

Safety of woodworking machines — Circular sawing machines —

Part 1: Circular saw benches (with and without sliding table) and dimension saws

The European Standard EN 1870-1:1999 has the status of a British Standard

ICS 79.120.10

National foreword

This British Standard is the English language version of EN 1870-1:1999.
The UK participation in its preparation was entrusted to Technical Committee MTE/23, Woodworking machines, which has the responsibility to:

- aid enquirers to understand the text;
- present to the responsible European committee any enquiries on the interpretation, or proposals for change, and keep the UK interests informed;
- monitor related international and European developments and promulgate them in the UK.

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Summary of pages

This document comprises a front cover, an inside front cover, the EN title page, pages 2 to 70, an inside back cover and a back cover.

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This British Standard, having been prepared under the direction of the Engineering Sector Committee, was published under the authority of the Standards Committee and comes into effect on 15 November 1999

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ISBN 0 580 32805 8

Amendments issued since publication

Amd. No.	Date	Comments
10804 Corrigendum No. 1	December 1999	Marks on pages 18, 52 and 55 removed.

EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN 1870-1

June 1999

ICS : 79.120.10

English Version

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

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

Sicherheit von Holzbearbeitungsmaschinen -
Kreissägemaschinen - Teil 1 : Tischkreissäge-maschinen
(mit und ohne Schiebetisch) und
Formatkreissägemaschinen

This European Standard was approved by CEN on 8 January 1999.

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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 Central Secretariat has the same status as the official versions.

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COMITÉ EUROPÉEN DE NORMALISATION
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CONTENTS

Foreword 3

0 Introduction 3

1 Scope..... 3

2 Normative references..... 4

3 Definitions and terminology 6

 3.1 Definitions 6

 3.2 Terminology 13

4 List of hazards 14

5 Safety requirements and/or measures 17

 5.1 Controls 17

 5.2 Protection against mechanical hazards 24

 5.3 Protection against non-mechanical hazards 55

6 Information for use..... 58

 6.1 Warning devices 58

 6.2 Marking 58

 6.3 Instruction handbook 59

Annex A (normative) Test for rigidity of building site saws 61

Annex B (normative) Saw spindle dimensional tolerances..... 62

Annex C (normative) Riving knife mounting strength test..... 63

Annex D (normative) Riving knife lateral stability test..... 64

Annex E (normative) Machine table and insert minimum dimensions..... 65

Annex F (normative) Test for stability of sawblade guard 66

Annex G (informative) Safe working practice 68

Annex H (informative) Bibliography 69

Annex ZA (informative) Clauses of this European Standard addressing essential requirements or other provisions of EU directives 70

Foreword

This European Standard has been prepared by Technical Committee CEN/TC 142 "Woodworking machines - Safety", the secretariat of which is held by BSI.

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 December 1999, and conflicting national standards shall be withdrawn at the latest by December 1999.

This European Standard has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive(s).

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

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

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

The 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 292-1 : 1991 for a description of A, B and C standards).

0 Introduction

This European standard has been prepared to be a harmonized standard to provide one means of conforming to the essential safety requirements of the Machinery Directive and associated EFTA regulations and is a type "C" standard as defined in EN 292-1 : 1991.

The extent to which hazards are covered is indicated in the scope of this European Standard

The requirements of this European Standard concern designers, manufacturers, suppliers and importers of circular saw benches (with and without sliding table) and dimension saws.

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

Common requirements for tooling are given in EN 847-1 : 1997.

1 Scope

This European Standard specifies the requirements and/or measures to remove the hazards and limit the risks on circular saw benches (with and without sliding table) and dimensions saws, hereinafter referred to as "machines", designed to cut solid wood, chipboard, fibreboard, plywood and also these materials where they are covered with plastics edging and/or plastics/light alloy laminates.

Electrically driven machines excluded by the scope of this European Standard are covered by the requirements of EN 61029-1 : 1995 and prEN 61029-2-1 or by EN 50144 -1 : 1995.

This European Standard covers the hazards relevant to this machine as listed in 4. This European Standard does not cover the hazards related to Electromagnetic Compatibility (EMC) as required by the EMC Directive 89/336/EEC dated 03-05-89.

This European Standard does not apply to :

- hand held woodworking machines or any adaptation permitting their use in a different mode, i.e. bench mounting;
- machines set up on a bench or a table similar to a bench, which is intended to carry out work in a stationary position, capable of being lifted by one person by hand.

This European Standard is primarily directed at machines which are manufactured after the date of issue of this standard.

Circular saw benches and dimension saws can be used for ripping, cross cutting and dimensioning.

NOTE : Machines covered by this European Standard are listed under A.1.1 of Annex IV of the Machinery Directive.

2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

EN 292 - 1 :	1991	Safety of machinery - Basic concepts, general principles for design - Part 1 : Basic terminology and methodology
EN 292 - 2 :	1991	Safety of machinery - Basic concepts, general principles for design - Part 2 : Technical principles and specifications
EN 292-2/A1 :	1995	
EN 294 :	1992	Safety of machinery - Safety distances to prevent danger zones being reached by the upper limbs
EN 847-1 :	1997	Tools for woodworking - Safety requirements - Part 1 : Milling tools and circular sawblades
EN 954-1 :	1996	Safety of machinery - Safety related parts of control systems - Part 1 : General principles for design
EN 982 :	1996	Safety requirements for fluid power systems and their components - Hydraulics
EN 983 :	1996	Safety requirements for fluid power systems and their components - Pneumatics
EN 1088 :	1995	Safety of machinery - Interlocking devices associated with guards - General principles and provisions for design

