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ISO 19085-5

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Woodworking machines — Safety —

Part 5: Dimension saws

Machines à bois — Sécurité —

Partie 5: Scies au format

Reference number
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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see the following URL: www.iso.org/iso/foreword.html.

The committee responsible for this document is ISO/TC 39, *Machine tools*, Subcommittee SC 4 *Woodworking machines*.

This document is intended to be used in conjunction with ISO 19085-1, which gives requirements common to different machine types.

A list of all parts in the ISO 19085 series can be found on the ISO website.

Introduction

The ISO 19085 series of International Standards provides technical safety requirements for the design and construction of woodworking machinery. It concerns designers, manufacturers, suppliers and importers of the machines specified in the Scope. It also includes a list of informative items that the manufacturer will need to give to the user.

This document is a type-C standard as stated in ISO 12100.

The machinery concerned and the extent to which hazards, hazardous situations or hazardous events are covered are indicated in the Scope of this part of ISO 19085.

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

The full set of requirements for a particular type of woodworking machine are those given in the part of ISO 19085 applicable to that type, together with the relevant requirements from ISO 19085-1:2017, to the extent specified in the Scope of the applicable part of ISO 19085.

As far as possible, in parts of ISO 19085 other than ISO 19085-1:2017, safety requirements are referenced to the relevant sections of ISO 19085-1:2017, to avoid repetition and reduce their length. The other parts contain replacements and additions to the common requirements given in ISO 19085-1:2017.

Thus, Clauses 5, 6, 7 and 8, with their subclauses and the annexes of this part can either

— confirm as a whole,

— confirm with additions,

— exclude in total, or

— replace with specific text,

the corresponding subclauses or annexes of ISO 19085-1:2017.

This interrelation is indicated in the first paragraph of each subclause or annex right after the title by one of the following statements:

— “This subclause of ISO 19085-1:2017 applies.”;

— “This subclause of ISO 19085-1:2017 applies with the following additions.”, or “This subclause of ISO 19085-1:2017 applies with the following additions, subdivided into further specific subclauses.”;

— “This subclause of ISO 19085-1:2017 does not apply.”;

— “This subclause of ISO 19085-1:2017 is replaced by the following text.”, or “This subclause of ISO 19085-1:2017 is replaced by the following text, subdivided into further specific subclauses.”.

Specific subclauses and annexes in this part of ISO 19085 without correspondent in ISO 19085-1:2017 are indicated by the introductory sentence: “Subclause (or annex) specific to this part of ISO 19085.”

Clauses 1, 2, 4 replace the correspondent clauses of ISO 19085-1:2017, with no need for indication since they are specific to each part of the series.

NOTE Requirements for tools are given in EN 847-1:2013 and EN 847-2:2013.

Woodworking machines — Safety —

Part 5:
Dimension saws

1 Scope

This document gives the safety requirements and measures for stationary and displaceable dimension saws, hereinafter referred to as "machines", designed to cut wood and material with similar physical characteristics to wood.

NOTE 1 For the definitions of stationary and displaceable machines, see ISO 19085-1:2017, 3.4 and 3.5.

It deals with all significant hazards, hazardous situations and events as listed in Clause 4, relevant to the machines, when operated, adjusted and maintained as intended and under the conditions foreseen by the manufacturer including reasonably foreseeable misuse. Also, transport, assembly, dismantling, disabling and scrapping phases have been taken into account.

NOTE 2 For relevant but not significant hazards, e.g. sharp edges of the machine frame, see ISO 12100.

It is also applicable to machines fitted with one or more of the following devices/additional working units, whose hazards have been dealt with:

— device for the main saw blade and scoring saw blade to be raised and lowered;

— device to tilt the main saw blade and scoring saw blade for angled cutting;

— device for scoring;

— device for grooving with milling tool with a width not exceeding 20 mm;

— demountable power feed unit;

— post-formed edge pre-cutting unit;

— power-operated sliding table;

— workpiece clamping.

NOTE 3 Dimension saws are used for ripping, cross cutting, dimensioning and grooving.

It is not applicable to machines intended for use in potentially explosive atmospheres or to machines manufactured prior to the date of its publication.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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.

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

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

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

ISO 13849-1:2015, *Safety of machinery — Safety-related parts of control systems — Part 1: General principles for design*

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

ISO 19085-1:2017, *Woodworking machines — Safety — Part 1: Common requirements*

IEC 60204-1:2005, *Safety of machinery — Electrical equipment of machines — Part 1: General requirements*

EN 847-1:2013, *Tools for woodworking — Safety requirements — Part 1: Milling tools, circular saw blades*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 12100:2010, ISO 13849-1:2015, ISO 19085-1:2017, and the following apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at http://www.iso.org/obp

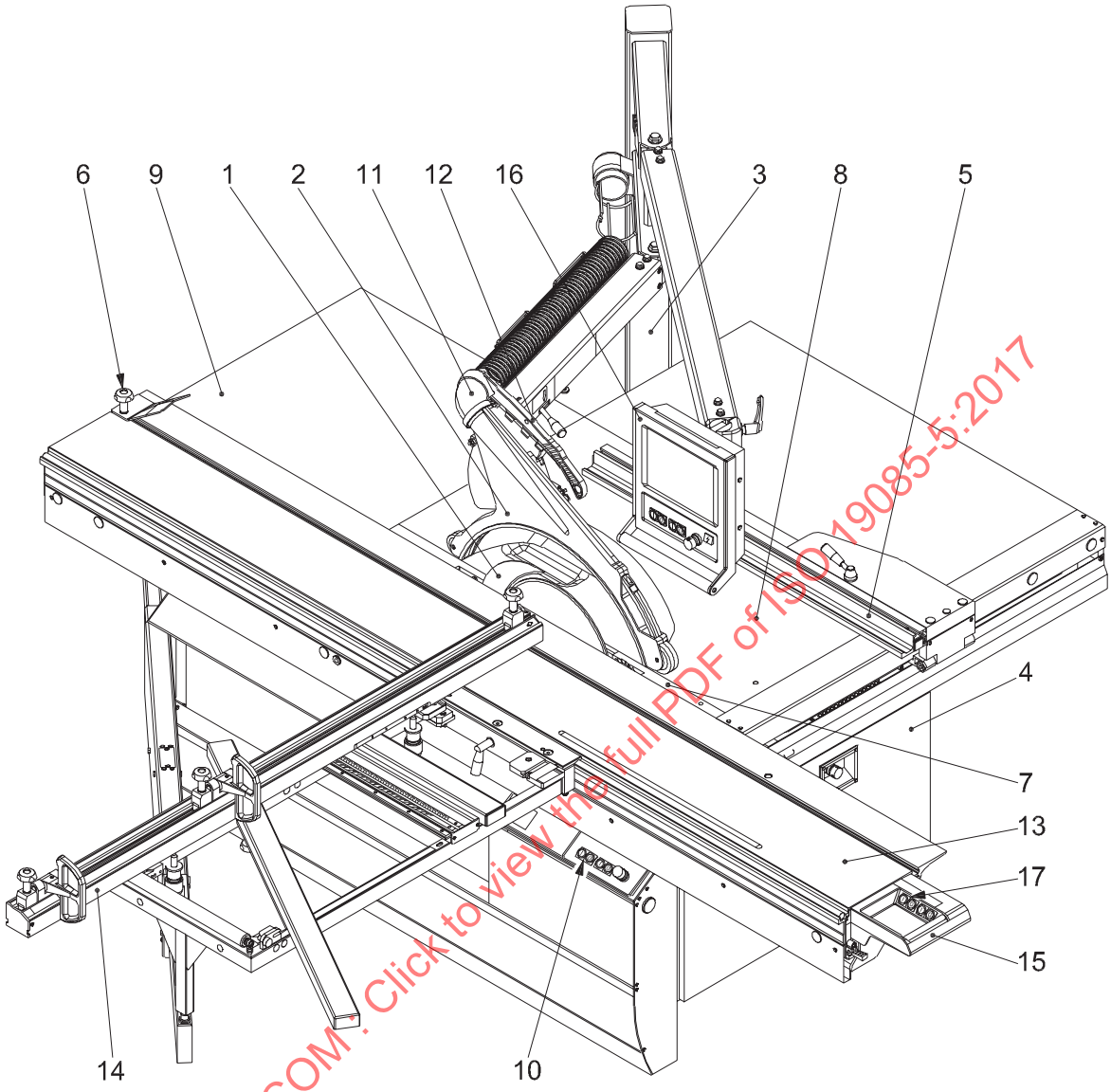
— IEC Electropedia: available at http://www.electropedia.org/

3.1
dimension saw
hand-fed machine fitted with a single main circular saw blade, which is fixed in position during the cutting operation, and a sliding table adjacent to the saw blade
Note 1 to entry: An example and the terminology are given in Figure 1.

Note 2 to entry: The main saw blade is mounted on a spindle below the table.

Note 3 to entry: It is possible to operate the machine from two possible workplaces (see Figure 3).

Note 4 to entry: The machine may have any of the devices/additional working units listed in the scope.



Key

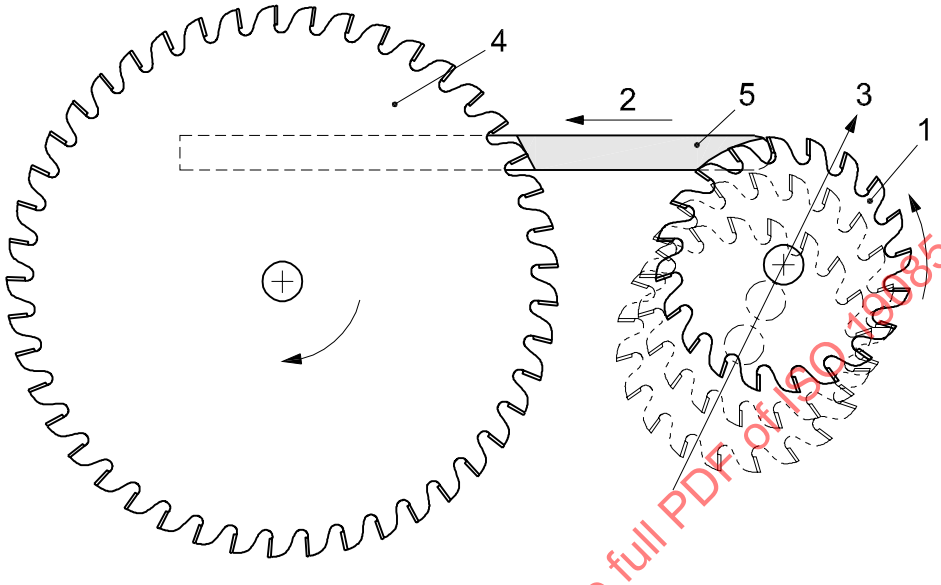
1	riving knife	10	controls
2	saw blade(s) guard	11	saw blade guard support (may include pipe for chips and dust extraction)
3	saw blade guard support	12	push stick
4	fixed guard beneath table	13	sliding table
5	rip fence	14	cross-cut fence mounted to the cross-cut sliding table
6	clamping shoe	15	sliding table handle
7	table insert	16	moveable control panel
8	machine table	17	additional controls at the rear side of the sliding table
9	extension table		

Figure 1 — Example of a dimension saw

3.2
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

3.3
post-formed edge pre-cutting
soft-formed edge pre-cutting
cut made by a separate saw blade in the front profiled edge of the workpiece deep enough to prevent surface damage when the main saw blade makes its cut

Note 1 to entry: See Figure 2.



