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ISO 19085-5

Second edition
2024-07

Woodworking machines — Safety —

Part 5: Dimension saws

Machines à bois — Sécurité —

Partie 5: Scies au format

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Foreword

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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 document 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).

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For an explanation of 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 www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 39, *Machine tools*, Subcommittee SC 4 *Woodworking machines,* in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 142, *Woodworking machines — Safety,* in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This second edition cancels and replaces the first edition (ISO 19085-5:2017), which has been technically revised.

The main changes are as follows:

— the Scope now specifies that machines are intended for continuous production use;

— the requirements for post-forming have been deleted since it is not produced anymore;

— the list of significant hazards has been moved to a new Annex A;

— the structure has been simplified and modified, in particular in 5.6;

— subclause 6.2 has been updated and a new full noise test code has been added in Annex F.

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

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

The ISO 19085 series provides technical safety requirements for the design and construction of woodworking machinery, as well as for the content of the relevant instruction handbook. It concerns designers, manufacturers, suppliers and importers of the machines specified in the Scope.

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

This document is of relevance, in particular, for the following stakeholder groups representing the market players with regard to machinery safety:

— machine manufacturers (small, medium and large enterprises);

— health and safety bodies (e.g. regulators, accident prevention organisations, market surveillance)

Others can be affected by the level of machinery safety achieved with the means of the document by the above-mentioned stakeholder groups:

— machine users/employers (small, medium and large enterprises);

— machine users/employees (e.g. trade unions, organizations for people with special needs);

— service providers, e.g. for maintenance (small, medium and large enterprises);

— consumers (in case of machinery intended for use by consumers).

The above-mentioned stakeholder groups have been given the possibility to participate in the drafting process of this document.

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

When requirements of this type-C standard are different from those which are stated in type-A or type-B standards (as defined in ISO 12100), 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 the ISO 19085 series applicable to that type, together with the relevant requirements from ISO 19085-1:2021, to the extent specified in the Scope of the applicable part of the ISO 19085 series.

As far as possible, the safety requirements of parts of the ISO 19085 series refer to the relevant clauses of ISO 19085-1. Each part includes replacements and additions to the common requirements given in ISO 19085-1.

All parts of the ISO 19085 series have the same structure, so that reference to ISO 19085-1 is made always and only from and to the same subclause number, last indent.

Clauses 1 to 3 are specific to each part and, therefore are distinct from ISO 19085-1:2021, Clauses 1 to 3.

For Clauses 4 to 7 and the annexes, each subclause in ISO 19085-1:2021, is cited as:

— confirmed as a whole;

— confirmed with additions;

— excluded in total; or

— replaced with specific text.

This is indicated by one of the following possible statements:

— “ISO 19085-1:2021, [subclause/Annex], applies.”;

— “ISO 19085-1:2021, [subclause/Annex], applies with the following additions.” or “ISO 19085-1:2021, [subclause/Annex], applies with the following additions, subdivided into further specific subclauses.”;

— “ISO 19085-1:2021, [subclause/Annex], does not apply.”;

— “ISO 19085-1:2021, [subclause/Annex], is replaced by the following text.” or “ISO 19085-1:2021, [subclause/Annex], is replaced by the following text, subdivided into further specific subclauses.”.

Other subclauses and annexes specific to this document are indicated by the introductory sentence: “Subclause/Annex specific to this document.”.

Woodworking machines — Safety —

Part 5:
Dimension saws

1 Scope

This document specifies the safety requirements and measures for dimension saws (defined in 3.1), capable of continuous production use and hereinafter referred to also as “machines”.

The machines are designed to cut solid wood and material with similar physical characteristics to wood.

This document deals with all significant hazards, hazardous situations and events, listed in Annex A, relevant to the machines, when operated, adjusted and maintained as intended and under the conditions foreseen by the manufacturer; reasonably foreseeable misuse has been considered too. Transport, assembly, dismantling, disabling and scrapping phases have also been taken into account.

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

a) device to raise and lower the main saw blade and scoring saw blade;

b) device to tilt the main saw blade and scoring saw blade for angled cutting in one or both directions;

c) device for scoring;

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

e) demountable power feed unit;

f) power-operated sliding table;

g) workpiece clamping.

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

ISO 13857:2019, *Safety of machinery — Safety distances to prevent hazard zones being reached by upper and lower limbs*

ISO 19085-1:2021, *Woodworking machines — Safety — Part 1: Common requirements*

EN 847-1:2017, *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 19085-1:2021 and the following apply.

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

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

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

3.1
dimension saw
sliding table circular sawing machine
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: The main parts of the machine and their terminology are shown 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 2).

Note 4 to entry: The machine can have any of the following devices/additional working units:

a) device to raise and lower the main saw blade and scoring saw blade;

b) device to tilt the main saw blade and scoring saw blade for angled cutting in one or both directions;

c) device for scoring;

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

e) demountable power feed unit;

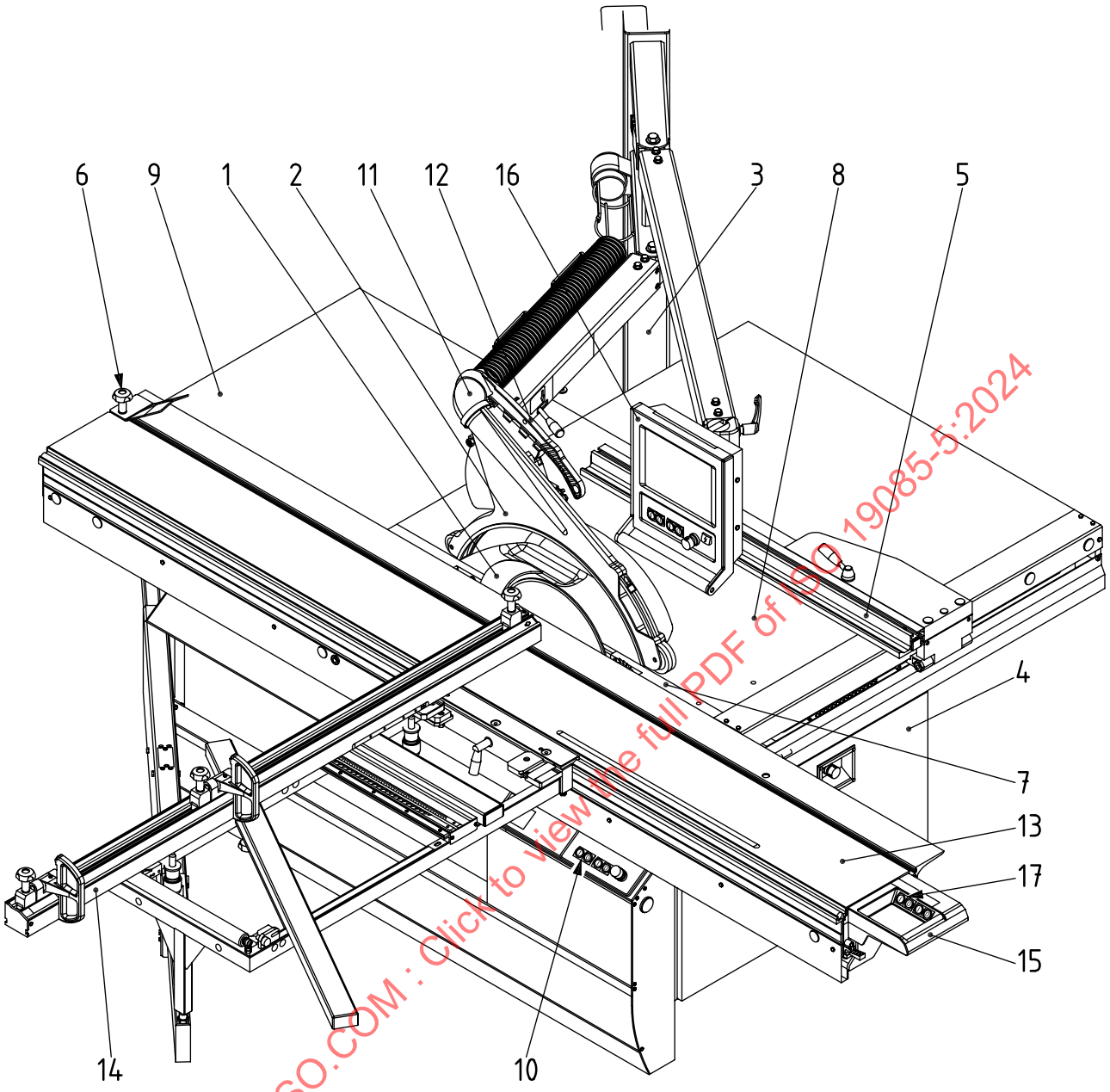
f) power-operated sliding table;