EN 50144-1 :	1995	Safety of hand held electric motor operated tools - Part 1 : General requirements
EN 60204-1 :	1992	Safety of machinery - Electrical equipment of Machines - Part 1 : General requirements (IEC 204-1 : 1992, modified)
HD 21.1 S3	1997	Polyvinyl chloride insulated cables of rated voltages up to and including 450/750V - Part 1 : General requirements
HD 22.1 S3	1997	Rubber insulated cables of rated voltages up to and including 450/750V - Part 1 : General requirements
EN 60529 :	1991	Degrees of protection provided by enclosures (IP Code) (IEC 529 : 1989)
EN 60825-1 :	1994	Safety of laser products - Part 1 : Equipment classification, requirements and user's guide
EN 60947-4-1 :	1992	Low voltage switchgear and control gear - Part 4 : Contactors and motor starters - Section 1 : Electromechanical contactors and motor starters (IEC 947-4-1 : 1990)
EN 60947-5-1 :	1991	Low voltage switchgear and control gear - Part 5 : Control circuit devices and switching elements - Section 1 : Electromechanical control circuit devices (IEC 947-5-1 : 1990)
EN 61029-1 :	1995	Safety of transportable motor operated electric tools - Part 1 : General requirements (IEC 1029-1 : 1990 modified)
prEN 61029-2-1 :		Safety of transportable motor operated electric tools - Part 2 : Section 1 : Particular requirements for Circular saw benches
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 - 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 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 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 - Survey method for the measurement of emission sound pressure levels at a workstation and at other specified positions (ISO 11202 : 1995)
EN ISO 11204 :	1995	Acoustics - Noise emitted by machinery and equipment - Determination of emission sound pressure levels at the workstation and at other specified positions with environmental corrections (ISO 11204 : 1995)
ISO 3745 :	1977	Acoustics - Determination of sound power levels of noise sources - Precision methods for anechoic and semi anechoic rooms
ISO 7960 :	1995	Airborne noise emitted by machine tools - Operating conditions for woodworking machines
ISO TR 11688-1 :	1995	Acoustics - Recommended practice for the design of low noise machinery and equipment - Part 1 : Planning.

3 Definitions and terminology

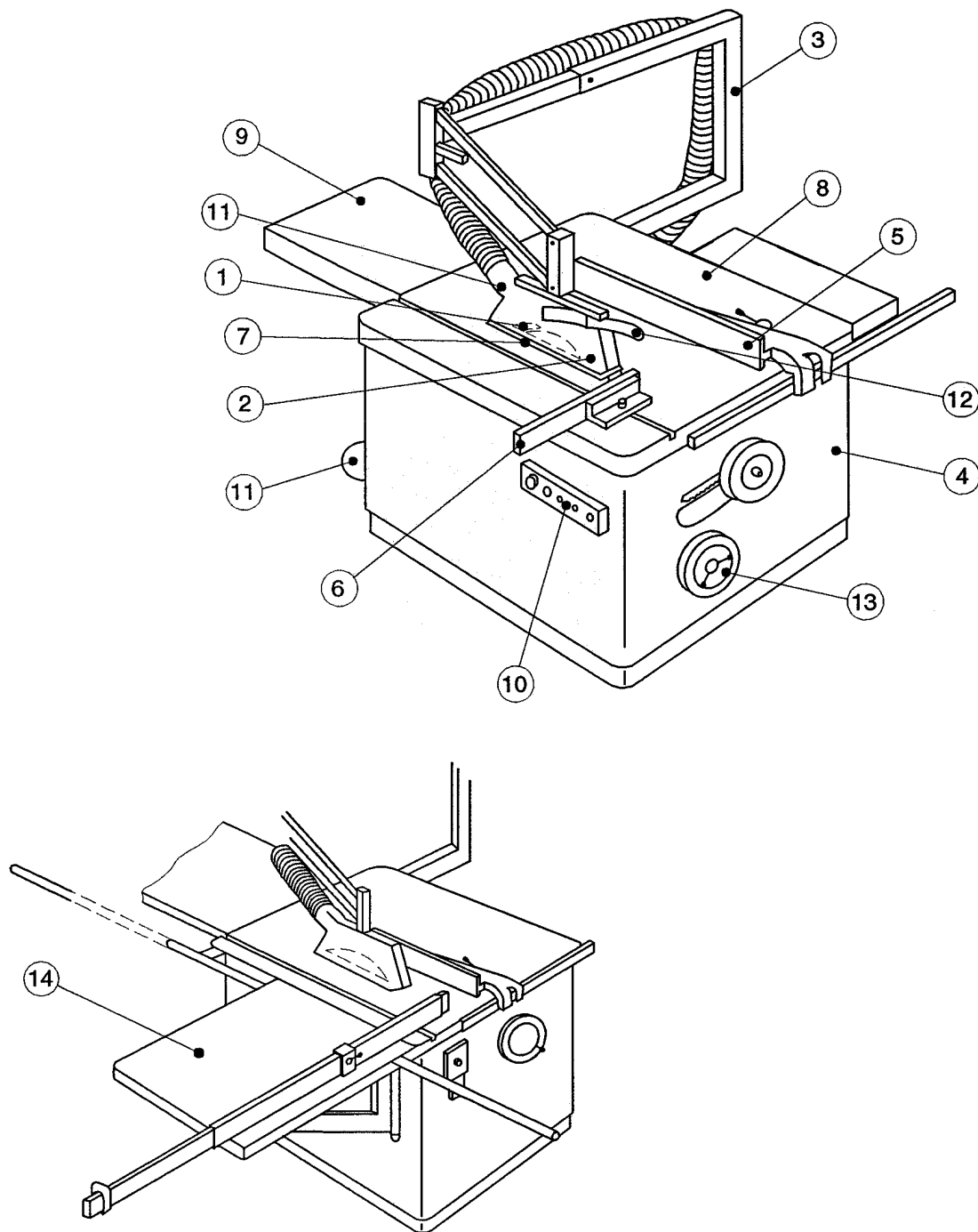
3.1 Definitions

For the purposes of this European Standard the following definitions apply :

3.1.1 circular saw bench

A hand fed machine fitted with a single circular sawblade which is fixed during the cutting operation, and a horizontal table, all or part of which is fixed during operation. The sawblade is mounted on a horizontal spindle below the table (see figure 1). The machine may have any of the following features:

- a) the facility for the sawblade to be raised and lowered through the table;
- b) the facility to tilt the sawblade for angled cutting;
- c) the machine frame below the table may be open (e.g. some building site saws, see figure 3) or closed in;
- d) an additional, manually operated sliding table (not adjacent to the sawblade);
- e) the facility for scoring.