Key
1 post-formed/soft-formed edge pre-cutting saw blade
2 feed direction of the sliding table
3 movement of post-formed/soft-formed edge pre-cutting saw blade
4 main saw blade
5 workpiece

Figure 2 — Post-formed/soft-formed edge pre-cutting

3.4
post-formed edge pre-cutting saw blade
soft-formed edge pre-cutting saw blade
saw blade used for *post-formed edge pre-cutting* (3.3) which may be the scoring saw blade or a separate saw blade specific for this purpose

3.5
initiation control
control which after actuation enables providing power to specific machine actuators, e.g. by a programmable logic control

4 List of significant hazards

This clause contains all significant hazards, hazardous situations and events (see ISO 12100), identified by risk assessment as significant for the machines as defined in Clause 1, and which require actions to eliminate or reduce the risk. This document deals with these significant hazards by defining safety requirements and 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	ISO 12100:2010	Relevant section of ISO 19085-5:2017
1	**Mechanical hazards** related to		
	— Machine parts or workpieces due to		
	a) shape	6.2.2.1, 6.2.2.2, 6.3	6.3, 6.9, 6.10, 6.6, 6.8, 7.5, 7.12
	b) relative location		5.2, 5.6, 5.7, 5.12, 6.10, 6.6, 6.8
	d) mass and velocity (kinetic energy of elements in controlled or uncontrolled motion)		5.3, 5.4.2, 5.6, 5.12, 6.4, 6.7, 7.5
	e) mechanical strength		6.2, 6.3, 6.4, 6.6, 6.11, Annex F, Annex H, Annex D
	— Accumulation of energy inside the machinery due to		
	f) liquids and gases under pressure	6.2.10, 6.3.5.4	6.3, 6.8
1.1	Crushing hazard		5.3, 5.4.2, 5.4.4, 5.6, 5.12, 6.4, 6.9, 6.10, 6.6, 6.8, 6.11, 7.13, 8.3
1.2	Shearing hazard		5.3, 5.4.2, 5.4.4, 5.6, 5.12, 6.4, 6.9, 6.10, 6.6, 6.8, 6.11, 7.13, 8.3
1.3	Cutting or severing hazard		5.3, 5.4.2, 5.4.4, 5.6, 5.12, 6.4, 6.9, 6.10, 6.6, 6.11, 7.13, 8.3
1.4	Entanglement hazard		5.3, 5.4.2, 5.4.4, 5.6, 5.12, 6.4, 6.10, 6.6, 7.13, 8.3
1.5	Drawing-in or trapping hazard		5.3, 5.4.2, 5.4.4, 5.6, 5.12, 6.4, 6.10, 6.6, 7.13, 8.3
1.6	Impact hazard		5.3, 5.4.2, 5.4.4, 5.6, 5.12, 6.4, 6.10, 6.6, 7.13, 8.3
1.8	Friction or abrasion hazard		5.3, 5.4.2, 5.4.4, 6.4, 6.6, 7.13, 8.3
1.9	High pressure fluid injection or ejection hazard		6.8, 7.7, 7.9
2	**Electrical hazards** due to		
2.1	Contact of persons with live parts (direct contact)	6.2.9, 6.3.5.4	7.4, 7.13
2.2	Contact of persons with parts which have become live under faulty conditions (indirect contact)	6.2.9	7.4, 7.13
2.3	Electrostatic phenomena	6.2.9	7.14
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	7.2, 8.3
4.2	Interference with speech communication, acoustic signals		7.2, 8.3
6	**Hazards generated by radiation**		
6.5	Lasers	6.3.4.5	7.10
7	**Hazards generated by materials and substances** (and their constituent elements) processed or used by the machinery		
7.1	Hazards from contact with or inhalation of harmful fluids and dusts	6.2.3, 6.2.4	7.3, 8.3
7.2	Fire hazard	6.2.4	7.1
8	**Hazards generated by neglecting ergonomic principles in machinery design**		
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, 7.5
8.2	Hand-arm or foot-leg anatomy	6.2.8.3	7.5

Table 1 *(continued)*

No.	Hazards, hazardous situations and hazardous events	ISO 12100:2010	Relevant section of ISO 19085-5:2017
8.4	Local lighting	6.2.8.6	8.3
8.5	Mental overload and underload, stress	6.2.8.5	8.3
8.6	Human error, human behaviour	6.2.8, 6.2.11.8, 6.2.11.10, 6.3.5.2, 6.4	8.3
8.7	Design, location or identification of manual controls	6.2.8 f), 6.2.11.8	5.2
8.8	Design or location of visual display units	6.2.8, 6.4.2	5.2
9	**Combination of hazards**	6.3.2.1	5.3, 5.4.4, 5.6, 5.7, 5.10, 6.9, 7.14, 7.12
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	5.1, 7.13
10.2	Restoration of energy supply after an interruption	6.2.11.4	5.10, 7.7, 7.9
10.3	External influences on electrical equipment	6.2.11.11	5.1, 7.10
10.5	Errors in the software	6.2.11.7	5.1
10.6	Errors made by the operator (due to mismatch of machinery with human characteristics and abilities, see 8.6)	6.2.8, 6.2.11.8, 6.2.11.10, 6.3.5.2, 6.4	5.6, 8.3
11	**Impossibility of stopping the machine in the best possible conditions**	6.2.11.1, 6.2.11.3, 6.3.5.2	5.4.2, 5.4.4, 7.13
12	**Variations in the rotational speed of tools**	6.2.2.2, 6.2.3	5.7
13	**Failure of the power supply**	6.2.11.1, 6.2.11.4	5.9
14	**Failure of the control circuit**	6.2.11, 6.3.5.4	5.1
15	**Errors of fitting**	6.2.7, 6.4.5	7.12
16	**Break-up during operation**	6.2.3	6.2
17	**Falling or ejected objects or fluids**	6.2.3, 6.2.10	6.9
18	**Loss of stability/overturning of machinery**	6.3.2.6	6.1

5 Safety requirements and measures for controls

5.1 Safety and reliability of control systems

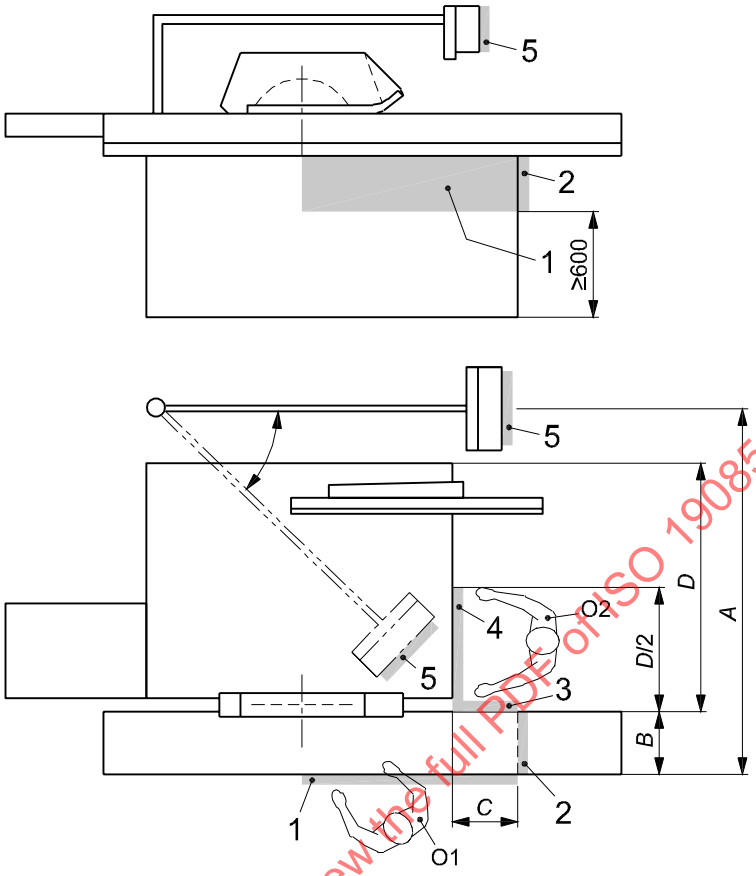
This subclause of ISO 19085-1:2017 applies.

5.2 Control devices

This subclause of ISO 19085-1:2017 applies with the following additions.

Electrical control devices shall be located on the machine frame in one or more of the shaded areas numbered 1 to 4 in Figure 3 and/or on a movable control panel (position 5 in Figure 3), and in accordance with the requirements of Table 2 for emergency stop control devices (when required according to 5.4.4).

Dimensions in millimetres



Key

A	maximum distance between the edge of the sliding table and extreme position of moveable control panel
B	width of the sliding table
C	distance between the rear end of the sliding table support and front edge of the fixed table
D	width of the fixed table
O1, O_2	alternative position of the operator
1 to 5	positions of the emergency stop (see Table 2)

Figure 3 — Position of control devices

As an exception, the main power switch may be located at a height (H) ≥ 550 mm above the floor level.

No height requirement applies for plug fixed to the machine when supply disconnection is by a plug/socket combination

A stop control device for the saw blades shall be situated adjacent to each start control device for the saw blades.

Additional control devices for starting of the saw blades, along with a stop control device, may be provided at the rear side of the sliding table.

The initiation control device for scoring with post-formed edge pre-cutting (where fitted according to 5.6) shall be positioned at the rear end of the integrated sliding table or in position 1. The selector defined in 5.6 shall be located in position 1 or 5.

Table 2 — Choice of positions of emergency stop control devices when required (according to 5.4.4)

C mm	Without movable control panel	With movable control panel	
		A ≤ 1 300 mm	*A* > 1 300 mm
0 ≤ *C* ≤ 300	2[a] or 1 and 3 or 1 and 4	1 and 5 or 2[a] and 5[a]	2[a] and 5[a] or 1 and 3 and 5 or 1 and 4 and 5
C > 300	1 and 3 or 1 and 4	1 and 5	1 and 3 and 5 or 1 and 4 and 5
[a] Only for B up to 350 mm = sliding table width.			

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

5.3 Start

This subclause of ISO 19085-1:2017 applies with the following additions.

The scoring saw blade drive or the post-formed edge pre-cutting saw blade drive shall not be capable of being started before the main saw blade drive.

The SRP/CS for interlocking of the scoring and the post-formed edge pre-cutting saw blade drives with the main saw blade drive shall achieve PL_r = c (see also 5.6, 6.6).

5.4 Safe stops

5.4.1 General

This subclause of ISO 19085-1:2017 applies.

5.4.2 Normal stop

This subclause of ISO 19085-1:2017 applies.

5.4.3 Operational stop

This subclause of ISO 19085-1:2017 does not apply.

5.4.4 Emergency stop

This subclause of ISO 19085-1:2017 applies.

5.5 Braking function of tool spindles

This subclause of ISO 19085-1:2017 applies.

5.6 Mode selection

This subclause of ISO 19085-1:2017 is replaced by the following text.

Machines fitted with a post-formed edge pre-cutting saw unit shall be fitted with a mode selection switch. The mode selection switch shall select between “scoring with post-formed edge pre-cutting” and “scoring without post-formed edge pre-cutting”.

If the mode “scoring with post-formed edge pre-cutting” is selected, start of the post-formed edge pre-cutting cycle (consisting of the raise and immediate moving down of the post-formed edge pre-cutting saw blade) shall only be possible when an initiation control device is actuated for post-formed edge pre-cutting cycle initiation (see 5.2 for location).

The initiation control shall be such that each actuation of the appropriate device allows only a single post-formed edge pre-cutting cycle to be performed within maximum 30 s from actuation, controlled by a time delay device, and a warning signal (e.g. a yellow light) shall be given (see also 8.1).

The SRP/CS for the initiation control of the post-formed edge pre-cutting cycle and for mode selection shall achieve PL_r = c.

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

5.7 Spindle speed changing

5.7.1 Spindle speed changing by changing belts on the pulleys

This subclause of ISO 19085-1:2017 applies.

5.7.2 Spindle speed changing by incremental speed change motor

This subclause of ISO 19085-1:2017 applies.

5.7.3 Infinitely variable speed by frequency inverter

This subclause of ISO 19085-1:2017 applies.

5.8 Failure of any power supply

This subclause of ISO 19085-1:2017 applies with the following additions.

On machines with a device for post-formed edge pre-cutting, in the event of power supply failure, the enabling for the post-formed edge pre-cutting saw blade shall be reset/disabled.

The SRP/CS for holding the post-formed edge pre-cutting saw blade in the low position under the table shall achieve PL_r = c.

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

5.9 Manual reset control

This subclause of ISO 19085-1:2017 does not apply.

5.10 Enabling control

This subclause of ISO 19085-1:2017 does not apply.

5.11 Machine moving part speed monitoring

This subclause of ISO 19085-1:2017 is replaced by the following text.

The control for speed monitoring shall ensure that, as soon as the real speed exceeds the speed limit, the drive shall be stopped automatically in stop category 0 according to IEC 60204-1:2005, 9.2.2.

For software requirements, see ISO 13849-1:2015, 4.6.

For limited speed monitoring of PDS(SR) (power drive system, safety-related), IEC 61800-5-2:2007, 4.2.3.4 (safely limited speed, SLS) applies.

The SRP/CS for limited speed monitoring of machine moving parts (except tools) shall achieve PL_r = b.

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

5.12 Time delay

This subclause of ISO 19085-1:2017 applies.

5.13 Power-operated adjustment of the saw blades and/or fences

Subclause specific to this part of ISO 19085.

Power-operated movements for adjusting the saw blades and/or the fences, e.g. rip fence and/or cross-cut fence, shall only be possible after actuation of either an initiation control device or a hold-to-run control device.

The SRP/CS for initiation control shall achieve PL_r = c.

Within a collision area, where the position of rip fence is as close to the saw blade that contact between the rip fence and the saw blade is possible, movement of the saw blade toward the rip fence and of the rip fence toward the saw blade shall only be possible by hold-to-run control, whereby the maximum speed of adjustment shall be 15 mm/s for linear and 5°/s for rotational movements (see also 5.11).

The SRP/CS for detection of the position of the rip fence within the collision area shall achieve PL_r = c.

Where power-operated movements are activated by hold-to-run control, not more than one power-operated movement at a time shall be possible.