g) workpiece clamping.

Note 5 to entry: Dimension saws are mainly used for ripping, cross-cutting, dimensioning and grooving.

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
initiation control
control which, after actuation, enables providing power to specific machine actuators, for example, by a programmable logic control

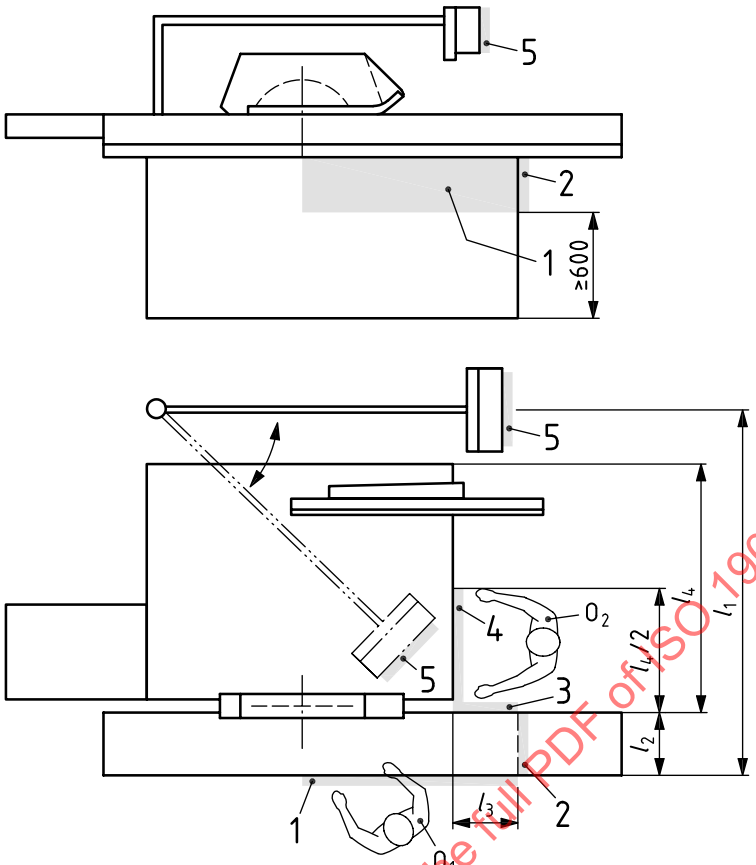


Key

1	riving knife	10	controls
2	saw blade guard	11	saw blade guard support (can 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

Dimensions in millimetres



Key

l_1	maximum distance between the edge of the sliding table and extreme position of moveable control panel
l_2	width of the sliding table
l_3	distance between the rear end of the sliding table support and front edge of the fixed table
l_4	width of the fixed table
O_1, O_2	alternative positions of the operator
1 to 5	areas for electrical control devices

Figure 2 — Position of control devices

4 Safety requirements and measures for controls

4.1 Safety and reliability of control systems

ISO 19085-1:2021, 4.1, applies with the following additions.

Table B.1 summarizes the performance levels required (PL_r) in Clauses 4 and 5 for each safety function.

4.2 Control devices

ISO 19085-1:2021, 4.2, applies with the following additions.

Electrical control devices shall be located on the machine frame in one or more of the shaded areas Key 1 to 4 in Figure 2 and/or on a movable control panel (see Figure 2 position 5).

Emergency stop control devices (when required in accordance with 4.4.4) shall be located in accordance with the requirements of Table 1.

As an exception, the main power switch may be located at a height of less than 600 mm but at a minimum of 500 mm above the floor level.

No height requirement applies for plug fixed to the machine when supply disconnection is by a plug and 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.

Table 1 — Choice of positions of emergency stop control devices when required in accordance with 4.4.4

l_3 mm	Without movable control panel	With movable control panel	
		$l_1 \leq 1\,300$ mm	$l_1 > 1\,300$ mm
$0 \leq l_3 \leq 300$	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
$l_3 > 300$	1 and 3 or 1 and 4	1 and 5	1 and 3 and 5 or 1 and 4 and 5

[a] Only for l_2 up to 350 mm = sliding table width.

NOTE Dimensions and positions 1 to 5 are indicated in Figure 2.

Verification is done by checking the relevant drawings, measurement and inspection of the machine.

4.3 Start

4.3.1 Direct start

ISO 19085-1:2021, 4.3.1, applies with the following addition.

The scoring saw blade drive shall not be capable of being started before the main saw blade drive.

The SRP/CS for interlocking of the scoring saw blade drive with the main saw blade drive shall achieve PL_r = c.

Verification is done by checking the relevant drawings and circuit diagrams, inspecting the machine and relevant functional testing of the machine.

4.3.2 Start via control power-on

ISO 19085-1:2021, 4.3.2, does not apply.

4.4 Safe stops

4.4.1 General

ISO 19085-1:2021, 4.4.1, applies.

4.4.2 Normal stop

ISO 19085-1:2021, 4.4.2, applies.

4.4.3 Operational stop

ISO 19085-1:2021, 4.4.3, does not apply.

4.4.4 Emergency stop

ISO 19085-1:2021, 4.4.4, applies.

4.5 Braking function of tools

ISO 19085-1:2021, 4.5, applies.

4.6 Mode selection

ISO 19085-1:2021, 4.6 does not apply.

4.7 Tool speed changing

4.7.1 Speed changing by shifting the belts on the pulleys

ISO 19085-1:2021, 4.7.1, applies.

4.7.2 Speed changing by incremental speed change motor

ISO 19085-1:2021, 4.7.2, applies.