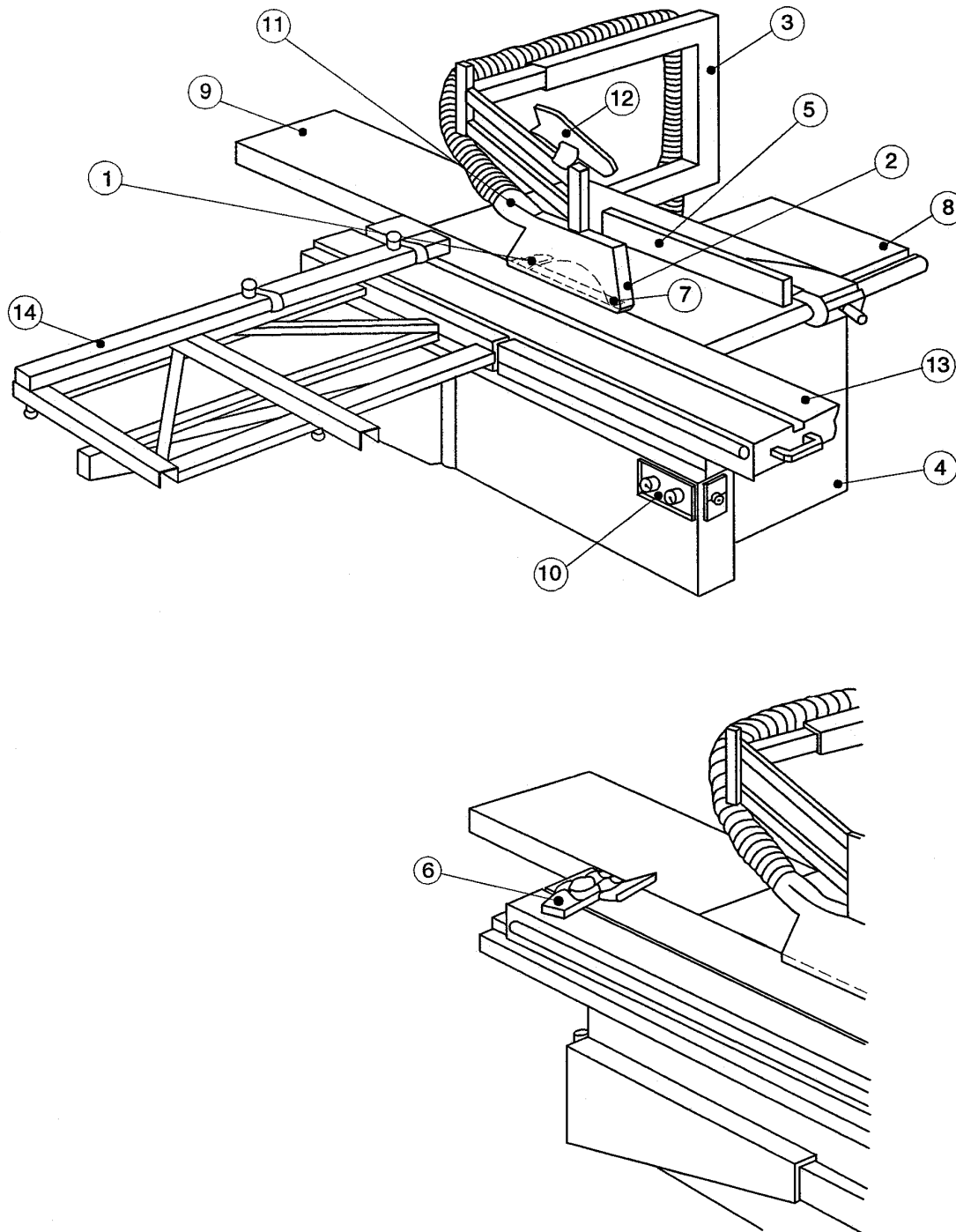


Number	Name	Number	Name
1	Riving knife	8	Table
2	Saw guard	9	Extension table
3	Saw guard support	10	Controls
4	Fixed guard beneath table	11	Exhaust outlet
5	Rip fence	12	Push stick
6	Cross-cut fence	13	Cutting height adjustment
7	Table insert	14	Travelling table

Figure 1 : Circular saw bench terminology

3.1.2 dimension saw

A hand fed circular saw bench which has an integral sliding table adjacent to the sawblade (see figure 2) which may have the facility for post-formed edge pre-cutting.