NOTE 1 The simultaneous adjustment of height and tilt of the saw blade is considered to be one single movement.

NOTE 2 Saw blade rotation is allowed during power-operated adjustments.

The SRP/CS for the movement limitation shall achieve PL_r = b.

Unexpected start of power-operated movements under pre-set electronic control shall be prevented, e.g. by using a time delay device cutting power to the actuators with a time delay set to the maximum adjustment time.

The safety-related part of the corresponding control system shall achieve PL_r = c.

When the machine is fitted with the possibility to tilt the saw blade in both directions, the SRP/CS for the choice of the direction of saw blade tilt shall achieve PL_r = b.

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

6 Safety requirements and measures for protection against mechanical hazards

6.1 Stability

6.1.1 Stationary machines

This subclause of ISO 19085-1:2017 applies.

6.1.2 Displaceable machines

This subclause of ISO 19085-1:2017 applies.

6.2 Risk of break-up during operation

This subclause of ISO 19085-1:2017 applies with the following additions.

The machine table slot and the edge of the sliding table close to the tool shall be lined with easily machinable material (see ISO 19085-1:2017, 3.3).

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

6.3 Tool holder and tool design

6.3.1 General

This subclause of ISO 19085-1:2017 applies with the following additions.

Saw spindles shall be manufactured in steel with an ultimate tensile strength of at least 580 N mm^{-2}.

Verification: By checking the relevant drawings, documents and by measurement.

6.3.2 Spindle locking

This subclause of ISO 19085-1:2017 applies.

6.3.3 Circular saw blade fixing device

This subclause of ISO 19085-1:2017 applies.

6.3.4 Flange dimension for circular saw blades

This subclause of ISO 19085-1:2017 applies.

6.3.5 Fixing device for milling tools

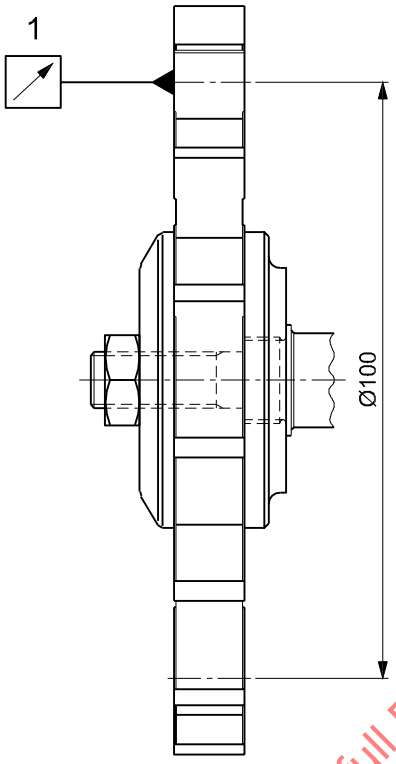
Subclause specific to this part of ISO 19085.

Machines with the device for grooving with a milling tool shall be equipped, in addition to flange or flanges, with a set of spindle rings having a minimum wall thickness of 9,75 mm and a tolerance of H7 on their internal diameter. The spindle ring shall be capable of covering the whole useable length of the spindle.

Spindle rings shall be manufactured from steel having an ultimate tensile strength of at least 580 N mm^{-2}.

The spindle ring set shall be subjected to a camming test. The camming shall not exceed 0,1 mm, when measured on the test disk at a diameter of 100 mm with the spindle set assembled using the same torque as for tool mounting (see Figure 4).

Dimensions in millimetres



Key

1 dial gauge

Figure 4 — Spindle ring camming test

As an alternative to spindle rings, machines with the device for grooving with a milling tool shall be equipped with special flange or flanges, with a higher thickness or protrusion.

Verification: By checking the relevant drawings, measurements (see Figure 4) and inspection of the machine.

6.4 Braking

6.4.1 Braking of tool spindles

This subclause of ISO 19085-1:2017 applies.

6.4.2 Maximum run-down time

This subclause of ISO 19085-1:2017 applies with the following additions.

Note: For machines with the device for grooving, it has to be determined whether the condition with the greatest kinetic energy, as required by the test in Annex B, will be achieved with a saw blade or a milling tool.

6.4.3 Brake release

This subclause of ISO 19085-1:2017 applies.

6.5 Safeguards

6.5.1 Fixed guards

This subclause of ISO 19085-1:2017 applies.

6.5.2 Interlocking movable guards

6.5.2.1 General

This subclause of ISO 19085-1:2017 applies.

6.5.2.2 Movable guards with interlocking without guard locking

This subclause of ISO 19085-1:2017 applies.

6.5.2.3 Movable guards with interlocking and guard locking

This subclause of ISO 19085-1:2017 does not apply.

6.5.3 Hold-to-run control

This subclause of ISO 19085-1:2017 applies with the following additions.

As an exception, the SRP/CS for hold-to-run shall achieve PL_r = b. In this case, an emergency stop control device shall be positioned in the vicinity of the hold-to-run control device.

6.5.4 Two-hand control

This subclause of ISO 19085-1:2017 applies.

6.5.5 Electro-sensitive protective equipment (ESPE)

This subclause of ISO 19085-1:2017 does not apply.

6.5.6 Pressure-sensitive protective equipment (PSPE)

This subclause of ISO 19085-1:2017 applies.

6.6 Prevention of access to moving parts

6.6.1 General

This subclause of ISO 19085-1:2017 does not apply.

6.6.2 Guarding of tools

This subclause of ISO 19085-1:2017 is replaced by the following text, subdivided into further specific subclauses.

6.6.2.1 Access to the saw blade above the machine table

6.6.2.1.1 General

An adjustable guard shall prevent access to the saw blade above the machine table. This guard shall be either manually or automatically adjustable. It shall be fitted to the riving knife (see Figure 6) or to the

machine separately from the riving knife. In the latter case, it shall be mounted to the machine with a support not being in line with the riving knife (see Figure 1).

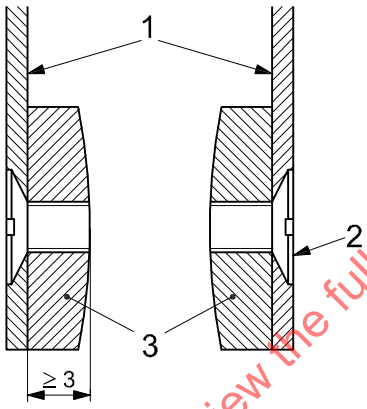
The saw blade guard shall be in accordance with the following.

a) The saw blade guard shall pass the rigidity test set in Annex H.

b) On machines designed to be used with saw blade diameters > 315 mm, the adjustable saw blade guard shall be mounted separately from the riving knife (see Figure 1).

c) The lower inner edges of the sides of the saw blade guard shall be lined with a rib, made of plastic, light alloy, wood or wood based materials. This rib shall be a minimum 3 mm in width, and shall be designed so as to prevent the saw blade teeth from cutting into the saw blade guard should the saw blade guard be displaced from the line of cut (see Figure 5). If the rib is replaceable, the fixing arrangement shall be such that it does not damage the saw blade, e.g. brass screws.

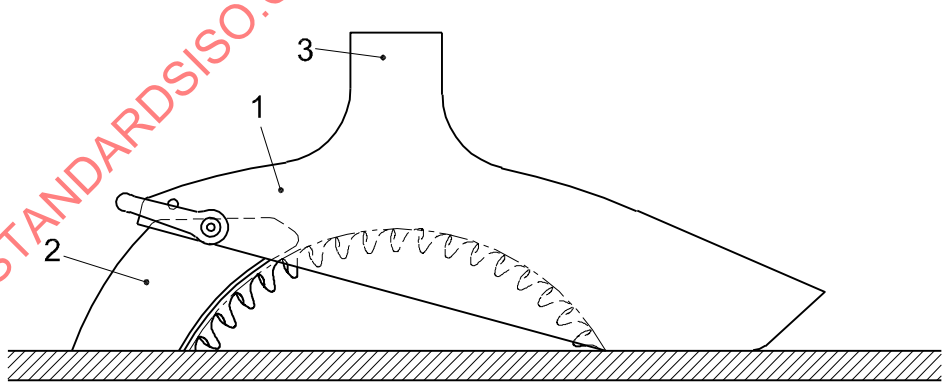
Dimensions in millimetres



Key

1 side walls
2 fixing screws
3 ribbings

Figure 5 — Example of replaceable ribs at the underside of saw blade guard side walls



Key

1 sawing blade guard
2 riving knife
3 extraction outlet

Figure 6 — Example of riving knife mounted saw blade guard

d) Independent of its pre-set adjusted position, the saw blade guard shall be capable of upward movement during the cutting operation as a function of variations in workpiece thickness and may or may not return to the pre-set adjusted position at the end of the cutting operation.

e) If a manually adjustable saw blade guard is provided, the height adjustment shall be possible without the aid of a tool.

f) On non-transparent saw blade guards, the line of cut shall be indicated, for example, by a groove moulded into the saw blade guard.

g) On machines fitted with a device for grooving with milling tools or post-forming edge pre-cutting, the saw blade guard shall be mounted separately from the riving knife, independently from the maximum diameter of the saw blades.

On machines with a saw blade guard mounted on the riving knife and having the facility to adjust the saw blade height, coverage of the saw blade during grooving shall be made possible by providing mountings for fixing a safety appliance [see 6.11 and 8.3.2 j)].

Verification: By checking the relevant drawings, inspection of the machine, relevant functional testing of the machine and performing of the saw blade guard rigidity test in accordance with Annex H.

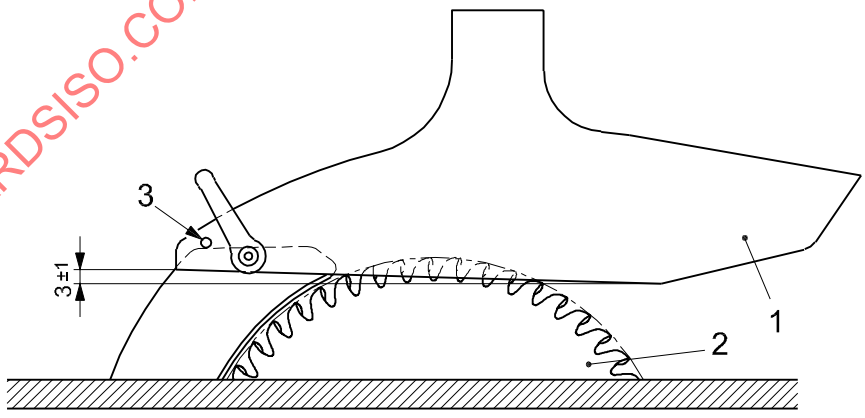
6.6.2.1.2 Additional requirements for guards mounted on the riving knife

When mounted on the riving knife, the saw blade guard shall be in accordance with the following.

a) Access to the top and sides of the exposed saw teeth shall be prevented from the guard mounting point on the riving knife to the first cutting tooth at the machine table level for all intended saw blade diameters and highest vertical position of the saw blade. The saw blade guard shall, at the same time, prevent access from the top of the scoring saw blade (see Figure 6). It may be necessary to provide more than one fixing point on the riving knife in order to achieve these requirements.

b) To avoid jamming of the workpiece during feeding, the rear end of the bottom edge of the saw blade guard shall be higher by at least 2 mm and no more than 4 mm than the front end if the saw blade guard is raised to its highest position; see Figure 7. This requirement needs to be fulfilled at all possible vertical positions of the saw blade.

Dimensions in millimetres



Key

1 saw blade guard adjusted for maximum cutting capacity
2 saw blade
3 end stop

Figure 7 — Riving-knife-mounted saw blade guard raised to highest position

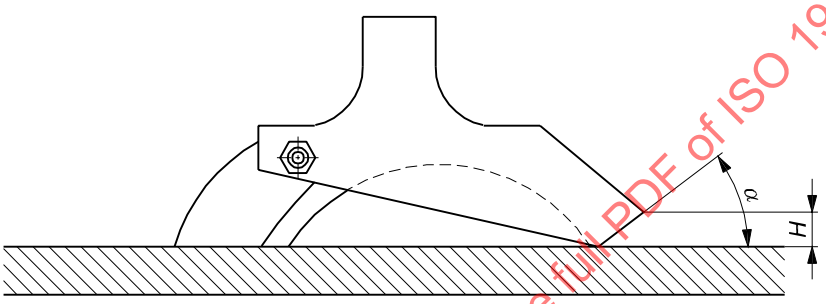
c) The mounting and dismounting of the saw blade guard on the riving knife shall be possible without the aid of a tool.

d) In the area where the saw blade guard can come in contact with the rip fence in the lower position, the maximum width of the saw blade guard shall not exceed 40 mm. The maximum width of the saw blade guard on the fence side shall be 15 mm from the saw blade flange.

e) The in-feed end of the base of the saw blade guard shall have a "lead-in" in order to avoid misfeeding should the saw blade guard be incorrectly set or the workpiece be uneven. If the saw unit is fitted with the maximum saw blade and raised to the maximum cutting depth and the saw blade guard is lowered to the machine table, the lead in shall be in accordance with the following:

   1) the minimum height, *H*, (see Figure 8) shall be such that the saw blade guard can be raised by a workpiece with a thickness of 20 % of the maximum cutting depth for which the machine is designed;

   2) the angle, α, shall be not more than 45°.