4.7.3 Infinitely variable speed by frequency inverter

ISO 19085-1:2021, 4.7.3, applies.

4.8 Failure of any power supply

ISO 19085-1:2021, 4.8, applies with the following additions.

As an exception, non-return valves are not required if workpiece clamping is provided by pneumatic cylinders.

Verification is done by checking relevant drawings and inspecting the machine.

4.9 Manual reset control

ISO 19085-1:2021, 4.9, does not apply.

4.10 Standstill detection and monitoring

ISO 19085-1:2021, 4.10, does not apply.

4.11 Machine moving part speed monitoring

ISO 19085-1:2021, 4.11, applies.

4.12 Time delay

ISO 19085-1:2021, 4.12, applies.

4.13 Teleservice

ISO 19085-1:2021, 4.13, applies.

4.14 Power-operated adjustment of the saw blades and fences

Subclause specific to this document.

4.14.1 Risk of contact between the saw blades and fences

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

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

Within a collision area, i.e. where the position of the rip fence is so 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 (no PL required for speed monitoring).

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

Saw blade rotation is allowed during power-operated adjustments.

The SRP/CS for limitation of concurrent movements under hold-to-run control shall achieve PL_r = b.

Unexpected start of power-operated movements under pre-set electronic control shall be prevented after the pre-set position has been reached. This can be achieved, e.g. by the following measure: after actuation of the initiation control for power-operated movements under pre-set electronic control, a time delay device shall cut power to the actuators with a time delay set to the maximum possible adjustment time.

The SRP/CS for power cut-off by time delay shall achieve PL_r = c.

Where the saw blade can tilt in both directions, no PL is required for the choice of the tilt direction.

Verification is done by checking the relevant drawings and circuit diagrams, inspecting the machine and relevant functional testing of the machine.

4.14.2 Crushing hazard for the body

Crushing hazards for the body between power-operated moving parts of the rip fence and other 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) it shall be located on the other 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 other 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 the other parts of the machine.

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 is done by checking the relevant drawings and circuit diagrams, measurement, inspecting the machine and relevant functional testing of the machine.

4.14.3 Crushing and shearing hazard for the arm, hand or finger

Crushing and shearing hazards for the arm, hand and fingers between power-operated moving parts of the fences, for example rip fence or cross-cut fences, and other parts of the machine, for example 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),

   1) which shall 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.

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

Verification is done by checking the relevant drawings and circuit diagrams, measurement, inspecting the machine and relevant functional testing of the machine.

5 Safety requirements and measures for protection against mechanical hazards

5.1 Stability

ISO 19085-1:2021, 5.1, applies with the following additions.

On machines provided with wheels, a stability test shall be carried out in accordance with Annex C.

5.2 Risk of break-up during operation

ISO 19085-1:2021, 5.2, 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 19085-1:2021, 3.3).

Verification is done by checking relevant drawings and inspecting the machine.

5.3 Tool and tool fixing design

5.3.1 General

ISO 19085-1:2021, 5.3.1, applies.

5.3.2 Spindle locking

ISO 19085-1:2021, 5.3.2, applies.

5.3.3 Circular saw blade fixing device

ISO 19085-1:2021, 5.3.3, applies with the following additions.

As an exception, the scoring saw blade may be fixed with a nut and without additional flanges.

Verification is done by checking relevant drawings and inspecting the machine.

5.3.4 Flange dimension for circular saw blades

ISO 19085-1:2021, 5.3.4, applies.

5.3.5 Fixing device for milling tools

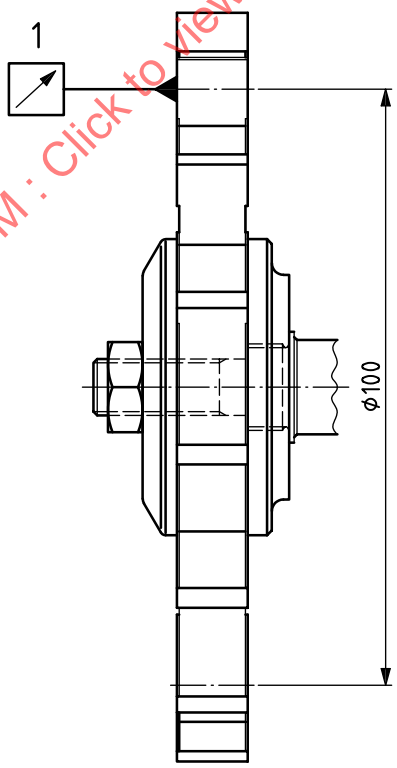
Subclause specific to this document.

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 7,5 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 3).

Dimensions in millimetres



Key

1 dial gauge

Figure 3 — 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 is done by checking relevant drawings, measurement (see Figure 3) and inspecting the machine.

5.4 Braking

5.4.1 Braking of tools

ISO 19085-1:2021, 5.4.1, applies with the following addition.

When conducting the test for braking function on machines with the device for grooving with milling tool, it shall be determined whether the condition with the greatest kinetic energy will be achieved with a saw blade or a milling tool.

The braking function shall be tested in accordance with Annex D.

5.4.2 Maximum run-down time

ISO 19085-1:2021, 5.4.2, applies.

5.4.3 Brake release

ISO 19085-1:2021, 5.4.3, applies.

5.5 Safeguards

5.5.1 Fixed guards

ISO 19085-1:2021, 5.5.1, applies.

5.5.2 Interlocking movable guards

5.5.2.1 General

ISO 19085-1:2021, 5.5.2.1, applies with the following additions.

Additional measures according to ISO 14119:2013, 7.2 are not required.

NOTE The motivation to defeat the interlocking devices in reasonably foreseeable manner does not exist.

5.5.2.2 Movable guards with interlocking

ISO 19085-1:2021, 5.5.2.2, applies.

5.5.2.3 Movable guards with interlocking and guard locking

ISO 19085-1:2021, 5.5.2.3, does not apply.

5.5.3 Hold-to-run control

ISO 19085-1:2021, 5.5.3, applies.

5.5.4 Two-hand control

ISO 19085-1:2021, 5.5.4, does not apply.

5.5.5 Electro-sensitive protective equipment (ESPE)

ISO 19085-1:2021, 5.5.5, does not apply.

5.5.6 Pressure-sensitive protective equipment (PSPE)

ISO 19085-1:2021, 5.5.6, applies.

5.5.7 Enabling control

ISO 19085-1:2021, 5.5.7, does not apply.

5.6 Prevention of access to hazardous moving parts

ISO 19085-1:2021, 5.6, is replaced with the following text, subdivided into further specific subclauses.

5.6.1 Access to the saw blades above the machine table

5.6.1.1 General

An adjustable guard shall reduce the risk of access to the saw blades above the machine table. This guard shall be either manually or automatically adjustable. It shall be fitted to the riving knife (see Figure 5) 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).

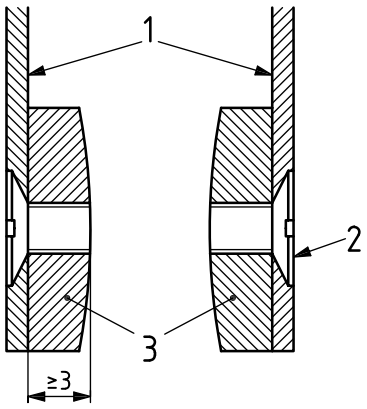
The saw blade guard shall be in accordance with the following requirements.

