5.3.6.2.3, 5.3.7.3);
- g) mode selection: category 1 or 3 (see 5.2.6);
- h) detecting of the selected speed of the saw spindle: category 1 or 2 (see 5.2.7);
- i) change/monitoring/detection of the speed of the saw spindle if fitted with infinitely variable (step less) speed: category 2 (see 5.2.7);
- j) hold-to-run control circuit: category 1 or 3 (see 5.2.8, 5.2.10);
- k) power operated adjustment movements speed of saw spindle or fence(s): category B (see 5.2.8);
- l) power operated adjustment movements initiation: category 1 (see 5.2.8);
- m) power operated movement of the integrated sliding table on dimension saws: category 1 or 3 (see 5.2.10);
- n) braking system: category B, 1 or 2 (see 5.3.4.1);

- o) trip device: category 1 or 3 (see 5.2.8);
- p) quick saw blade clamping device and/or de-clamping: category 1 (if mechanical or pneumatic) or 3 (see 5.3.3.4);
- q) monitoring of the powered workpiece clamping system: category 1 (see 5.3.8);

NOTE Where more than one category is given further information about the necessary type is specified in the quoted clauses.

Where category B is required all categories fulfil the requirements, where category 1 is required categories 3 and 4 also fulfil the requirement. Where category 2 is required categories 3 and 4 also fulfil the requirement, where category 3 is required category 4 also fulfils the requirement.

NOTE 2 6.3 of EN 13849-1:2006 give useful information on combination of safety-related parts to the same or different categories.

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

5.2.1.2 Use of well-tried components

Components are considered well-tried if they comply with 6.2.4 of EN ISO 13849-1:2006 (see also Annex H).

NOTE 1 Well-tried electrical components are listed in Table D.3 of EN 13849-2:2003.

NOTE 2 EN 13849-2:2003 gives useful information on assessment of well-tried components, possible exclusion of faults etc.

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

5.2.1.3 Use of electronic components

If electronic components are used the requirements given in Annex J shall be met.

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

5.2.1.4 Use of protective devices

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

- a) magnetic/proximity switches shall be in accordance with the requirements of 6.2 of EN 1088:1995 and the related control system shall conform to category 3 in accordance with the requirements of EN ISO 13849-1:2006;
- b) component failure shall not cause an unexpected movement (starting), a change of running conditions during operation (adjustment of the speed or of a powered movement) and a failure of a commanded stopping. Well known solutions such as monitoring, redundancy shall be used to achieve category 3 in accordance with the requirements of EN ISO 13849-1:2006;
- c) if a time delay is used it shall be either of fail safe technique e.g. of capacity type or shall conform to the requirements of category 3 according to EN ISO 13849-1:2006.

NOTE 1 Also see 5.4.8 for the EMC requirements on the complete circular saw bench or dimension saw.

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

NOTE 2 For the components characteristics a confirmation from the components' manufacturers can be useful.

5.2.2 Position of controls

5.2.2.1 General

All hand-operated electrical controls shall be positioned ≥ 600 mm above floor level.

The start control for the main saw spindle and the scoring saw spindle for circular saw benches or dimension saws or the post-formed edge pre-cutting saw spindle on dimension saws (where fitted) shall be situated adjacent to one of the stop controls for the saw blade(s).

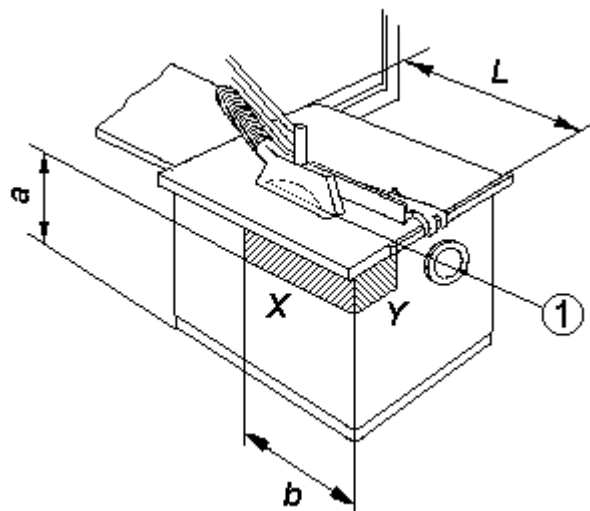
An emergency stop control required by 5.2.5 shall be situated adjacent to the start control for the saw blade(s) except for a start control situated at the rear end of the sliding table (if fitted).