Key

α in-feed end lead-in maximum angle

H in-feed end minimum lead-in height

Figure 8 — Dimensions of "lead-in" at front edge of riving-knife-mounted saw blade guards

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

6.6.2.1.3 Additional requirements for saw blade guards mounted separately from the riving knife

When mounted separately from the riving knife, the saw blade guard shall be in accordance with the following.

a) It shall prevent access to the top and both sides of the saw blades, when the saw blades are in the vertical position and adjusted in their highest position.

b) It shall be adjustable in height from the table level up to a maximum height of 5 mm above the uppermost saw teeth when the machine is fitted with the largest saw blade for which it is designed.

c) Means of adjustment shall ensure that the bottom of the saw blade guard remains parallel to the table at all times (within 1 mm for every 100 mm length).

d) It shall be fitted with a device for easy height adjustment, e.g. a handle or the push stick positioned in a holder on the saw blade guard.

e) When it is adjusted to its lowest position, the height of the saw blade shall be visible from the point at which the operator adjusts the saw blade height.

f) In-feed and out-feed ends of its base shall be designed to allow upward vertical movement of the saw blade guard in order to avoid misfeeding should the saw blade guard be incorrectly set or the workpiece be uneven. This can be achieved, for example, by the following:

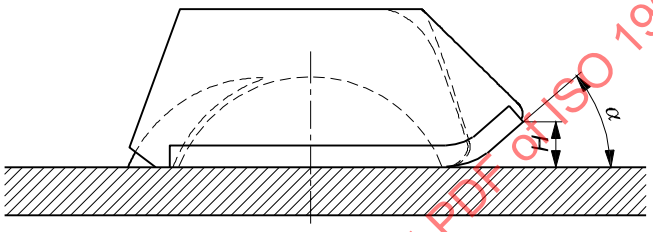
1) providing "lead-ins", where the front lead-in shall (see Figure 9)

i) have a minimum height, *H*, such that the saw blade guard can be raised by a workpiece with a thickness of 20 % of the maximum cutting depth for which the machine is designed, and

ii) whose angle, α, shall be not more than 45°;

2) equipping the saw blade guard with rollers (see Figure 10), whose minimum radius, *H*, shall be such that the saw blade guard can be raised by a workpiece with a thickness of 20 % of the maximum cutting depth for which the machine is designed;

3) providing an automatically adjustable saw blade guard, e.g. of the kind with a three-roller climber on the front edge.

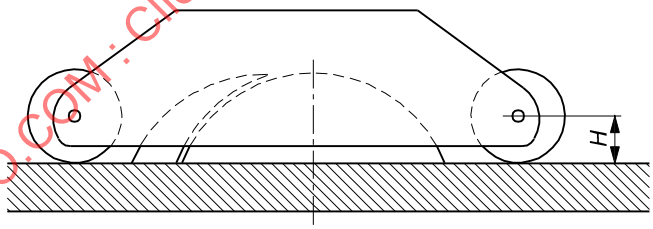


Key

α in-feed end lead-in maximum angle

H in-feed end minimum lead-in height

Figure 9 — Dimensions of "lead-in" at front edge of saw blade guards mounted on table separately from riving knife



Key

H in-feed end minimum lead-in roller radius

Figure 10 — Dimensions of roller at front edge of saw blade guards mounted on table separately from riving knife

g) In the area where the saw blade guard can come in contact with the rip fence in the lower position, the maximum width of the saw blade guard shall not exceed 50 mm. The maximum width of this saw blade guard on the fence side shall be 15 mm from the saw blade flange (see Figure 11).

h) When an automatically adjustable saw blade guard is provided, the following requirements shall be fulfilled:

1) it shall raise up when feeding the workpiece for any workpiece height up to maximum cutting capacity;

2) it shall be possible to be manually pre-adjusted in any height position.

Dimensions in millimetres

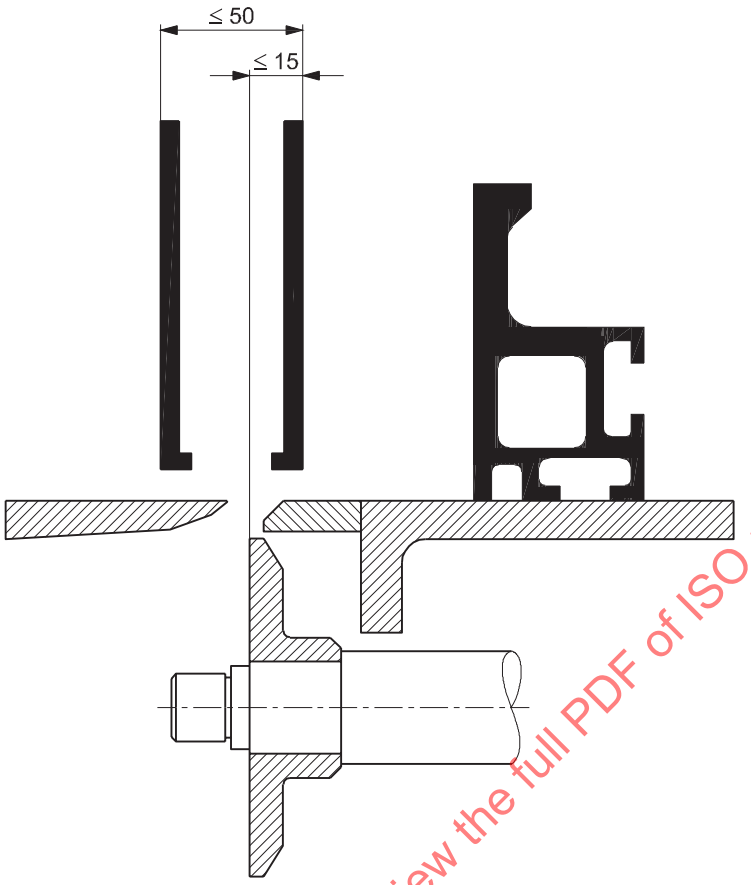


Figure 11 — Maximum width of saw blade guard on machines with saw blade guard mounted separately from riving knife and with non-tilting saw blade

For machines with the facility to tilt the saw blade towards one side or with the facility for grooving with milling tools, either one or more auxiliary guards shall be provided, or the saw blade guard shall be provided with one or more extension pieces.

For machines with the facility to tilt the saw blade to both sides, the saw blade guard shall be provided with two extension pieces or one extension piece in conjunction with the facility for repositioning the saw blade guard.

The auxiliary saw blade guard or the extension pieces shall be exchangeable without the aid of a tool and shall be wide enough to avoid contact with the saw blade or milling tool in any possible position.

The support for the saw blade guard shall be designed in such a way that it cannot be dismounted from the machine without the aid of a tool.

If the support for the saw blade guard allows the movement of the saw blade guard away from its position above the saw blade, then this movement shall

— be capable of being carried out without the aid of a tool, and

— be stopped by providing an end stop, such that when the saw blade guard is moved back into position above the saw blade, no further adjustment is necessary.

When the machine is fitted with a post-formed edge pre-cutting saw blade, the saw blade guard shall be interlocked so that post-formed edge pre-cutting is not possible unless the saw blade guard is at the same height or lower than the maximum rise for post-formed edge pre-cutting for which the machine is designed. When the post-formed edge pre-cutting saw blade stops, it shall move to its lowest position beneath the table.

The SRP/CS for the interlocking of the post-formed edge pre-cut with the saw blade guard position shall achieve PL_r = c.

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

6.6.2.1.4 Slot for the saw blade/milling tool in the table or the table slot lining

The total width *L* of the slot for the saw blade shall not exceed 12 mm for saw blade diameter of not more than 500 mm and 15 mm for saw blade diameters exceeding 500 mm. Bevel dimension on table edges shall not exceed 4 mm (see Figure 12) (where *L* is measured, the table bevel edges are not taken into account). On the fixed saw flange side of the table, the distance *D* between the fixed saw flange and the edge of the table slot shall not exceed 3 mm (see Figure 12).

Dimensions in millimetres

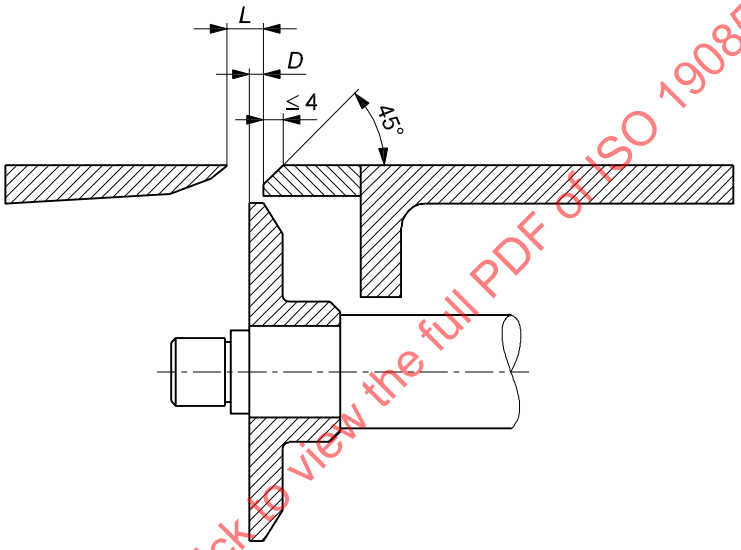


Figure 12 — Width of table slot and distance of fixed saw flange from edge of table slot

As an exception, the width of the slot may exceed the above dimension up to a maximum of 25 mm when the machine is equipped with a milling tool for grooving. In this case, an additional table insert for grooving shall be provided.

Table inserts shall not be capable of being removed without the aid of a tool.

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

6.6.2.2 Access to the saw blade below the machine table

Access to the tools (saw blade, milling tool) below the table shall be prevented by a fixed guard according to 6.5.1.

For changing the saw blade a movable guard beneath the sliding table shall be provided. This guard shall cover those parts of the saw blades that are exposed when the sliding table is moved to either of its end stops. The saw blade drives and the drive of the powered sliding table shall be interlocked with this guard. The area below the machine table surface consisting of the sliding table thickness and the area necessary for fixing the tool and tilting the saw unit may be uncovered.

The SRP/CS for the interlocking of the saw blade drives and the drive of the powered sliding table with the moveable guard shall achieve PL_r = c.

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

6.6.3 Guarding of drives

This subclause of ISO 19085-1:2017 applies with the following additions.

A movable guard interlocked to the saw blade drive shall be provided if access is required for changing the saw blade's rotational speed by changing the belt position.

6.6.4 Guarding of shearing and/or crushing zones

This subclause of ISO 19085-1:2017 is replaced by the following text, subdivided into further specific subclauses.

6.6.4.1 Crushing hazard for the body

Crushing hazards for the body between power-operated moving parts of the rip fence and fixed parts of the machine, e.g. the sliding table or machine body, shall be avoided by either

a) a hold-to-run control for the movement of the rip fence within the crushing area for the body,

b) a mechanically actuated trip device (PSPE), which shall meet the following requirements:

   1) be located on the fixed parts of the machine, e.g. frame, at maximum 50 mm below table level; and

   2) the crushing force shall not exceed 400 N, or

c) reduction of the force of the fence toward the fixed parts of the machine, e.g. frame or sliding table to a maximum of 400 N.

NOTE Crushing hazards for the body according to ISO 13854 occur if power-operated moving parts go below a safety distance of 500 mm toward fixed parts.

The SRP/CS for detection of the position of the rip fence within the crushing area for the body shall achieve PL_r = c.

The SRP/CS for limiting the power-operated movement force shall achieve PL_r = c.

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

6.6.4.2 Crushing/shearing hazard of arm/hand/finger

Crushing and shearing hazards for the arm, hand and fingers between power-operated moving parts of the fences and fixed parts of the machine, e.g. the sliding table or machine body, shall be avoided by either

a) a hold-to-run control device for the movement of the fences within the crushing area for the arm/hand/finger, or

b) a mechanically actuated trip device (PSPE), which shall

   1) be located on the fixed parts of the machine, e.g. frame or integrated sliding table at table level, and

   2) whose crushing force shall not exceed 150 N.

NOTE Crushing hazards for arm, hand and finger according to ISO 13854 occur if power-operated moving parts go below a safety distance of 120 mm for arm and hand and 25 mm for finger toward fixed parts.

The SRP/CS for detection of the shearing and crushing area for arm/hand/finger shall achieve PL_r = c.

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

6.7 Impact hazard

This subclause of ISO 19085-1:2017 is replaced by the following specific text.