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

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 (see Figure 4). This rib shall be a minimum of 3 mm in width and shall be designed 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. If the rib is replaceable, the fixing arrangement shall be such that it does not damage the saw blade, e.g. with brass screws.

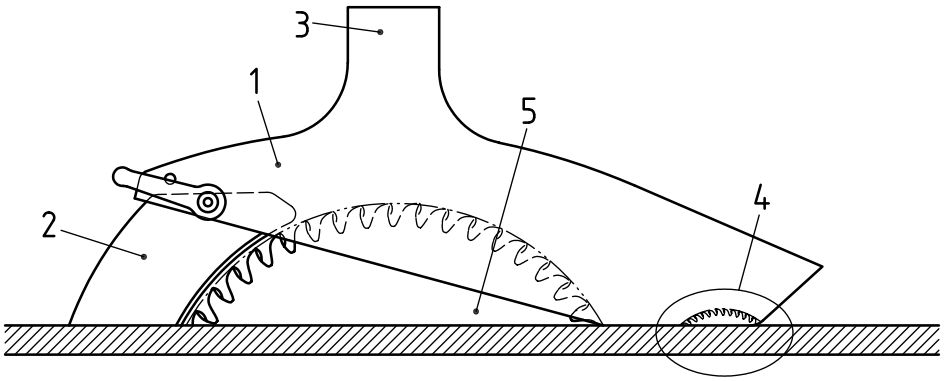
Dimensions in millimetres



Key

1 side walls
2 fixing screws
3 ribs

Figure 4 — Example of replaceable ribs



Key

1 saw blade guard
2 riving knife
3 extraction outlet
4 scoring saw blade
5 main saw blade

Figure 5 — Example of a 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, 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 5.11 and 7.3.2 l)].

Verification is done by checking relevant drawings, inspecting the machine, relevant functional testing of the machine and performing of the saw blade guard rigidity test according to Annex I.

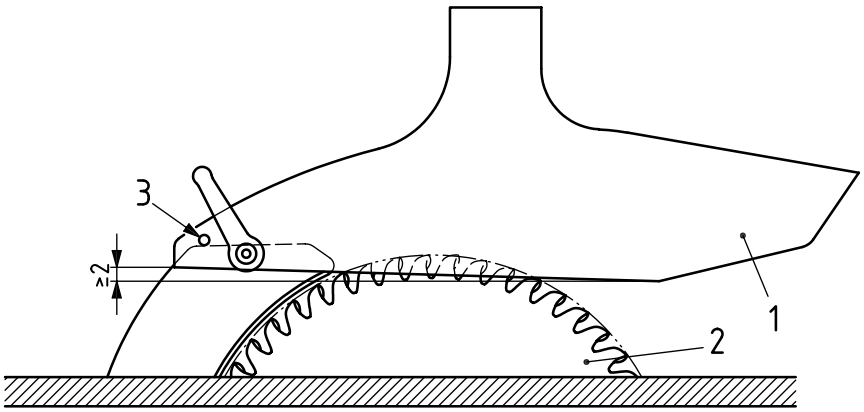
5.6.1.2 Additional requirements for guards mounted on the riving knife

The saw blade guard mounted on the riving knife shall also be in accordance with the following requirements.

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 5). It can be necessary to provide more than one fixing point on the riving knife 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 than the front end if the saw blade guard is raised to its highest position; see Figure 6. 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 6 — Riving-knife-mounted saw blade guard raised to highest position

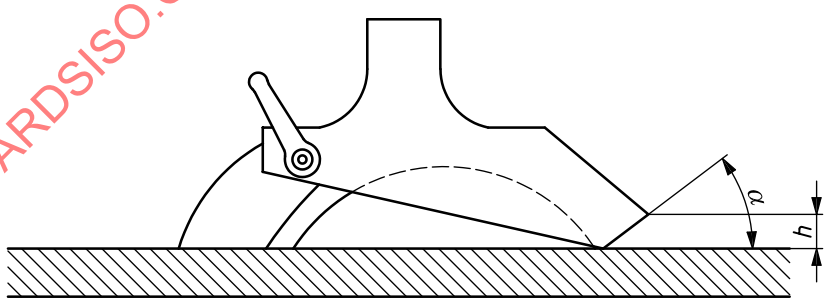
c) The mounting and dismounting of the saw blade guard on the riving knife shall be possible without the aid of a tool.

d) In the area where the saw blade guard can come in contact with the rip fence in the lower position (see Figure 17 Key 2), the maximum width of the saw blade guard shall not exceed 40 mm.

e) The in-feed end of the base of the saw blade guard shall have a lead-in 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 requirements:

   1) the minimum height, *h*, (see Figure 7) 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 angle

h in-feed end lead-in height

Figure 7 — Lead-in of riving-knife-mounted saw blade guards

Verification is done by checking relevant drawings, inspecting the machine and relevant functional testing of the machine.

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

The saw blade guard mounted separately from the riving knife shall also be in accordance with the following requirements.

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 always remains parallel to the table (within 1 mm for every 100 mm length).

d) It shall be fitted with a device for easy height adjustment, e.g. a handle 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 any of the following solutions:

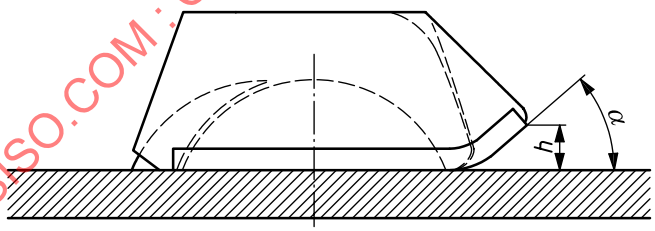
   1) providing lead-ins; the front lead-in shall be in accordance with the following requirements (see Figure 8):

      i) the minimum height, 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;

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

   2) equipping the saw blade guard with rollers (see Figure 9); the minimum radius, h, of the rollers 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.

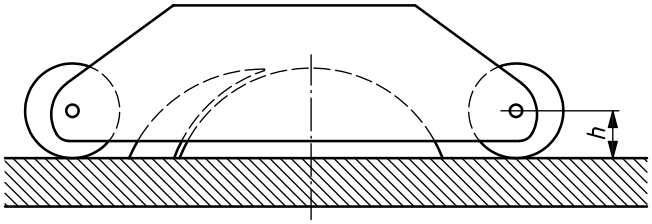


Key

α in-feed end lead-in angle

h in-feed end lead-in height

Figure 8 — Lead-in of saw blade guards mounted separately from riving knife



Key

h in-feed end lead-in roller radius

Figure 9 — Lead-in roller of saw blade guards mounted separately from riving knife

g) In the area where the saw blade guard can touch the rip fence in its lower position, the maximum width of the saw blade guard shall not exceed 50 mm.

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

1) it shall rise 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.

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 with 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

— 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.