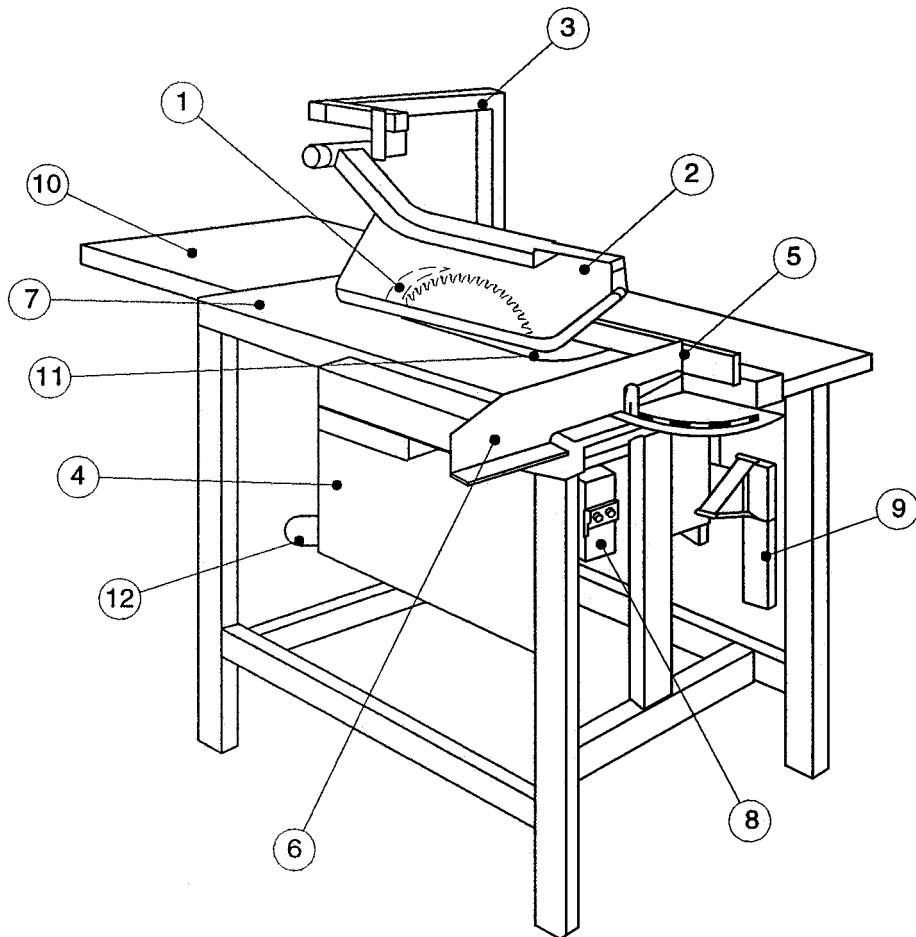
Number	Name	Number	Name
1	Riving knife	8	Table
2	Saw guard	9	Extension table
3	Saw guard support	10	Controls
4	Fixed guard beneath table	11	Exhaust outlet
5	Rip fence	12	Push stick
6	Clamping shoe	13	Travelling table
7	Table insert	14	Cross cut fence

Figure 2 : Dimension saw terminology

3.1.3 building site saw (non-tilting/non-stroking)

A hand fed circular saw bench, generally open type, with integrated lifting facilities (e.g. lifting eyes) and with a sawblade diameter ≥ 315 mm, designed for use on a building site (see figure 3).

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



Number	Name	Number	Name
1	Riving knife	7	Table
2	Saw guard	8	Controls
3	Saw guard support	9	Push block
4	Fixed guard beneath table	10	Extension table
5	Rip fence	11	Table insert
6	Cross-cut fence	12	Exhaust outlet

Figure 3 : Building site saw terminology

3.1.4 scoring

The making of a shallow cut in the surface of a workpiece, deep enough to pass through any veneer or plastics facing on the workpiece so as to prevent surface damage when the main sawblade makes its cut.

3.1.5 scoring sawblade

A sawblade mounted in front of the main sawblade which is used for scoring (see figure 4).

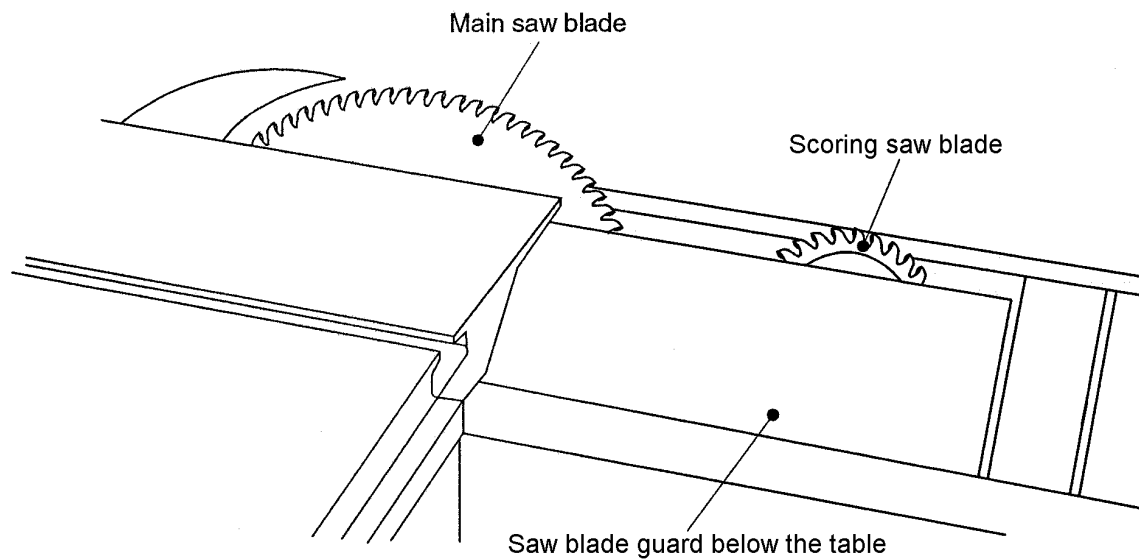


Figure 4 : Main sawblade and scoring sawblade (main sawblade guard not shown)

3.1.6 post-formed edge pre-cutting

That cut made in the rear profiled edge of the workpiece deep enough to prevent surface damage when the main sawblade makes its cut.

3.1.7 post-formed edge pre-cutting sawblade

The sawblade used for post-formed edge pre-cutting. This may be the scoring sawblade or a separate sawblade specifically for this purpose.

3.1.8 machine actuator

A power mechanism used to effect motion of the machine.

3.1.9 hand feed

The manual holding and/or manual guiding of the workpiece. Hand feed includes the use of a hand operated carriage on which the workpiece is placed manually or clamped, as illustrated in figure 5, and the use of a demountable power feed unit.