The speed for the power-operated movement of the fences shall be ≤ 25 m min^{-1}.

On machines fitted with power-operated movement of the sliding table, impact shall be avoided by meeting the following requirements. See also 8.3.2 b).

a) Forward and backward movement shall be controlled by a hold-to-run control device positioned on the integrated sliding table, whereby the exception in 6.5.3 is not allowed.

b) The speed of the power-operated movement of the sliding table shall be adjustable, not exceed 40 m min^{-1} and be monitored according to 5.11.

c) After the hold-to-run control device is released, the sliding table shall stop within a distance of 150 mm.

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

6.8 Clamping devices

This subclause of ISO 19085-1:2017 applies with the following additions.

On machines with a power-operated sliding table, a power-operated clamping device or a combination of the work-piece clamping shoe (see 6.10.3) or the cross-cut fence and a mechanical end stop shall be supplied to fix the work-piece during operation. The mechanical end stop may be included in the hold-to-run control device for activating the movement of the sliding table.

The full clamping force of each clamping unit shall be at least 700 N over the whole range of adjustment of the clamping device.

Where pneumatic or hydraulic clamping is provided, the requirements of ISO 4414:2010 and ISO 4413:2010, respectively, shall be met.

6.9 Measures against ejection

6.9.1 General

This subclause of ISO 19085-1:2017 applies with the following additions.

Anti-splinter devices are not relevant.

6.9.2 Guards materials and characteristics

6.9.2.1 Choice of class of guards

This subclause of ISO 19085-1:2017 applies with the following additions.

Guards used to prevent ejection shall be of class B.

6.9.2.2 Guards of class A

This sub clause of ISO 19085-1:2017 does not apply.

6.9.2.3 Guards of class B

This subclause of ISO 19085-1:2017 applies.

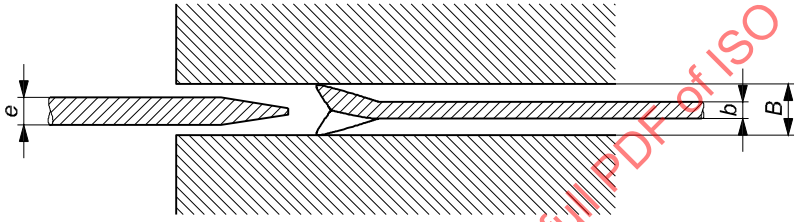
6.9.3 Anti-kickback devices

Subclause specific to this part of ISO 19085.

To reduce the risk of kick-back, the machine shall be supplied with a riving knife mounting arrangement and one or more riving knives to accommodate the range of saw blades which are intended for use with the machine [see 8.3.2 f) and g)].

The riving knives and the mounting arrangement shall be in accordance with the following requirements.

a) They shall be manufactured from steel with an ultimate tensile strength of at least 580 N mm^{-2} or of a comparable material, have flat sides (within 0,2 mm per 100 mm) and shall have a thickness less than the width of cut (kerf) and at least 0,2 mm greater than the saw blade plate (see Figure 13).



Key

B kerf (width of saw blade cut)

b saw blade plate thickness

e riving knife thickness

Figure 13 — Riving knife thickness in relation to saw blade dimensions

b) They shall be of constant thickness (within ± 0,1 mm) throughout their working length; their leading edge shall be chamfered to provide a "lead-in";

c) They shall be capable of vertical adjustment. For machines with a saw blade guard mounted separately from the riving knife, their tip shall reach a level between 0 mm and 2 mm below the highest point on the periphery of the saw blade when set in accordance with the requirements of 6.9.3 d) [see Figure 14 and 8.3.2 g)]. The tip of the riving knives designed to carry saw blade guards may reach a level higher than the highest point on the periphery of the saw blade (see Figure 7).

Dimensions in millimetres

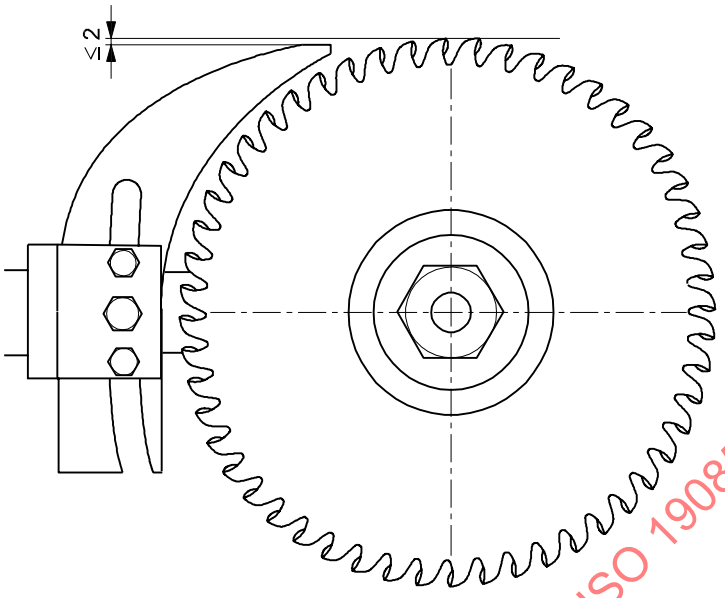


Figure 14 — Riving knife height adjustment

d) They shall be designed to be mounted and adjusted so that the gap between them and the saw blade shall be at least 3 mm and shall not exceed 8 mm, measured radially through the centre of the saw spindle in the area above the table (see Figure 15).

Dimensions in millimetres

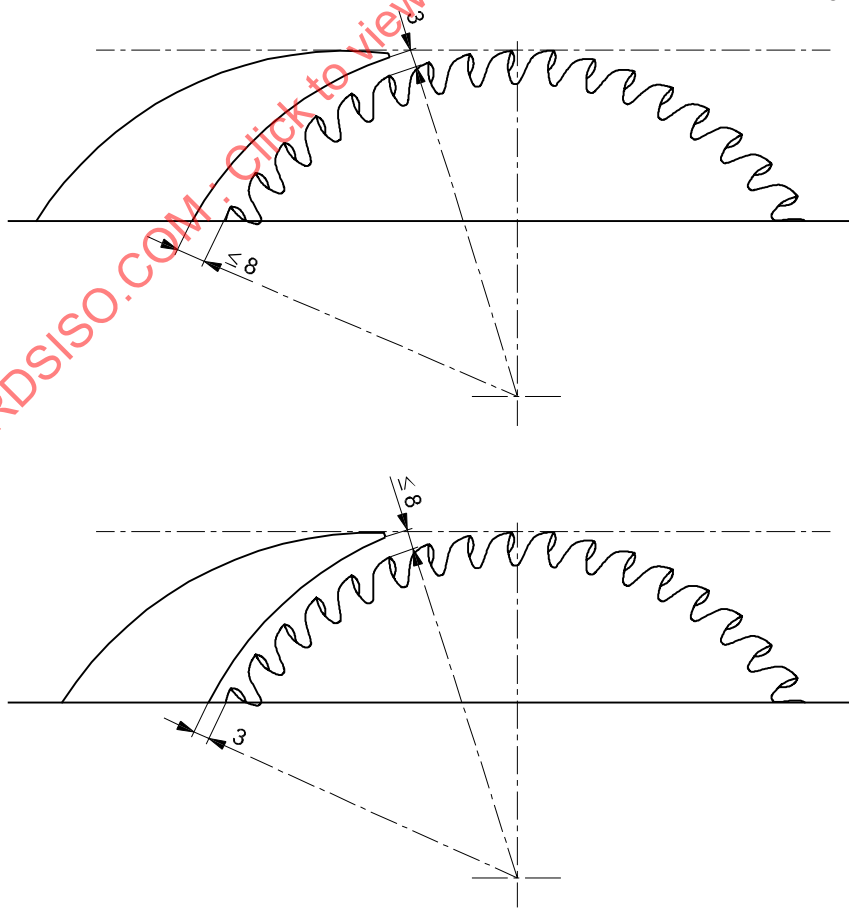
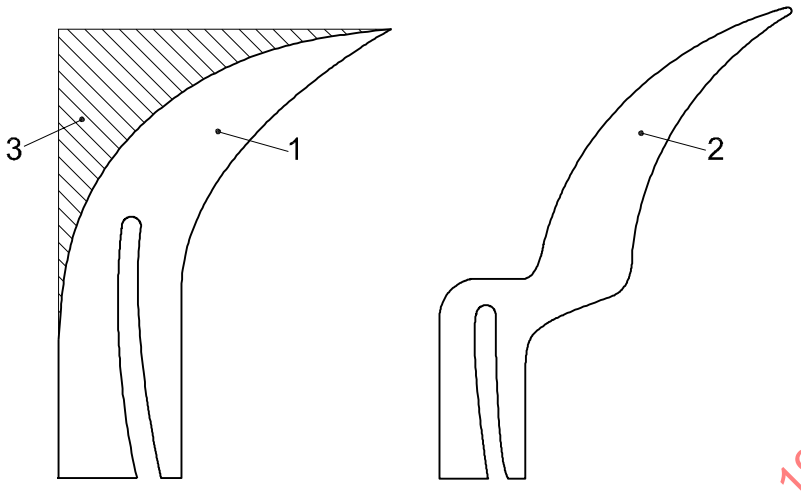


Figure 15 — Positioning limits for riving knife design

e) Their front and rear contours shall be continuous curves or straight lines, without any flexure which could weaken them (e.g. see Figure 16).

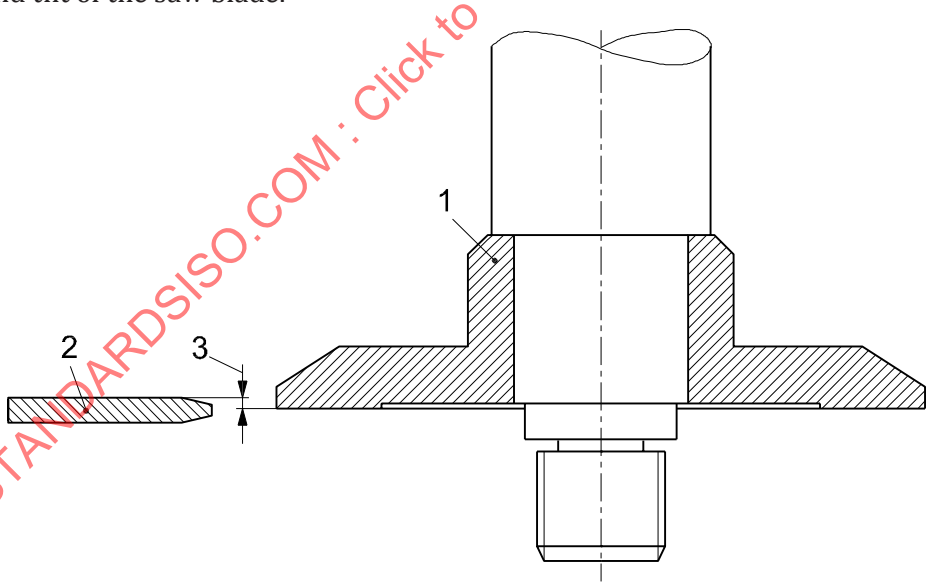


Key

1 example of acceptable riving knife shape
2 example of unacceptable riving knife shape
3 shaded area: shape of riving knife for machines with a riving knife mounted saw blade guard

Figure 16 — Example of shape of riving knife

f) Their mounting arrangement shall provide a positive offset of their position relative to the rear saw flange of not more than 0,5 mm (key item 3 of Figure 17); this offset shall be maintained with the rise, fall and tilt of the saw blade.



Key

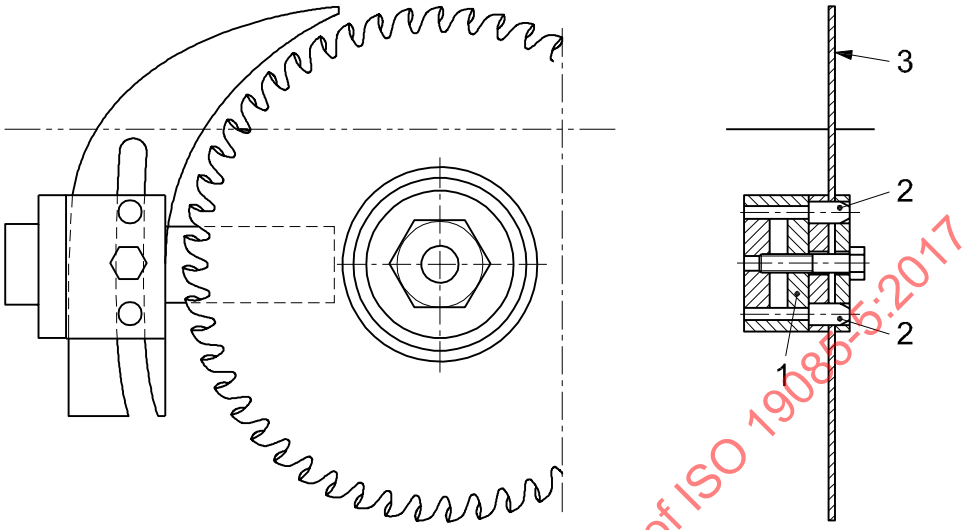
1 fixed saw flange
2 riving knife
3 0,5 mm max

Figure 17 — Positioning of riving knife in relation to fixed saw flange

g) They and their mountings shall be longitudinally stable (see F.1).

h) They and their mountings shall be laterally stable (see F.2).

i) They shall be held in position by guiding elements, e.g. guiding pins (see Figure 18); their fixing slot shall be not more than 0,5 mm wider than the guiding elements.