Verification is done by checking the relevant drawings and circuit diagrams, inspecting the machine and relevant functional testing of the machine.

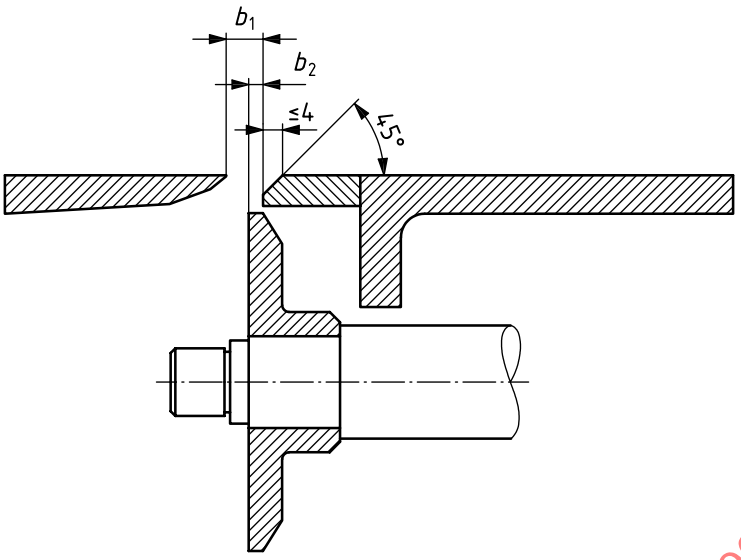
5.6.1.4 Slot for the saw blade/milling tool in the table

The total width b_1 of the table slot for the saw blade (see Figure 10) 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.

The bevel dimension on table edges shall not exceed 4 mm (when b_1 is measured, the bevel dimension is not considered).

On the fixed saw blade flange side of the table, the distance b_2 between the fixed saw blade flange and the edge of the table slot shall not exceed 3 mm. As an exception, for machines which can tilt in both directions, b_2 may be up to 5 mm, whereby b_2 together with the bevel dimension shall not exceed 7 mm.

Dimensions in millimetres



Key

b_1 total width of the table slot for the saw blade

b_2 distance between the fixed saw blade flange and the edge of the table slot

Figure 10 — Arrangement of table slot and fixed saw blade flange

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 is done by checking relevant drawings, inspecting the machine and relevant functional testing of the machine.

5.6.2 Access to the saw blade below the machine table

Access to the tools (saw blade, milling tool) below the table shall be prevented by fixed guards.

Any slot in the machine frame required for the adjustment of the tools shall be designed in accordance with the safety distances in ISO 13857:2019, Table 4. As an exception, the safety distance from the frame surface to the tools in any position may be reduced to:

— 120 mm if the slot width does not exceed 30 mm, or

— 200 mm if the slot width does not exceed 35 mm, or

— 120 mm if the slot width does not exceed 35 mm and straight access to the tools is impeded, or

— 200 mm if the slot width does not exceed 45 mm and straight access to the tools is impeded.

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 is done by checking the relevant drawings and/or circuit diagrams, inspecting the machine and relevant functional testing of the machine.

5.6.3 Guarding of drives

A movable or dismountable 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.

Access to the tool drives (i.e. belts) through the slots in the machine frame required for the adjustment of tools and for dust extraction pipes shall be impeded, but the requirements of ISO 13857:2019 on fixed guards and distance guards do not apply.

Verification is done by checking the relevant drawings and circuit diagrams, inspecting the machine and relevant functional testing of the machine.

5.7 Impact hazard

ISO 19085-1:2021, 5.7, is replaced by the following text.

The speed for the power-operated movement of the fences shall not exceed 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 7.3.2 d).

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 5.5.3 is not allowed.

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

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

Verification is done by checking the relevant drawings and circuit diagrams, measurement, inspecting of the machine and relevant functional testing of the machine.

5.8 Clamping devices

ISO 19085-1:2021, 5.8, applies with the following additions.

On machines with a power-operated sliding table, a power-operated clamping device or a combination of the workpiece clamping shoe (see 5.10.3) or the cross-cut fence and a mechanical end stop shall be supplied to fix the workpiece 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 the power-operated clamping device shall be at least 700 N over the whole range of adjustment of the clamping device.

Where pneumatic clamping is provided, 6.7 applies.

Verification is done by checking the relevant drawings and circuit diagrams, measurement, inspecting the machine and relevant functional testing of the machine.

5.9 Measures against ejection

5.9.1 General

ISO 19085-1:2021, 5.9.1, applies.

5.9.2 Guards materials and characteristics

5.9.2.1 Choice of class of guards

ISO 19085-1:2021, 5.9.2.1, applies with the following additions.

Guards used to prevent ejection shall be of class B.

An impact test for guards shall be carried out in accordance with Annex E.

5.9.2.2 Guards of class A

ISO 19085-1:2021, 5.9.2.2, does not apply.

5.9.2.3 Guards of class B

ISO 19085-1:2021, 5.9.2.3, applies.

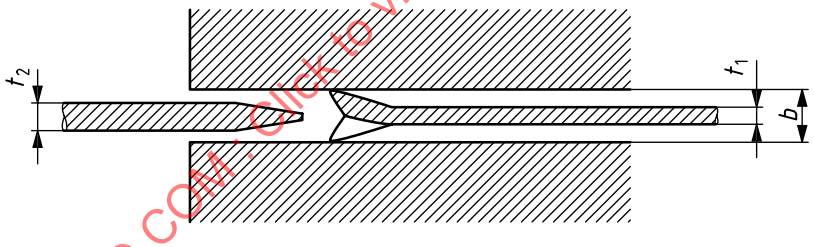
5.9.3 Anti-kickback devices

Subclause specific to this document.

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 7.3.2 h) and i)].

The riving knives 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, t_2, less than the width of cut, b, (kerf) and at least 0,2 mm greater than the saw blade plate, t_1 (see Figure 11).



Key

b kerf (width of saw blade cut)

t_1 saw blade plate thickness

t_2 riving knife thickness

Figure 11 — 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 5.9.3 d) [see Figure 12 and 7.3.2 i)]. 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 5).

Dimensions in millimetres

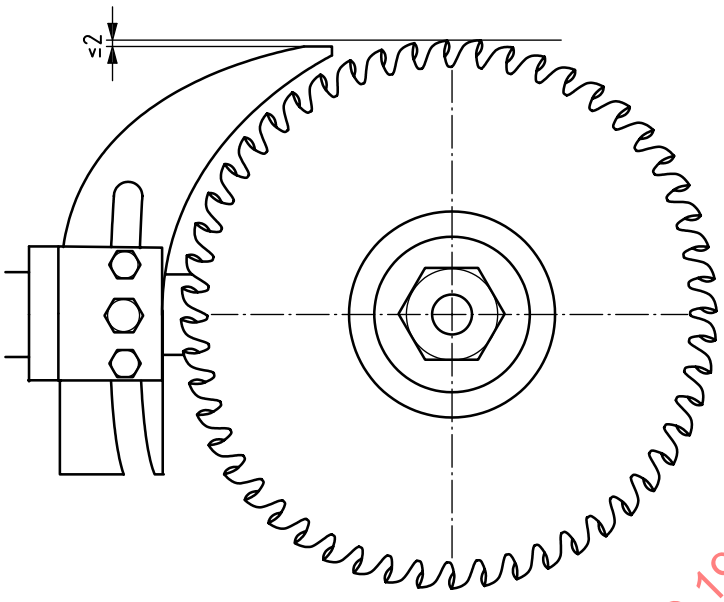


Figure 12 — Riving knife height adjustment

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 13).