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

5.2.2.2 Circular saw benches without sliding table and building site saws

For circular saw benches designed to be used without a sliding table and building site saws, the electrical control devices for normal stopping and emergency stop (if provided, see 5.2.5) shall be situated as follows (see the shaded area marked X or the shaded area marked Y in Figure 7):

- a) at the operator's position and
- b) either below the table located in a fixed position at a distance of at least 50 mm from the table top and more than 600 mm above the floor (see a) in Figure 7) and
 - 1) on the left side of the machine (area X) and extending not more than half of the table length L (see b) in Figure 7), or
 - 2) on the front side of the machine (area Y) on the left of the cutting line, or
- c) on a movable control panel fixed to the machine located so that:
 - 1) its front face is at a distance from the front edge of the table not exceeding 700 mm;
 - 2) its upper surface is at a distance from the floor level not exceeding 1 800 mm.



$$a \geq 600 \text{ mm}$$

$$b \leq \frac{1}{2} L$$

Key

- 1 saw line
- L length of machine table
- X left side controls area
- Y front side controls area (on the left of saw line)

Figure 7 — Position of controls – Circular saw benches or building site saw

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

5.2.2.3 Circular saw benches with sliding table

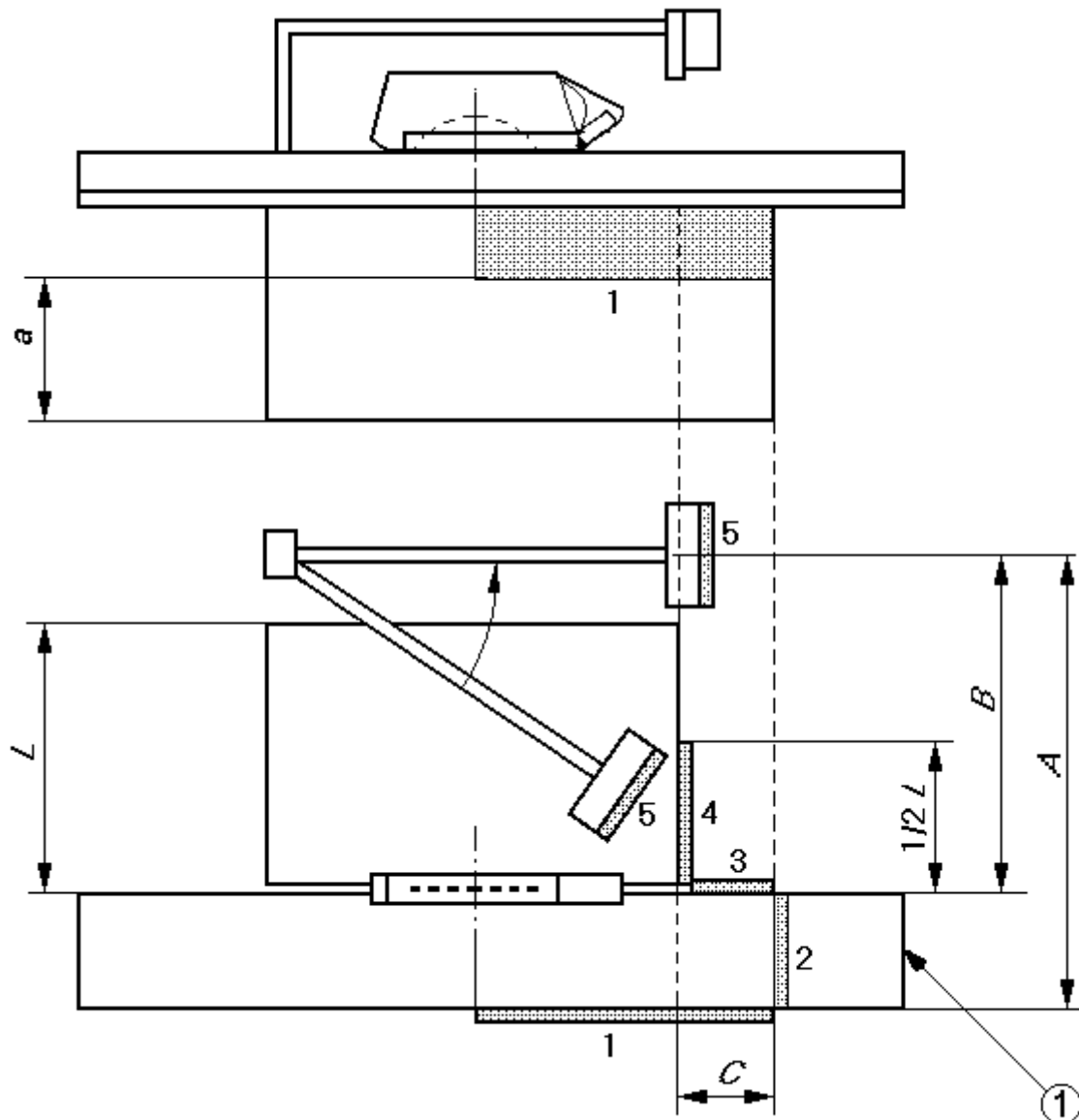
For circular saw benches equipped with a sliding table, the electrical control devices for normal stopping and emergency stop (if provided, see 5.2.5) shall be situated in the shaded area marked Y in Figure 7, or on a movable control panel.