Key

1 riving knife mounting arrangement
2 guiding pins
3 riving knife

Figure 18 — Example of riving knife mounting arrangement with guiding pins

j) Their fixing slots shall be open ended, should it be necessary to change them to accommodate different diameters of saw blade.

Verification: By checking the relevant drawings, inspection of the machine, measurement, relevant functional testing of the machine and performing the riving knife rigidity tests according to Annex F.

6.10 Work-piece supports and guides

This subclause of ISO 19085-1:2017 is replaced by the following text, subdivided into further specific subclauses.

6.10.1 Rip fence

The machine shall be equipped with a rip fence to allow the cutting of different workpiece widths.

The rip fence shall fulfil the following requirements.

a) It shall be made from plastic, light alloy or wood if there is a possibility of contact with the saw blade.

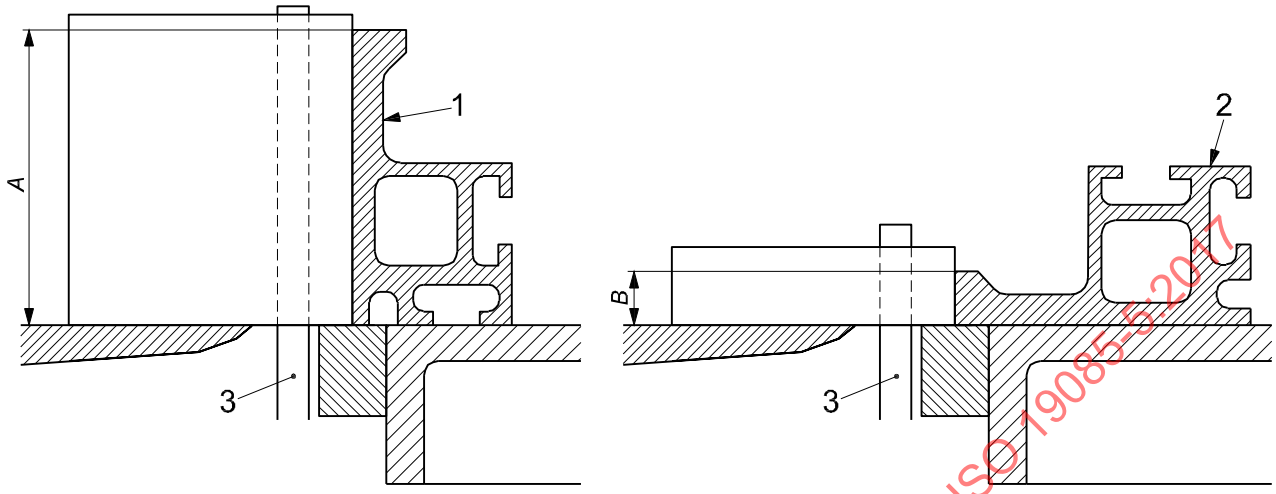
b) It shall be adjustable so that its out-feed end can be moved forward to a point in line with the front edge of the riving knife, and rearwards to a point at table level which is in line with the first cutting tooth of the largest saw blade for which the machine is designed and adjusted to the maximum cutting height.

c) It shall be manufactured from a single component, having two guiding surfaces, a lower one with a height B for shallow or angled cutting and a higher one with a height A for deep cutting and (see Figure 19); the height B shall be between 5 mm and 15 mm and the height A shall be

   1) min. 30 mm for machines designed to be used with saw blades of max. diameter up to 200 mm,

2) min. 50 mm for machines designed to be used with saw blades of max. diameter up to 315 mm,

3) min. 90 mm for machines designed to be used with saw blades of max. diameter higher than 315 mm.

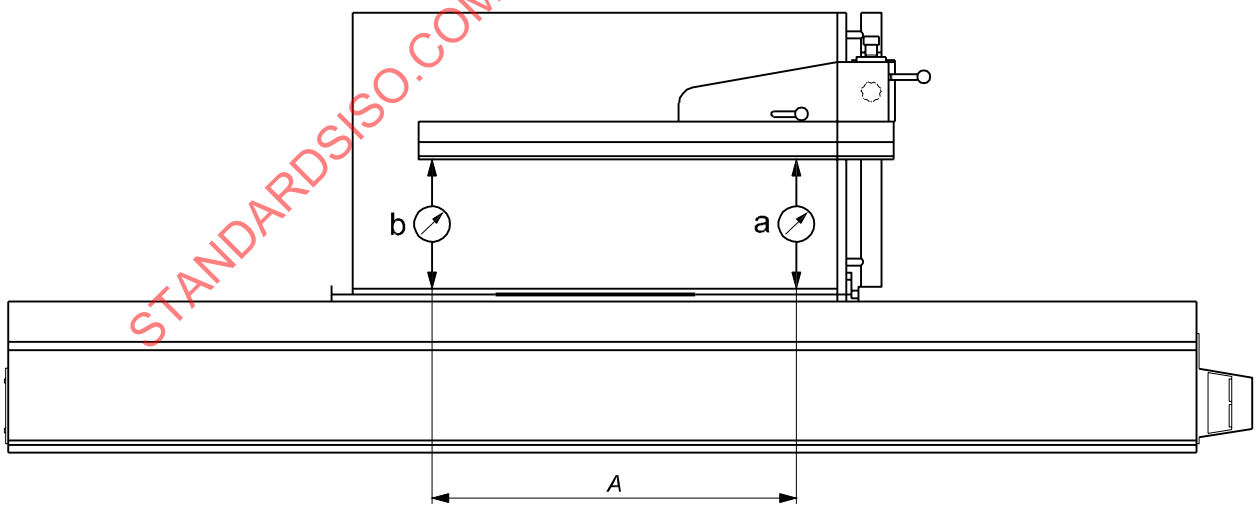


Key

A height of higher guiding surface
B height of lower guiding surface
1 rip fence in high position for deep cutting
2 rip fence in low position for shallow or angled cutting
3 saw blade

Figure 19 — Minimum dimensions of the high and low guiding parts of the fence

d) After adjustment, its work piece guiding surface shall remain in a vertical plane and be parallel to the cutting line of the saw blade where a deviation ek > ej from exact parallelism is necessary in order to prevent jamming (see Figure 20).

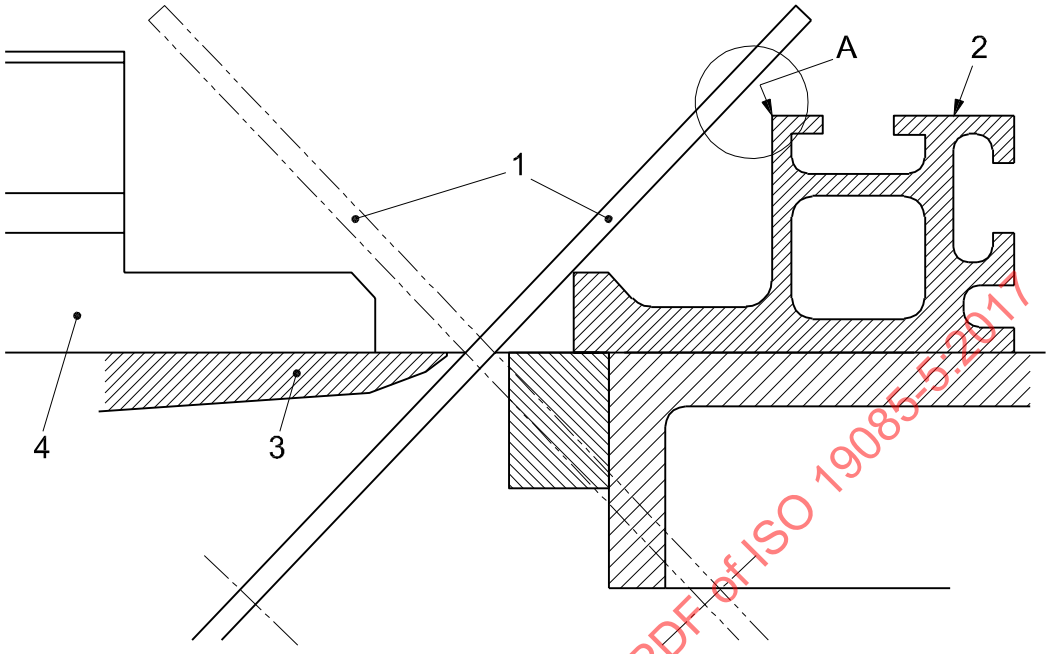


Key

A measuring distance
a measuring point for ej
b measuring point for ek

Figure 20 — Rip fence parallelism tolerance/adjustment range

e) In its low position, the saw blade shall not be capable of touching the rip fence at point A as shown in Figure 21 when the saw blade is fully tilted.



Key

A reference contact point
1 saw blade in maximum tilted positions
2 rip fence in low position
3 machine sliding table
4 cross-cut fence on machines with both sides tiltable saw blade

Figure 21 — Design of rip fence in low position and of cross-cut fence

f) In its low position, it shall be possible to lower the saw blade guard for vertical cuts, i.e. without extension piece, to the height of the workpiece guiding part of the fence.

g) It shall have a minimum length equal to the minimum machine table length (L) (see Table G.1).

h) Adjustment, switching between high and low guiding surface and fixing of the rip fence position shall be possible without the aid of a tool.

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

6.10.2 Cross-cut fence

The machines shall be equipped with a cross-cut fence (fixed to the sliding table or removable, e.g. key item 14 of Figure 1). The fixing arrangement shall ensure that the fence cannot lift up or swing out of position during use. If the cross-cut fence extends beneath the saw guard then the height of that section shall not exceed 15 mm.

NOTE This requirement also applies for the saw blade guard with extension piece used for cutting with saw blades tilted towards the sliding table.

On machines with tiltable saw blades towards both sides, the cross-cut fence shall be designed to prevent touching of the saw blade as shown in Figure 21 when the saw blade is fully tilted

If the workpiece guiding part of the cross-cut fence is adjustable in length and if there is a possibility of contact between the cross-cut fence and the saw blade, this part of the fence shall be made of easily machinable material.

Adjustment and fixing of the cross-cut fence position shall be possible without the aid of a tool.

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

6.10.3 Work piece clamping shoe

Machines shall be equipped with a workpiece clamping shoe which shall be mountable on the integrated sliding table, for holding down the end of workpieces during ripping (see key 6 of Figure 1).

Design and fixing arrangement of the clamping shoe and/or any other clamping devices shall allow using them in combination with the saw blade guard arranged for saw blade tilting towards the sliding table and lowered to the work piece height in order to avoid contact unless clamping devices are made of easily machinable material.

The fixing arrangement shall ensure that the workpiece clamping shoe cannot lift up or swing out of position during use.

Adjustment and fixing of the work-piece clamping shoe position shall be possible without the aid of a tool.

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

6.10.4 Machine table

The dimensions of the machine table shall be in accordance with the requirements in Table G.1.

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

6.10.5 Extension table

The machine shall be provided with an extension table such that the distance between the centre line of the saw spindle and the far end of the extension table (see Figure G.1, dimension X) is in accordance with the requirements in Annex G.

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

6.10.6 Sliding table

The forward movement of the sliding table shall be restricted so that it stops when the rear of the workpiece support of the sliding table has reached the centre of the main saw blade in any height position of the main saw blade. Where there is a device to override this stop in order to allow saw blade changing, this stop shall automatically return to the blocked position when the sliding table is returned within its normal operating limits.

The saw blade drives shall be interlocked with the device to override the sliding table stop. The SRP/CS for interlocking the saw blade drives with the sliding table stop override shall achieve PL_r = c.

A handle fitted at the rear of the sliding table, not passing through shall be provided (see key 15 of Figure 1).

At least one slot in the sliding table shall be provided to fix safety appliances or clamping devices.

Crushing and shearing hazard of hand operated sliding tables with other parts of the machine shall be minimised. A warning shall be given on residual risk e.g. by a sticker.

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

6.11 Safety appliances

Subclause specific to this part of ISO 19085.

A push stick (see Figure 22) and a push block handle (see Figure 23) shall be provided for use on all machines. Provision shall be made for storing the push stick and push block handle on the machine.