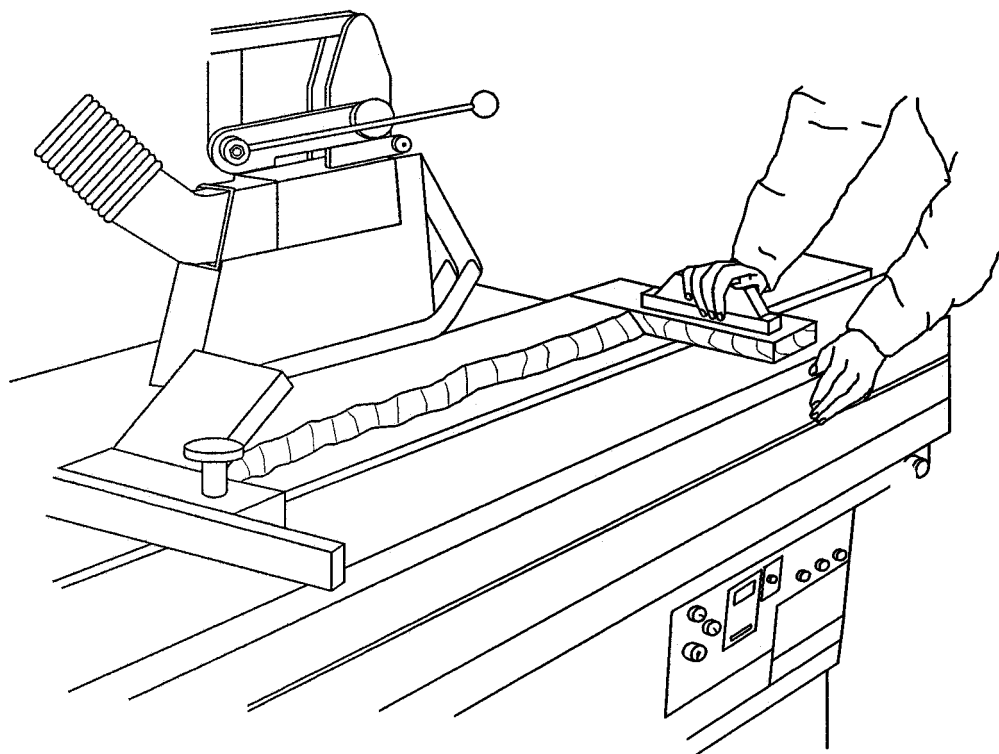


Figure 5 : Hand feeding using a sliding table

3.1.10 demountable power feed unit

A 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.

3.1.11 stationary machine

A 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.

3.1.12 transportable machine

A 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.

3.1.13 safety appliance

An 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. as illustrated in figure 6).

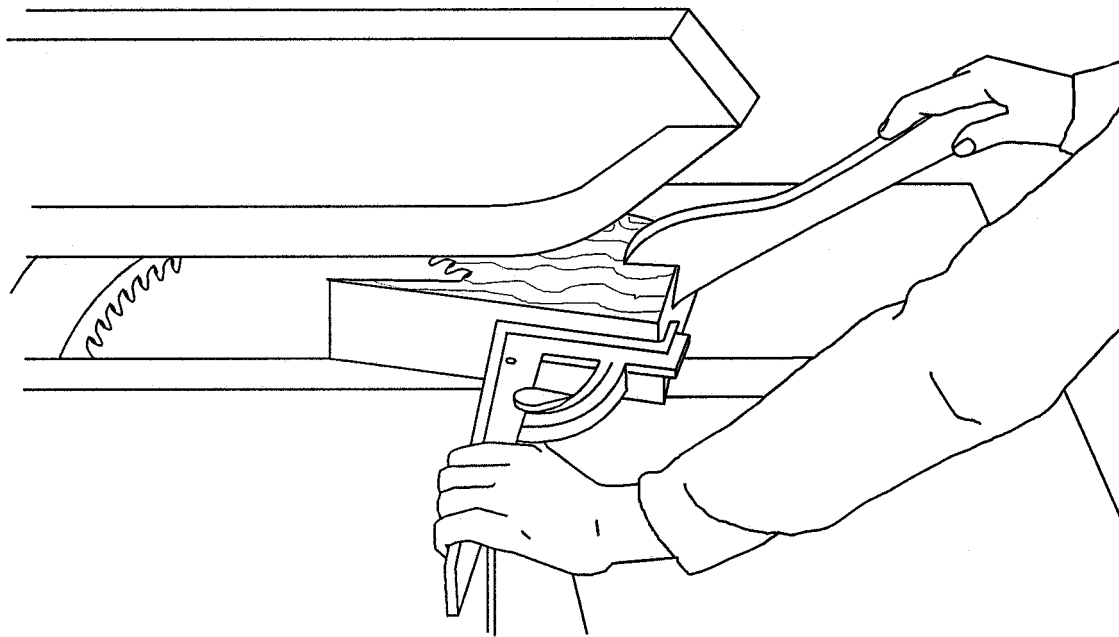


Figure 6 : Building site saw - Example of device for cutting wedges

3.1.14 ejection

The unexpected movement of the workpiece, parts of it or part of the machine from the machine during processing.

3.1.15 kickback

A particular form of ejection describing the unexpected movement of the workpiece or parts of it opposite to the direction of feed during processing.

3.1.16 run-up time

The elapsed time from the actuation of the start control device until the spindle reaches the actual speed related to the intended speed.

3.1.17 run-down time

The elapsed time from the actuation of the stop control device up to spindle standstill.

3.1.18 confirmation

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.

3.2 Terminology

The terminology for the main parts of the machine are shown in figures 1, 2, 3 and 4.

4 List of hazards

This European Standard deals with all hazards relevant to the machines as defined in the scope :

- for significant hazards by defining safety requirements and/or measures or by reference to relevant type B standards;
- for hazards which are not significant e.g. general, minor or secondary hazards by reference to relevant type A or B standards, especially parts 1 and 2 of EN 292 : 1991.

These hazards are listed in table 1 in accordance with annex A of EN 292-2 :1991/A1 : 1995.