Dimensions in millimetres

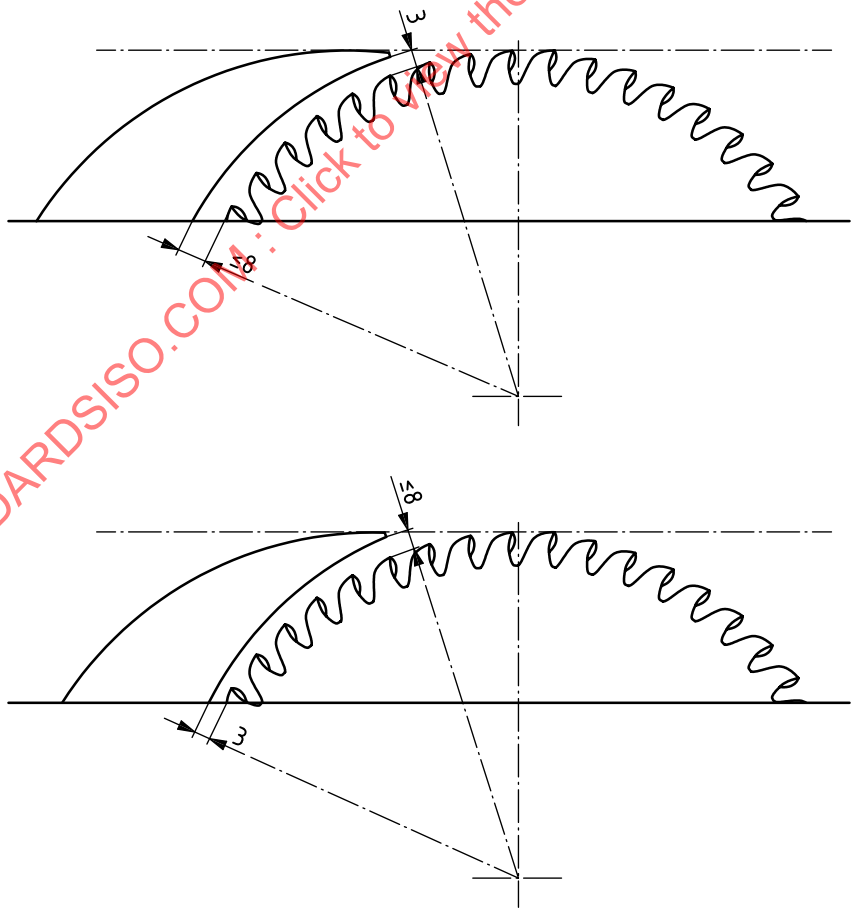
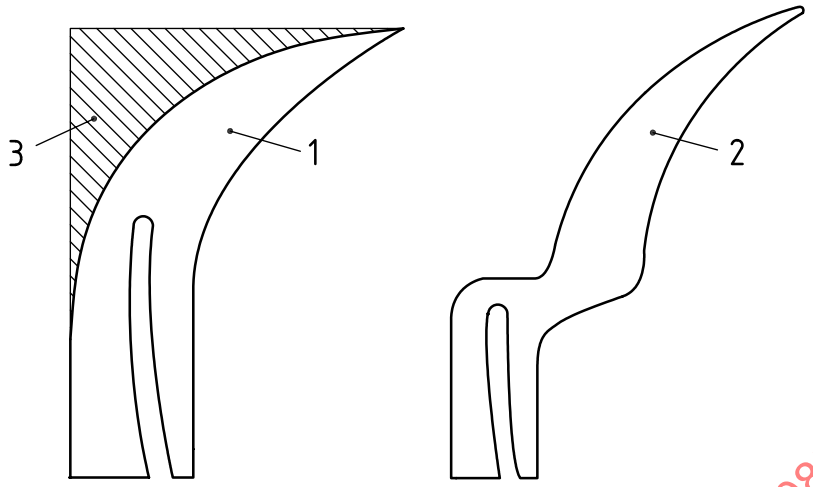


Figure 13 — Positioning limits for riving knife design

e) Their front and rear contours shall be continuous curves or straight lines, without any flexure which can weaken them (see Figure 14).

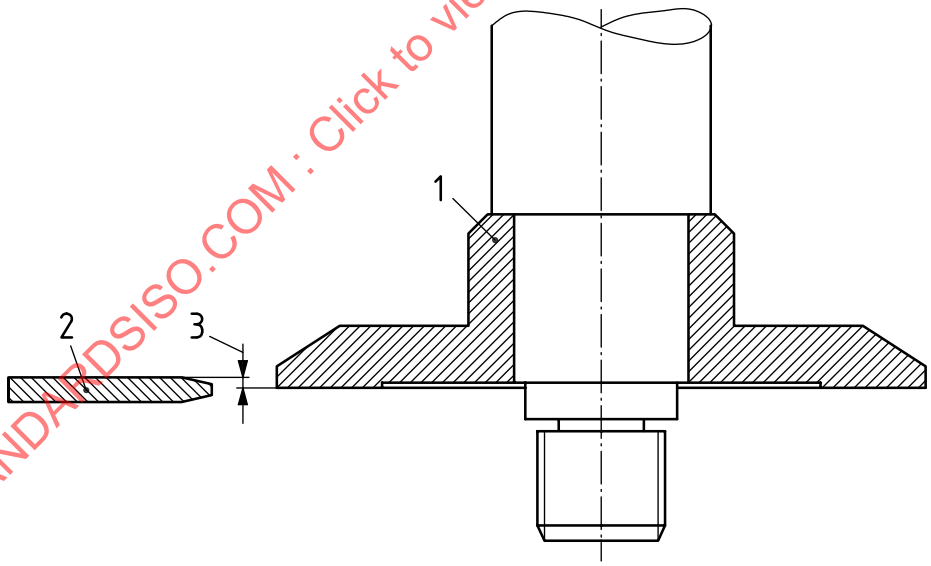


Key

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

Figure 14 — Example of the shape of a 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 (see Figure 15 Key 3), this offset shall be maintained with the rise, fall and tilt of the saw blade.