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

5.2.2.4 Dimension saws

For dimension saws, the electrical control devices for normal stopping and emergency stop (if provided— see 5.2.5) shall be situated on a fixed part of the machine (frame or movable control panel) in the shaded areas numbered 1 to 5 in Figure 8 and in accordance with the requirements of Table 4.

On dimension saws fitted with additional control device(s) for starting of the saw blade(s) drive motor there shall be a stop control located adjacent to the start control or an emergency stop control located in position 2 in Figure 8 (see also 5.2.6).



Key

- 1 rear end of the sliding table
- A maximum distance between the edge of the sliding table and extreme position of moveable control panel
- B maximum distance between the saw line and extreme position of moveable control panel
- C distance between the rear end of the sliding table support and front edge of the fixed table
- L width of the fixed table

Figure 8 — Position of controls – Dimension saws

Table 4 — Possible positions of normal stop and emergency stop controls on dimension saws

C mm	Without movable control panel	With movable control panel		
		$B \leq 850$ mm	$B > 850$ mm	
			$A \leq 1\,300$ mm	$A > 1\,300$ mm
$0 \leq C \leq 300$	2 or 1 and 3 or $\leq$ 1 and 4	5	1 and 5 or 2 and 5	2 and 5
$C > 300$	2 1 and 3 or 1 and 4	5	1 and 5	1 and 3 and 5 or 1 and 4 and 5

The separate start control device or enabling device for scoring with post-formed edge pre-cutting (where fitted according to 5.2.6 shall be positioned on dimension saws at the rear end of the integrated sliding table or in position 1, 2 or 5 in Figure 8 (see 5.3.6, 5.3.7.4.2).

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

5.2.3 Starting

Before starting the machine all interlocked guard(s) (where fitted as indicated in 5.3.7) shall be in place and functional. This is achieved by the interlocking arrangements described in 5.3.7. For non interlocked guards, tool spindle and guides adjustments' provisions before starting see 6.3 d).

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

The category of the control circuits (also see 5.2.1) for starting and the interlocking arrangements as indicated in 5.2.7, 5.2.8, 5.3.6, 5.3.7 shall be in accordance with the requirements of EN ISO 13849-1:2006 and at least:

- a) category 1 if the control circuits are hardwired;
- b) category 3 if the control circuits include electronic components.

When fitted with a unit for scoring and/or post-formed edge pre-cutting, the scoring saw blade spindle drive motor or the post-formed edge pre-cutting saw blade drive motor shall not be capable of being started before the main saw blade drive motor.

For electrically operated machines the requirements of 9.2.5.2 of EN 60204-1:2006 but the exceptions described in 9.2.5.2 of EN 60204-1:2006 are not relevant.

The category of the control circuits (also see 5.2.1) for interlocking between starting of the main saw blade drive motor and starting of the scoring saw blade spindle drive motor or the post-formed edge pre-cutting saw blade drive motor shall be in accordance with the requirements of EN ISO 13849-1:2006 and at least (see also 5.2.6, 5.3.7):

- 1) category 1 if the control circuits are hardwired;
- 2) category 3 if the control circuits include electronic components.

Closure of movable interlocked guards shall not lead to an automatic restart of hazardous movements. For each restart a deliberate action of the operator is required.

Also see 5.3.3.

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

5.2.4 Normal stopping

The machine shall be fitted with a stop control where by the machine and – if fitted – a demountable power feed unit can be brought safely to a complete stop. The stopping action shall include disconnection from energy supply of all actuators except workpiece clamping.

The machine shall stop directly from each speed.

If the machine is fitted with a spring operated mechanical brake this stop control shall be of category 0 in accordance with the requirements of 9.2.2 of EN 60204-1:2006.

If the machine is fitted with any other type of brake e.g. electrical brake this stop control shall be of category 1 in accordance with the requirements of 9.2.2 of EN 60204-1:2006.

Where a category 1 stop control is fitted, the stopping sequence shall be:

- a) cut power to all machine actuators and any sockets (if provided) except workpiece clamping (if fitted) and actuate the brake(s);
- b) cut power to brake(s) (if electrical brake is fitted) after the saw spindle has come to rest e.g. by using a time delay in accordance with 5.2.1.4 c);

The design of the control circuits shall be such as to satisfy the normal stopping sequence. If a time delay device is used the time delay shall be at least the maximum run-down time. Either the time delay shall be fixed or the time delay adjustment device shall be sealed.

When fitted with a scoring saw blade, the scoring saw blade shall stop when the main saw blade stop control is operated.

On dimension saw fitted with a post-formed edge pre-cutting saw blade, operation of the stop control shall stop not only the rotation of the saw blade(s), but also cause the post-formed edge pre-cutting saw blade to move to its lowest adjusted position beneath the table (see 5.3.7).

The category of the control circuits (also see 5.2.1) for stopping shall be in accordance with the requirements of EN ISO 13849-1:2006 and at least:

- 1) category 1 if the control circuits are hardwired;
- 2) category 3 if the control circuits include electronic components.

For stopping power operated movements of the saw unit or fence(s) see 5.2.8, 5.3.7.

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