Table 1 : List of hazards

Number	HAZARD	Relevant clause of this European Standard
1	Mechanical hazards (caused for example by : - shape - relative location - mass and stability (potential energy of elements) - mass and velocity (kinetic energy of elements) - inadequacy of the mechanical strength - accumulation of Potential energy by : - elastic elements (springs), or - liquids or gases under pressure, or - vacuum of the machine parts or workpieces	
1.1	Crushing hazard	5.2.1, 5.2.7, 5.2.8
1.2	Shearing hazard	5.2.7, 5.2.8
1.3	Cutting or severing hazard	5.2.2, 5.2.3, 5.2.7
1.4	Entanglement hazard	5.2.3, 5.2.6, 5.2.7
1.5	Drawing in or trapping hazard	5.2.7
1.6	Impact hazard	5.2.7
1.7	Stabbing or puncture hazard	Not relevant
1.8	Friction or abrasion hazard	Not relevant
1.9	High pressure fluid injection hazard	5.3.7, 5.3.8
1.10	Ejection of parts (of machinery and processed materials/workpieces)	5.2.2, 5.2.3, 5.2.5, 5.2.6, 5.2.8
1.11	Loss of stability (of machinery and machine parts)	5.2.1
1.12	Slip, trip and fall hazards in relationship with machinery (because of their mechanical nature)	Not relevant
2	Electrical hazards, caused for example by :	
2.1	Electrical contact (direct or indirect)	5.3.4, 5.3.15
2.2	Electrostatic phenomena	Not relevant
2.3	Thermal radiation or other phenomena such as ejection of molten particles, and chemical effects from short circuits, overloads, etc.	Not relevant
2.4	External influences on electrical equipment	5.1.1, 5.3.4, 5.3.12
3	Thermal hazards, resulting in :	
3.1	Burns and scalds, by a possible contact of persons, by flames or explosions and also by the radiation of heat sources	Not relevant
3.2	Health damaging effects by hot or cold work environment	Not relevant

(continued)

Table 1 : List of hazards (continued)

Number	HAZARD	Relevant clause of this European Standard
4	Hazards generated by noise, resulting in :	
4.1	hearing losses (deafness), other physiological disorders (e.g. loss of balance, loss of awareness)	5.3.2
4.2	interference with speech communication, acoustic signals, etc.	5.3.2
5	Hazards generated by vibration (resulting in a variety of neurological and vascular disorders)	Not relevant
6	Hazards generated by radiation, especially by :	
6.1	electrical arcs	Not relevant
6.2	lasers	5.3.12
6.3	ionising radiation sources	Not relevant
6.4	machines making use of high frequency electro magnetic fields	Not relevant
7	Hazards generated by materials and substances processed, used or exhausted by machinery for example :	
7.1	hazards resulting from contact with or inhalation of harmful fluids, gases, mists, fumes and dusts	5.3.3
7.2	fire and explosion hazard	5.3.1
7.3	biological and microbiological (viral or bacterial) hazards	not relevant
8	Hazards generated by neglecting ergonomic principles in machine design (mismatch of machinery with human characteristics and abilities) caused for example by :	
8.1	unhealthy postures or excessive efforts	5.1.2
8.2	inadequate consideration of human hand/arm or foot/leg anatomy	not significant
8.3	neglected use of personal protection equipment	6.3
8.4	Inadequate area lighting	Not significant
8.5	mental overload or underload, stress, etc.	Not relevant
8.6	human error	5.1.6, 6.3
9	Hazard combinations	5.1.6, 5.1.7
10	Hazards caused by failure of energy supply, breaking down of machinery parts and other functional disorders, for example :	
10.1	failure of energy supply (of energy and/or control circuits)	5.1.10
10.2	unexpected ejection of machine parts or fluids	5.2.2, 5.2.5
10.3	failure, malfunction of control system (unexpected start-up, unexpected overrun).	5.1.9, 5.1.11
10.4	errors of fitting	6.3
10.5	overturn, unexpected loss of machine stability	5.2.1

(continued)

Table 1 : List of hazards (concluded)

Number	HAZARD	Relevant clause of this European Standard
11	Hazards caused by (temporary) missing and/or incorrectly positioned safety related measures/means, for example :	
11.1	all kinds of guards	5.2.7
11.2	all kinds of safety related (protection) devices	5.1.1, 5.2.7
11.3	starting and stopping devices	5.1.2, 5.1.3, 5.1.4, 5.1.5
11.4	safety signs and signals	6.2
11.5	all kinds of information or warning devices	6.2, 6.3
11.6	energy supply disconnecting devices	5.3.15
11.7	emergency devices	5.1.5
11.8	feeding/removal means for workpieces	5.2.6, 6.3
11.9	essential equipment and accessories for safe adjusting and/or maintaining	5.3.16
11.10	equipment evacuating gases, etc.	5.3.3

5 Safety requirements and/or measures

For guidance in connection with risk reduction by design, see 3 of EN 292-2 : 1991, and in addition :

5.1 Controls

5.1.1 Safety and reliability of control systems

For the purposes of this European Standard a safety related control system is one from and including the initial manual control or position detector to the point of input to the final actuator or element e.g. motor. The safety related control systems of this machine are those for :

- starting (see 5.1.3);
- normal stopping (see 5.1.4);
- emergency stop (see 5.1.5);
- interlocking (see 5.1.3, 5.2.6.4, 5.2.7.1.5, 5.2.7.2);
- mode selection (see 5.1.6);
- powered movement of the fence and/or sawblade during machining (see 5.1.11);
- initiation of the braking system (see 5.2.4);
- maintaining the selected speed on machines fitted with devices for infinitely variable speed changing (see 5.1.7).

These control systems shall, as a minimum, be designed and constructed using “well tried” components and principles.