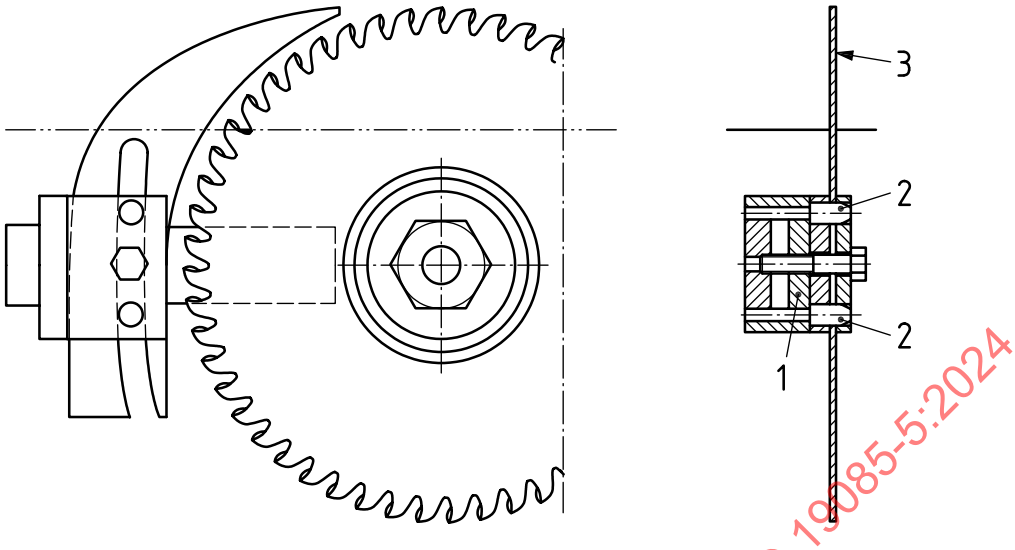
Key

1 rear saw flange
2 riving knife
3 0,5 mm maximum offset

Figure 15 — Positioning of the riving knife in relation to the fixed saw flange

g) They and their mounting arrangements shall be longitudinally and laterally rigid in accordance with the tests in Annex G.

h) They shall be held in position by guiding elements, e.g. guiding pins (see Figure 16); 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 16 — Example of a riving knife mounting arrangement with guiding pins

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

Verification is done by checking relevant drawings, inspecting of the machine, measurement, relevant functional testing of the machine and performing the riving knife rigidity tests according to Annex G.

5.10 Workpiece supports and guides

ISO 19085-1:2021, 5.10 is replaced by the following text, subdivided into further specific subclauses.

5.10.1 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.

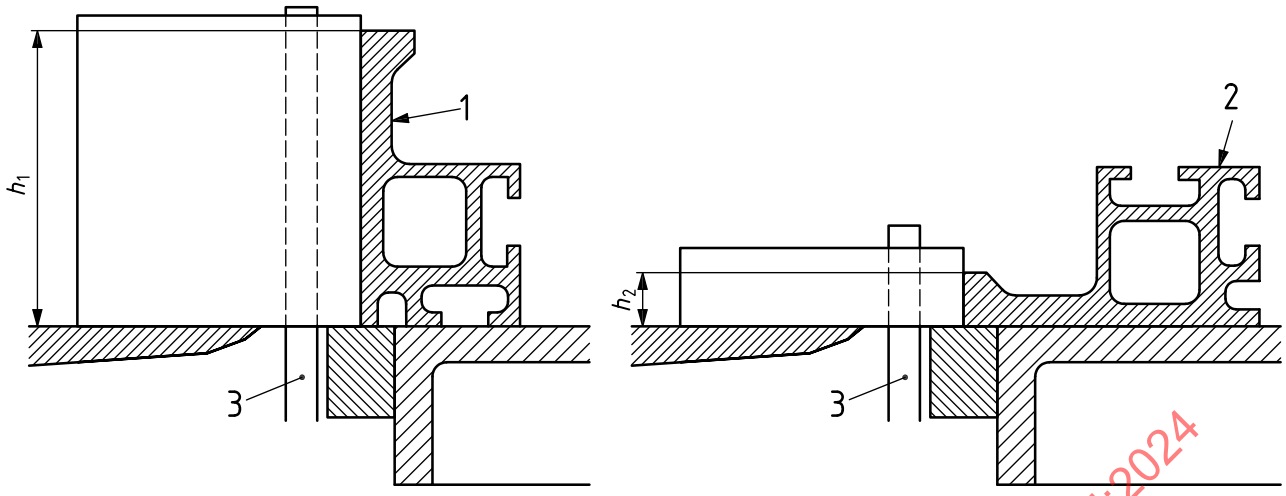
c) It shall be manufactured from a single component, having two guiding surfaces, a higher one with a height, h_1, for deep cutting and a lower one with a height, h_2, for shallow or angled cutting (see Figure 17).

d) The height, h_2, shall be between 5 mm and 15 mm and the height, h_1, shall be at least

   1) 30 mm for machines designed to mount saw blades of a maximum diameter of 200 mm,

   2) 50 mm for machines designed to mount saw blades of a maximum diameter of 315 mm,

   3) 90 mm for machines designed to mount saw blades of a maximum diameter higher than 315 mm.

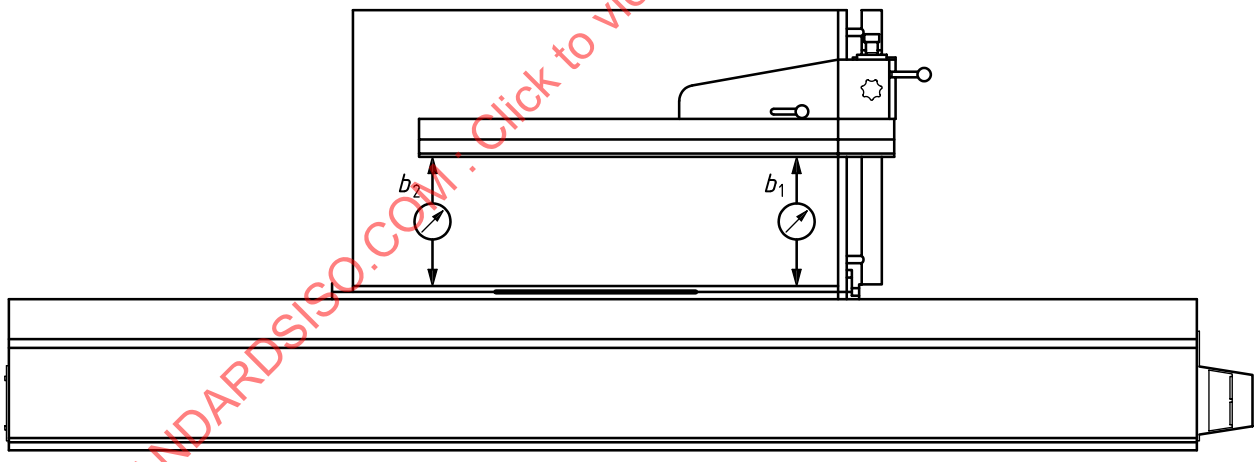


Key

h_1 height of higher guiding surface
h_2 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 17 — Dimensions of the high and low guiding parts of the fence

e) After adjustment, its workpiece guiding surface shall remain in a vertical plane and be parallel to the cutting line of the saw blade where a deviation from exact parallelism with $b_2 > b_1$ is necessary to prevent jamming (see Figure 18).