Dimensions in millimetres

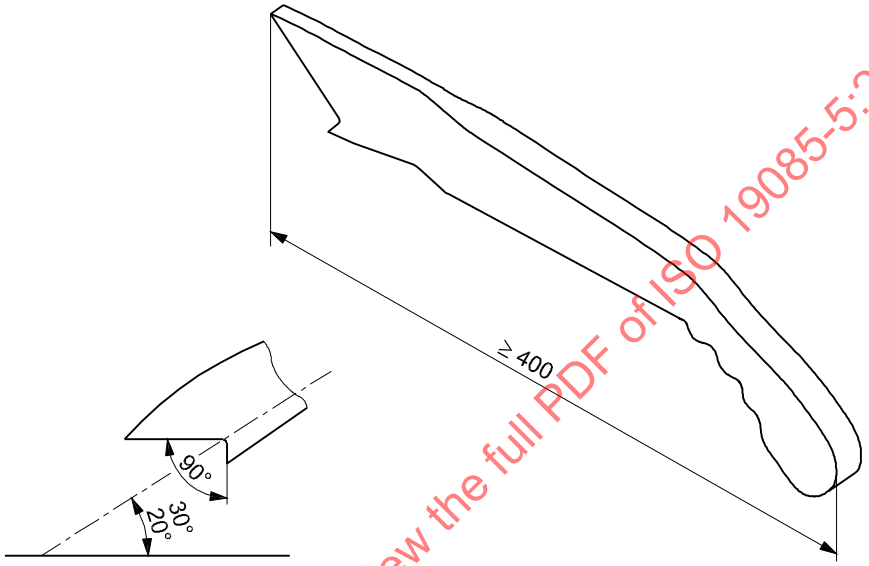
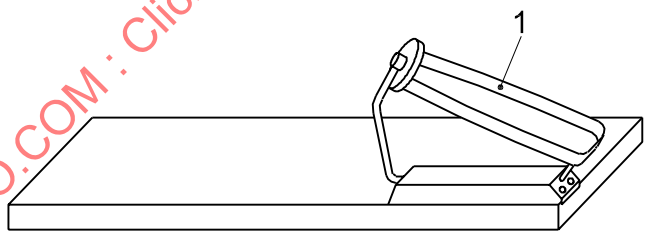


Figure 22 — Example of push stick



Key

1 push block handle

Figure 23 — Example of push block

Push sticks and push block handles shall be made from plastic, wood or plywood.

The minimum length for push sticks provided for use shall be 400 mm and the mouth of the push stick shall be manufactured in accordance with the dimensions given in Figure 22. An example of a push stick profile is shown in Figure 22.

On machines with a riving knife mounted saw blade guard mounting arrangements for a safety appliance for grooving shall be provided, e.g. fastening gibs at the parallel fence [see 8.3.2 j) for the design characteristics of such a safety appliance].

Safety appliances for cutting as an alternative to a push block handle may be provided (see Figures 24 and 25).

Dimensions in millimetres

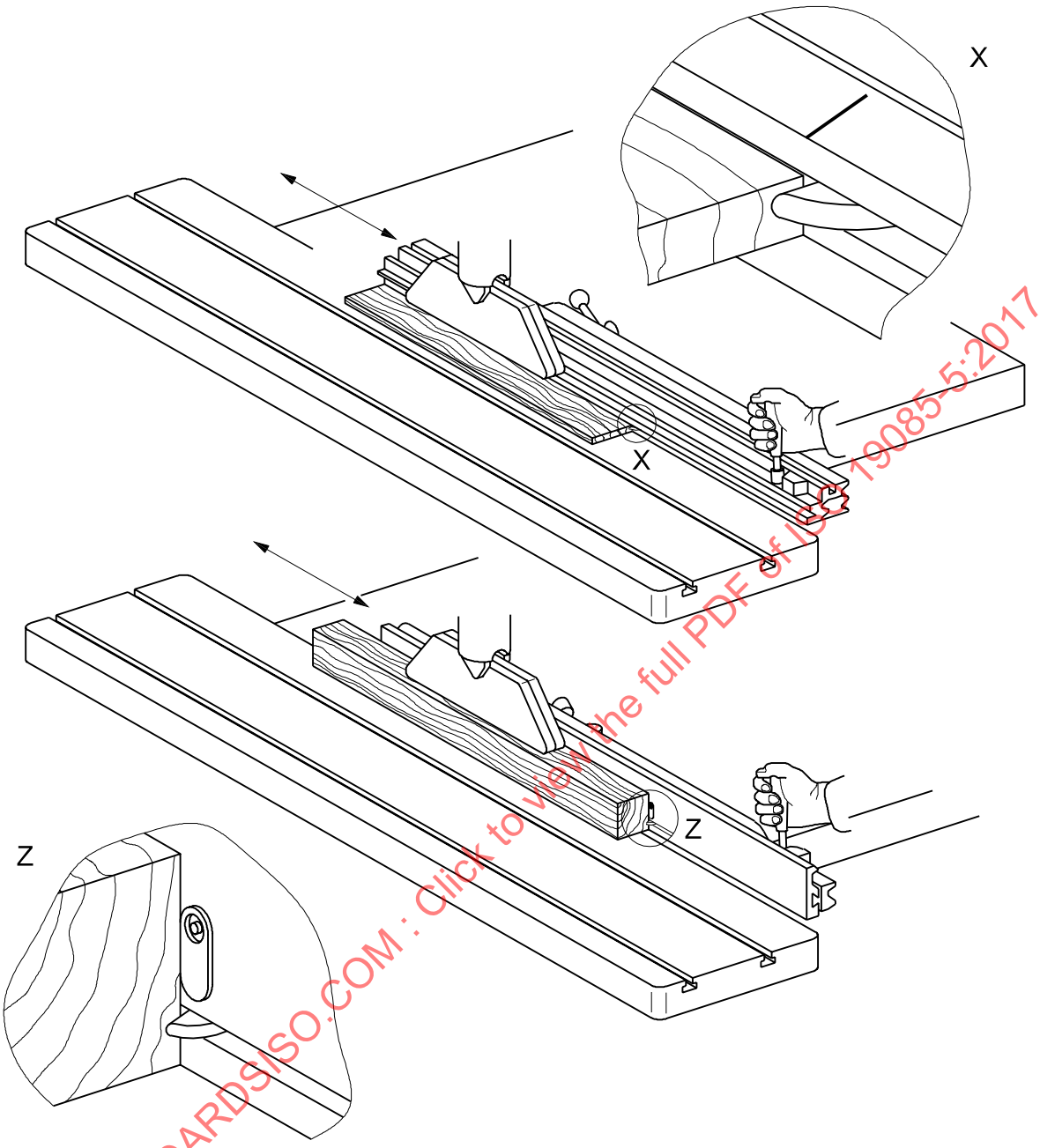
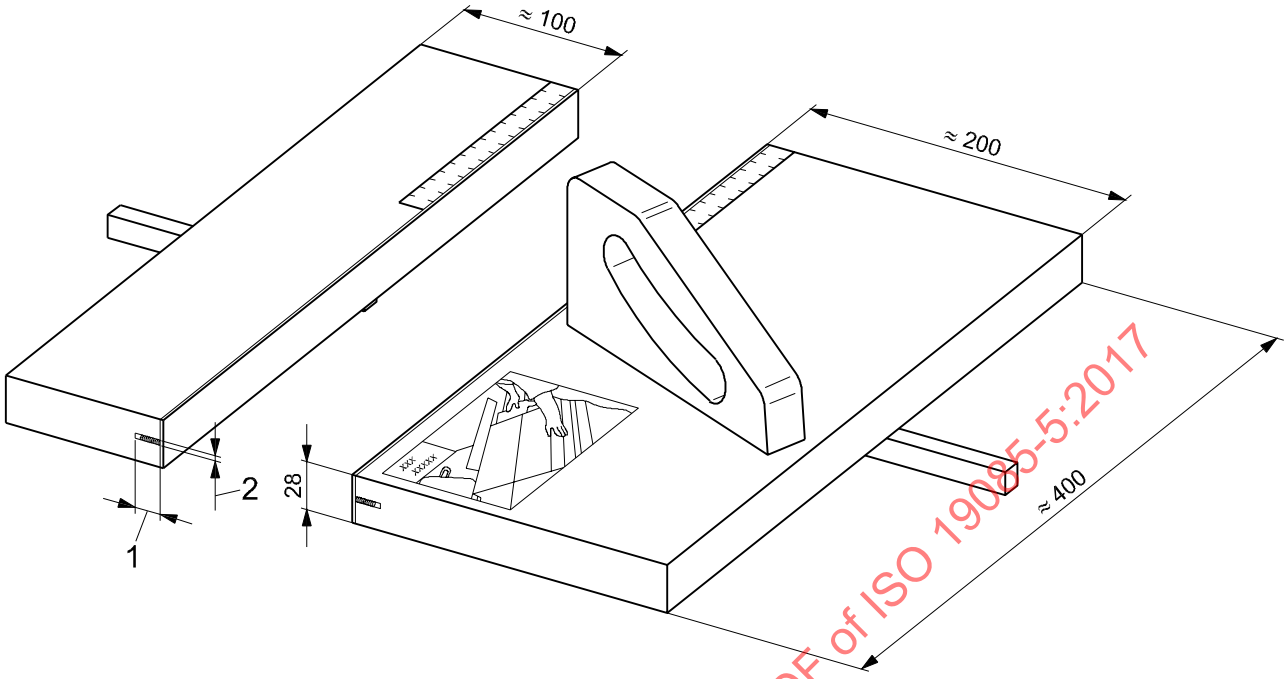


Figure 24 — Example 1 of a safety device for cutting

Dimensions in millimetres



Key

1 notch depth 8 mm

2 notch width 3 mm

Figure 25 — Example 2 of a safety device for cutting

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

7 Safety requirements and measures for protection against other hazards

7.1 Fire

This subclause of ISO 19085-1:2017 applies with the following additions.

See also 7.12 for avoiding contact between the main saw blade and the scoring saw blade or the post-formed edge pre-cutting saw blade, and 6.2 for avoiding sparks as result of contact between the saw blade and the machine table slot lining.

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

7.2 Noise

7.2.1 Noise reduction at the design stage

This subclause of ISO 19085-1:2017 applies.

7.2.2 Noise emission measurement

This subclause of ISO 19085-1:2017 applies with the following additions.

The operating conditions for noise measurement shall comply with ISO 7960:1995, Annex A.

7.3 Emission of chips and dust

This subclause of ISO 19085-1:2017 applies with the following additions.

The part of the saw blade situated below the table shall be enclosed by an exhaust hood, which shall have an extraction outlet.

The saw blade guard shall be provided with an extraction outlet (see Figures 1 and 7).

Unintended access to the tool through any dust extraction outlet with disconnected exhaust system shall be impeded.

NOTE 1 The requirements of ISO 13857 cannot be applied on the access through the dust extraction outlet due to the negative impact on the extraction of chips and dust.

NOTE 2 A proper chips and dust extraction can be obtained with the following recommended air flow rates, q, in m^3h^{-1} for the saw blade diameter, d, in mm:

$d \leq 315$:$q \geq 850$; $315 < d < 400$:$q \geq 1100$; $d \geq 400$:$q \geq 1400$.

7.4 Electricity

7.4.1 General

This subclause of ISO 19085-1:2017 applies.

7.4.2 Displaceable machines

This subclause of ISO 19085-1:2017 applies.

7.5 Ergonomics and handling

This subclause of ISO 19085-1:2017 applies with the following additions.

The height of the machine table above floor level shall be ≥ 850 mm.

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

The holders for the safety appliances required in 6.11 shall be positioned so that the operator can reach the safety appliances from the normal working position. For a possible position of the push sticks on machines with saw blade guard mounted separately from the riving knife, see Figure 1.

Handles, levers and latches or mechanically adjustable units shall as far as possible be reachable from the operator's position. No minimum height requirement applies.

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

7.6 Lighting

This subclause of ISO 19085-1:2017 does not apply.

7.7 Pneumatics

This subclause of ISO 19085-1:2017 applies.

7.8 Hydraulics

This subclause of ISO 19085-1:2017 applies.

7.9 Electromagnetic compatibility

This subclause of ISO 19085-1:2017 applies.

7.10 Laser

This subclause of ISO 19085-1:2017 applies.

7.11 Static electricity

This subclause of ISO 19085-1:2017 applies.

7.12 Errors of fitting

This subclause of ISO 19085-1:2017 applies with the following additions.

When a scoring saw blade or a post-formed edge pre-cutting saw blade is mounted it shall not be possible to mount a main saw blade that would come in contact with such additional saw blades taking account of all height adjustment positions of the saw blades.

7.13 Isolation

This subclause of ISO 19085-1:2017 applies.

7.14 Maintenance

This subclause of ISO 19085-1:2017 applies.

8 Information for use

8.1 Warning devices

This subclause of ISO 19085-1:2017 applies with the following additions.