For the purpose of this standard "well tried" means :

(a) Electrical components if they comply with relevant standards including the following :

- EN 60947-5-1 : 1991 (section 3) for control switches with positive opening operation used as mechanically actuated position detectors for interlocking of guards and for relays used in auxiliary circuits;
- EN 60947-4-1 : 1992 for electromechanical contactors and motor starters used in mains circuits;

- HD 22.1 S3 : 1997 for rubber insulated cables;
- HD 21.1 S3 : 1997 for polyvinyl chloride cable if this cable is additionally protected against mechanical damage by positioning (e.g. inside frames);

(b) Mechanical components if they comply with 3.5 of EN 292-2 : 1991/A1 : 1995;

(c) Mechanically actuated position detectors for guards if they are actuated in the positive mode and their arrangement/fastening and the cam design/mounting complies with 5.2.2 and 5.2.3 of EN 1088 : 1995;

(d) Hydraulic and pneumatic components and systems if they comply with EN 982 : 1996 and EN 983 : 1996 respectively;

(e) Electrical principles if they comply with the first four measures listed in 9.4.2.1 of EN 60204-1 : 1992. The circuits shall be "hardwired". If electronic components are used in safety related control systems "well tried" is fulfilled if they are in accordance with 9.4.2.2 or 9.4.2.3 of EN 60204-1 : 1992.

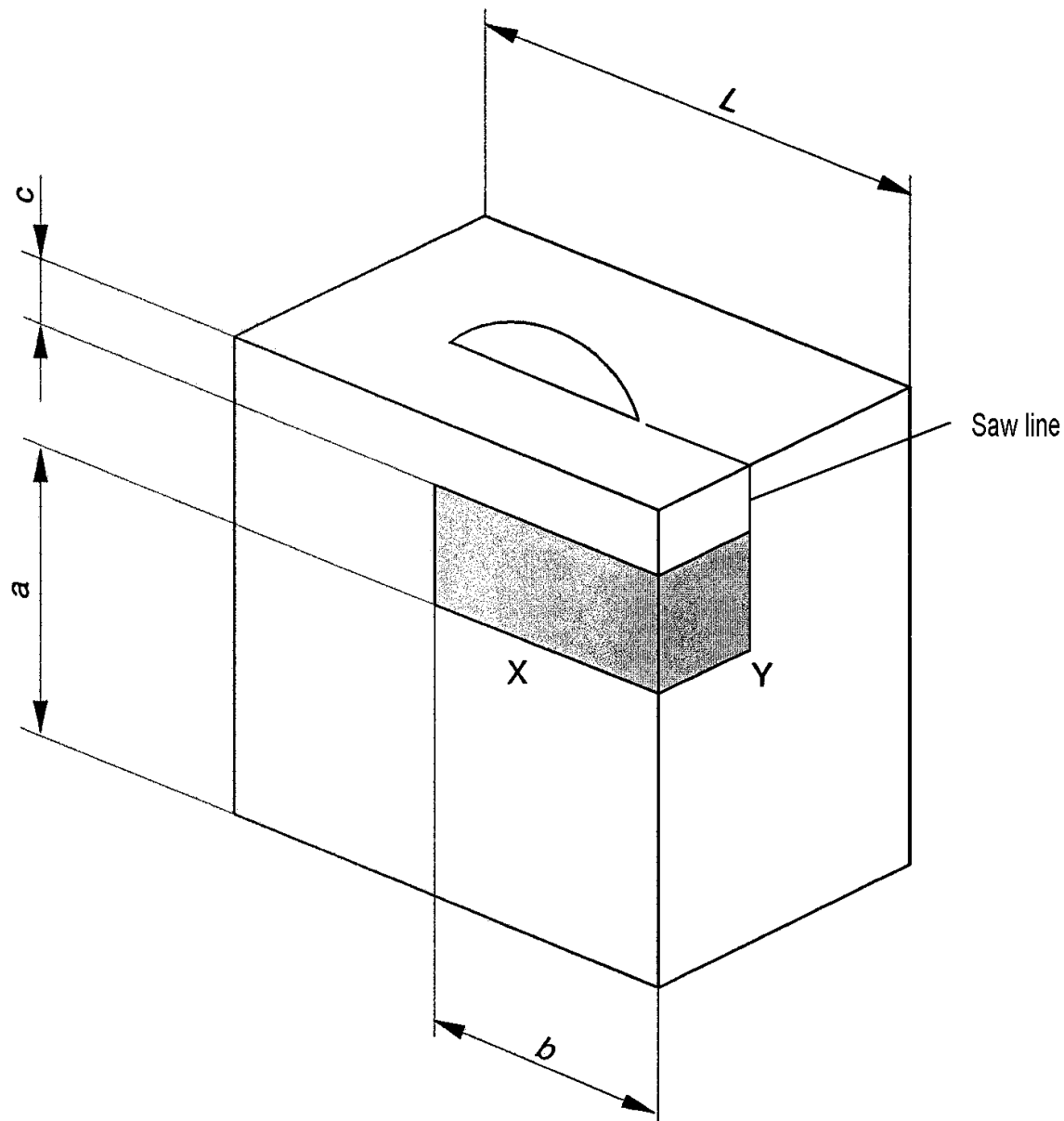
Time delay devices used in safety related control circuits may be of category B in accordance with EN 954-1 : 1996 if the time delay device is designed for at least one million actuations.

Verification : By checking the relevant drawings and/or circuit diagrams, inspection of the machine; for electrical components by requiring a confirmation from the manufacturer of the component which declares conformity with the relevant standards.

5.1.2 Position of controls

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

For circular saw benches designed to be used without a sliding table, electrical stop controls for sawblade(s) shall be situated in the shaded area marked X or the shaded area marked Y in figure 7, or on a movable control panel.



$a = 600 \text{ mm minimum}$
 $b = \frac{1}{2} L$
 $c = 50 \text{ mm minimum}$

Figure 7 : Position of controls - Circular saw benches with and without a sliding table

For circular saw benches designed to be used with a sliding table, electrical stop controls for sawblade(s) shall be situated in the shaded area marked Y in figure 7, or on a movable control panel.

For dimension saws, stop controls for sawblade(s) shall be situated on a fixed part of the machine in the shaded areas numbered 1-5 in figure 8 and in accordance with the requirements of table 2, except that where $C = 0 \text{ mm}$ the positions of these stop controls shall be in accordance with figure 7, areas X and Y.

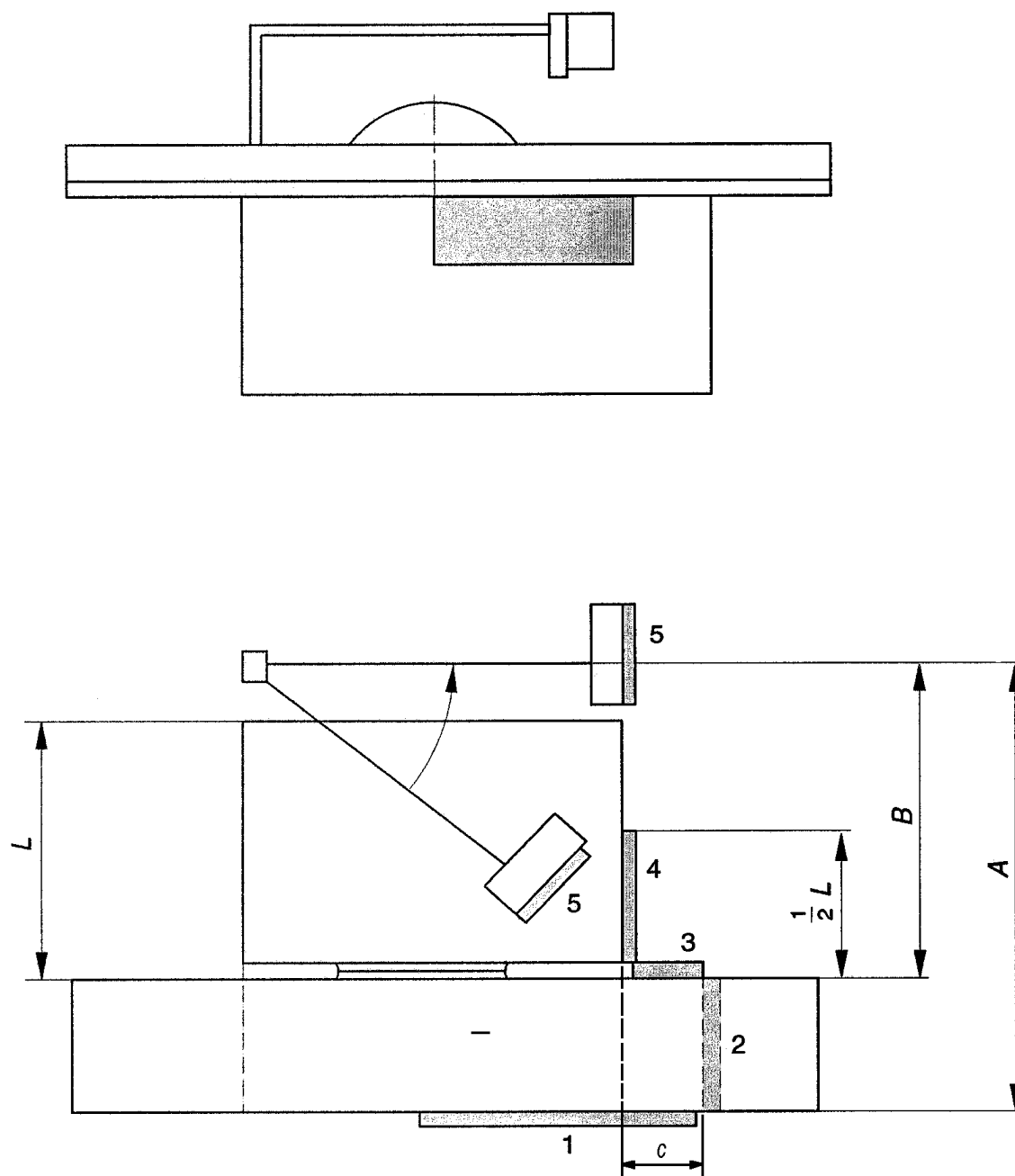


Figure 8 : Dimension saws - Position(s) of controls

Table 2 : Possible normal stop control positions on dimension saws

C mm	Without movable control panel	With movable control panel		
		A ≤ 850 mm	A > 850 mm	
			B ≤ 1300 mm	B > 1300 mm
C ≤ 300	2 or 1 and 3 or 1 and 4	5	1 and 5 or 2 and 5	2 and 5
C > 300	1 and 3 or 1 and 4	5	1 and 5	1 and 3 and 5 or 1 and 4 and 5

The start control for the main sawblade and the scoring sawblade or the post-formed edge pre-cutting sawblade (where fitted) shall be situated adjacent to one of the stop controls for the sawblade(s).

An emergency stop control required by 5.1.5 shall be situated adjacent to the start control for the sawblade(s).

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

5.1.3 Starting

See 9.2.5.2 of EN 60204-1 : 1992 and in addition :

For the purposes of this European Standard "all of the safeguards in place and functional" is achieved by the interlocking arrangements described in 5.1.3, 5.2.6.4 and 5.2.7.1.5, and "operation" means rotation and/or powered adjustment of any saw spindle and/or workpiece holding device and/or any machine element in which a tool is mounted.

The exceptions described in 9.2.5.2 of EN 60204-1 : 1992 are not relevant.

The requirements shall be met at the level of the control circuits.

When fitted with a scoring sawblade, the scoring sawblade shall not be capable of being started before the main sawblade.

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

5.1.4 Normal stopping

Machines shall be fitted with a stop control which, when actuated shall disconnect power from all the machine actuators and any sockets provided for other machine actuators (e.g. a demountable power feed) and actuate the brake (if provided).

If the machine is fitted with a mechanical brake this stop control shall be of category 0 in accordance with 9.2.2 of EN 60204-1 : 1992.

If the machine is fitted with an electrical brake this stop control shall be of category 1 in accordance with 9.2.2 of EN 60204-1 : 1992.

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