Machines fitted with a post-formed edge pre-cutting saw unit shall be fitted with a warning signal (e.g. a yellow light) indicating that a post-formed edge pre-cutting cycle will start.

8.2 Marking

8.2.1 General

This subclause of ISO 19085-1:2017 applies.

8.2.2 Additional markings

This subclause of ISO 19085-1:2017 is replaced by the following specific text.

The following additional information shall be marked in the same ways as in 8.2.1:

a) maximum and minimum diameter of the saw blades for which the machine is designed;

b) direction of rotation of the saw blades;

c) bore diameter of the saw blades;

d) on machines with tiltable saw blades and saw blade guards mounted separately from the riving knife a pictogram meaning the following: “Change the guard before tilting the saw blade” or an appropriate message on the screen before tilting starts;

e) on machines fitted with the facility for grooving with milling tool, a pictogram meaning the following: “Change the guard before grooving with milling tools”;

f) on machines where speed changing is achieved by changing the position of the drive belts on the drive pulleys, with a diagram adjacent to the pulleys or on a door giving access to the belt drive mechanism showing the relevant speed in min^{-1} selected for each combination of pulleys;

g) Riving knives shall be permanently marked with:

   1) their thickness;

   2) their range of saw blade diameters for which it is intended;

   3) their width of the riving knife mounting slot.

8.3 Instruction handbook

8.3.1 General

This subclause of ISO 19085-1:2017 applies.

8.3.2 Additional information

This subclause of ISO 19085-1:2017 is replaced by the following specific text.

The following additional information shall also be provided in the instruction handbook:

a) instructions to refrain from working without the saw blade guard when sawing and to refrain from working with the safety appliance for grooving in the non-protective position when grooving;

b) instructions for safe operation shall also include a description on proper use of

   1) manually operated tables (if provided),

   2) power-operated sliding tables (where fitted),

   3) rip fence to avoid kickback

      i) during ripping, the front end of the rip fence to be positioned close to an imaginary line at 45° on the table from the front end of the saw blade (see Figure 26), and

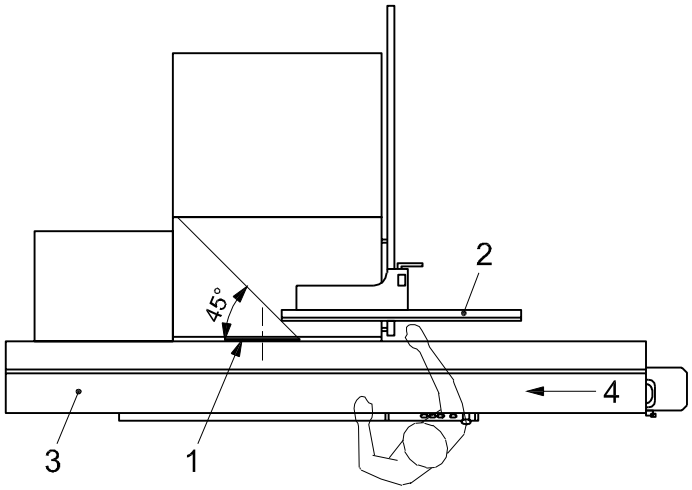
      ii) during sawing using cross cut fence, the front end of the rip fence to be positioned before the front end of the saw blade (see Figure 27) or not in contact with the work piece (retracted position);

   4) cross-cut fence;

   5) demountable power feed;

   6) safety appliances provided according to 6.11;

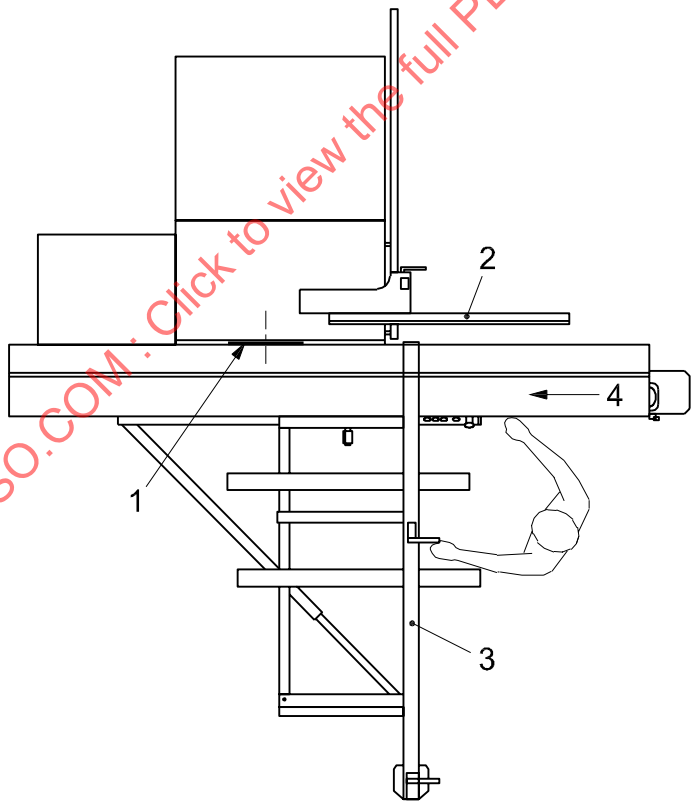
   7) clamping devices on machines with saw blade capable of being tilted towards both sides;



Key

1	main saw blade	3	sliding table
2	rip fence	4	workpiece feed direction

Figure 26 — Use of the rip fence to avoid kickback during ripping



Key

1	main saw blade	3	cross-cut fence
2	rip fence	4	workpiece feed direction

Figure 27 — Use of the rip fence to avoid kickback during cross cutting

c) instructions about safeguards tests, method and frequency which shall also include on sliding tables and functional testing of the interlocking of the stop override with the saw blade drive;

d) on machines with a facility for grooving with milling tools, for grooving only milling tools for hand feed with a cutting width of less than or equal to 20 mm, marked MAN in accordance with EN 847-1:2013;

e) on machines with a facility for grooving with milling tools, instructiond on how to set the machine for grooving and for return to normal sawing operation, with particular attention to the remounting and adjusting of the riving knife;

f) guidance on the selection of the correct riving knife for particular saw blade dimensions;

g) instructions that the riving knife shall be used, so that the gap between the riving knife and the saw blade shall be at least 3 mm and not exceed 8 mm and, for machines with the saw blade guard mounted separately from the riving knife, shall be set so that it reaches a level between 0 mm and 2 mm below the highest point on the periphery of the saw blade;

h) an instruction that push blocks or push sticks shall be used when cutting small workpieces and in circumstances where it is necessary to push the workpiece against the fence;

i) a warning that when cross-cutting round stock it is necessary to secure the workpiece against rotation by using a suitable jig or holder and to use a suitable saw blade;

j) design specifications for manufacturing the protective device for grooving with the saw blade in machines with riving-knife-mounted saw blade guard, including that such protective device shall be

   1) adjustable with the parallel fence to cover the saw blade,

   2) made out of easily machinable material (see ISO 19085-1:2017, 3.3),

   3) of a length of 400 mm, and

   4) of a dimension square to the parallel fence of at least 200 mm;

k) on machines with the facility for tilting the saw blade, an instruction to use the auxiliary guard or the guard with extension pieces before tilting and to restore the machine with the narrow saw blade guard when it is set for vertical cuts;

l) on machines with the facility for tilting the saw blade instruction to adjust the rip fence and/or the cross-cut fence to the correct positions to avoid contact with the tilted saw blade;

m) instructions on how to proceed when the signal that a post-formed edge pre-cutting cycle will start occurs (see also 5.6)

Verification: By checking the instruction handbook and relevant drawings.

Annex A
(informative)

Performance level required

This annex replaces ISO 19085-1:2017, Annex A and gives a quick-view summary of the performance level required (PL_r) for each safety function (see Table A.1). However, for full requirements and detailed explanations, refer to Clauses 5 and 6.

Table A.1 — Safety functions and their PL_r

Area	No.	Safety functions/devices	PL_r	Subclause of ISO 19085-1:2017	Subclause of ISO 19085-5:2017
Start	1	Interlocking of scoring/post-formed edge pre-cutting saw blade with drive of main saw blade	c		5.3
	2	Interlocking of start with all safeguards	c	5.3	
	3	Interlocking of power-operated feed with tool drive	c	5.3	
	4	Prevention of unexpected start/restart	c	5.3	
Stop	5	Normal stop (breaking function excluded)	c	5.4.2	
	6	Emergency stop (breaking function excluded)	c	5.4.4	
Braking	7	Braking function	b/c	5.5	
	8	Interlocking of brake release	c	6.4.3	
Mode selection	9	Mode selection	c		5.6
	10	Initiation control for post-formed edge pre-cutting cycle	c		5.6
Spindle speed	11	Speed indication (belt position)	b	5.7.1	
	12	Incremental speed changing	c	5.7.2	
	13	Infinitely variable speed monitoring	c	5.7.3	
Power supply failure	14	Holding the post-formed edge pre-cutting saw blade in the low position under the table	c		5.8
Controls	15	Time delay	c	5.12	
Axes movements	16	Machine moving part speed monitoring	b		5.11
	17	Initiation control for power-operated axes (saw blades and fences)	c		5.13
	18	Detection of collision area	c		5.13
	19	Limitation of concurrent movements under hold-to-run	b		5.13
	20	Control system for cut of power under pre-set electronic control	c		5.13
	21	Selection of saw blade tilting direction	b		5.13
Safeguards	22	Interlocking of movable guards	c	6.5.2.2	6.6.2.2
	23	Hold-to-run	c	6.5.3	
	24	Interlocking with PSPE	c	6.5.6	
	25	Interlocking of the post-formed edge pre-cutting drive with guard position	c		6.6.2.1.3

Table A.1 *(continued)*

Crushing/ shearing hazards for the body	26	Detection of crushing area for the body (500 mm)	c		6.6.4.1
	27	Maximum crushing force of rip fence 400 N	c		6.6.4.1
Crushing/ shearing hazards for arm /hand/ finger	28	Detection of shearing/crushing area for arm /hand (120 mm) / finger (25 mm)	c		6.6.4.2
Clamping	29	Prevention of unexpected activation of the second stage clamping force	c	6.8	
Sliding table	30	Interlocking of override stop	c		6.10.6

Annex B
(normative)

Test for braking function

This annex of ISO 19085-1:2017 applies.

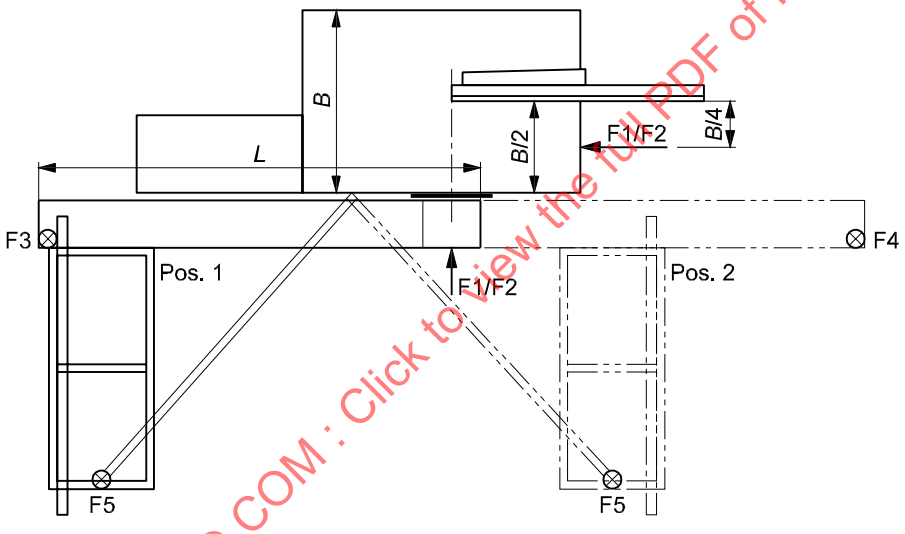
Annex C
(normative)

Stability test for displaceable machines

This annex of ISO 19085-1:2017 is replaced by the following specific text.

C.1 Test of stability during machining

The machine shall be set in its working position on a chipboard fixed on the floor and the brakes for the wheels applied (where fitted) or the wheels retracted from the floor (if a device for retracting them is fitted). The forces F1 and F2 shall be applied in the plane of work-piece support and in the direction of feed in line with the machine tool. Subsequently forces F1 and F2 are applied in the same plane but in perpendicular direction in the middle of the machine. Forces F3 through F5 are applied in vertical direction downwards at the places shown in Figure C.1.



Key

Pos.1, Pos.2	sliding table, cross cut table and cross cut fence in the forward and backward feed "worst case" working positions
B	machine table width
L	maximum optional length of sliding table, in m
F1/F2	forces applied horizontally in table height, sliding table in Pos.1
F3/F5 and F4/F5	forces applied vertically downwards, sliding table in Pos.1 and Pos.2, respectively

Figure C.1 — Test conditions for displaceable machines