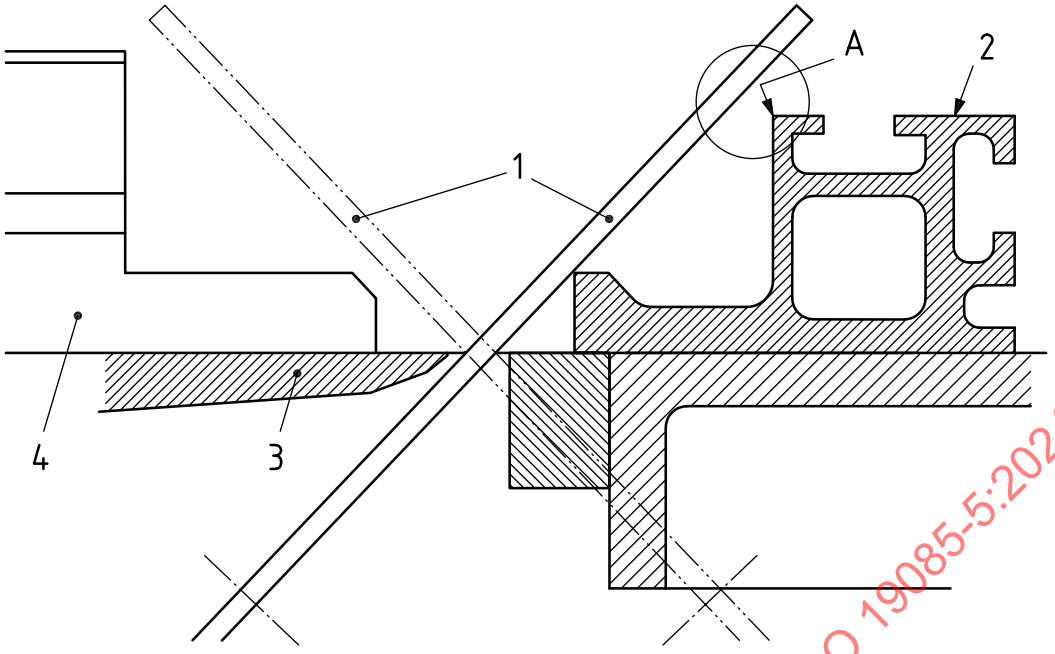


Key

b_1 distance to cutting line
b_2 distance to cutting line

Figure 18 — Rip fence parallelism adjustment

f) It shall be made so that the saw blade fully tilted is not capable of touching point A of the rip fence in its low position, as shown in Figure 19.



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

g) With the rip fence 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.

h) It shall have a minimum length equal to the minimum machine table length, l_1 (see Table H.1).

i) 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 is done by checking relevant drawings, measurement, inspecting the machine and relevant functional testing of the machine.

5.10.2 Cross-cut fence

The machines shall be equipped with a cross-cut fence (fixed to the sliding table or removable, e.g. Figure 1 Key 14). The fixing arrangement shall ensure that the fence cannot rise or swing out of position during use.

If the cross-cut fence extends beneath the saw blade guard, then the height of that section shall not exceed 15 mm. 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 saw blades tiltable in both directions, the cross-cut fence shall be designed to prevent touching of the saw blade as shown in Figure 19 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 is done by checking relevant drawings, measurement, inspecting the machine and relevant functional testing of the machine.

5.10.3 Workpiece 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 Figure 1 Key 6).

Design and fixing arrangement of either the clamping shoe or any other clamping devices, or both, shall allow using them in combination with the saw blade guard arranged for saw blade tilting towards the sliding table and lowered to the workpiece height 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 workpiece clamping shoe position shall be possible without the aid of a tool.

Verification is done by checking relevant drawings, inspecting the machine and relevant functional testing of the machine.

5.10.4 Machine table

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

Verification is done by checking relevant drawings, inspecting the machine and measurement.

5.10.5 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 H.1 dimension l_4) is in accordance with the requirements in Annex H.

Verification is done by checking relevant drawings, inspecting the machine and measurement.

5.10.6 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 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 not passing through handle shall be fitted at the rear of the sliding table (see Figure 1 Key 15).

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, for example, by a sticker [see 7.2.2 f)].

Verification is done by checking relevant drawings, inspecting the machine and relevant functional testing of the machine.

5.11 Safety appliances

Subclause specific to this document.

A push stick (see Figure 20) and a push block handle (see Figure 21) 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

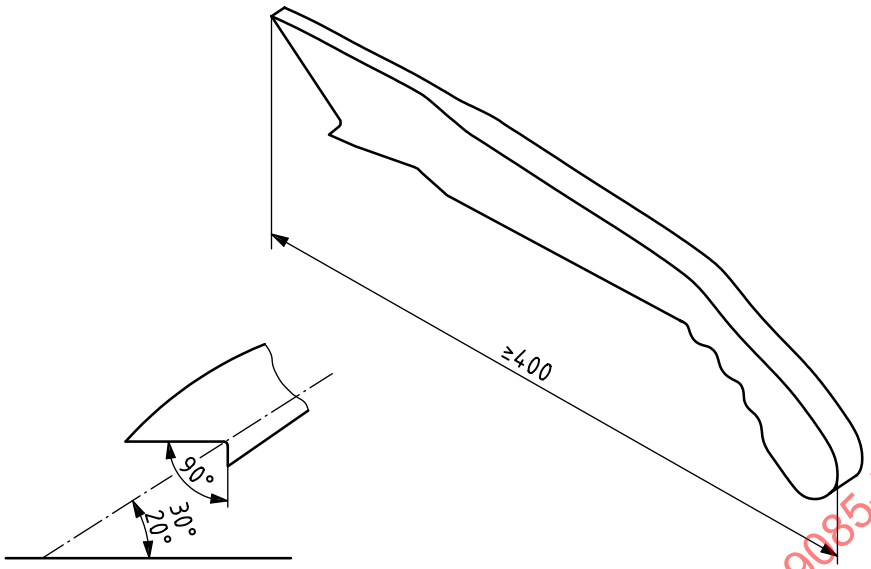
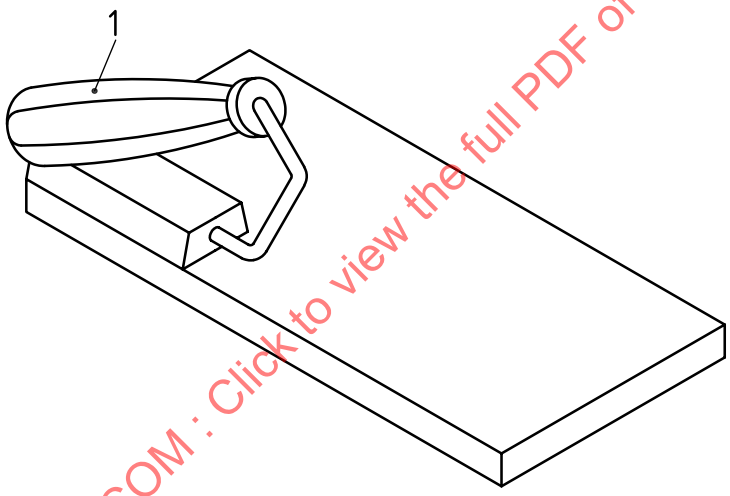


Figure 20 — Example of a push stick



Key

1 push block handle

Figure 21 — Example of a 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 20. An example of a push stick profile is shown in Figure 20.

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 7.3.2 l) 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 22 and 23).

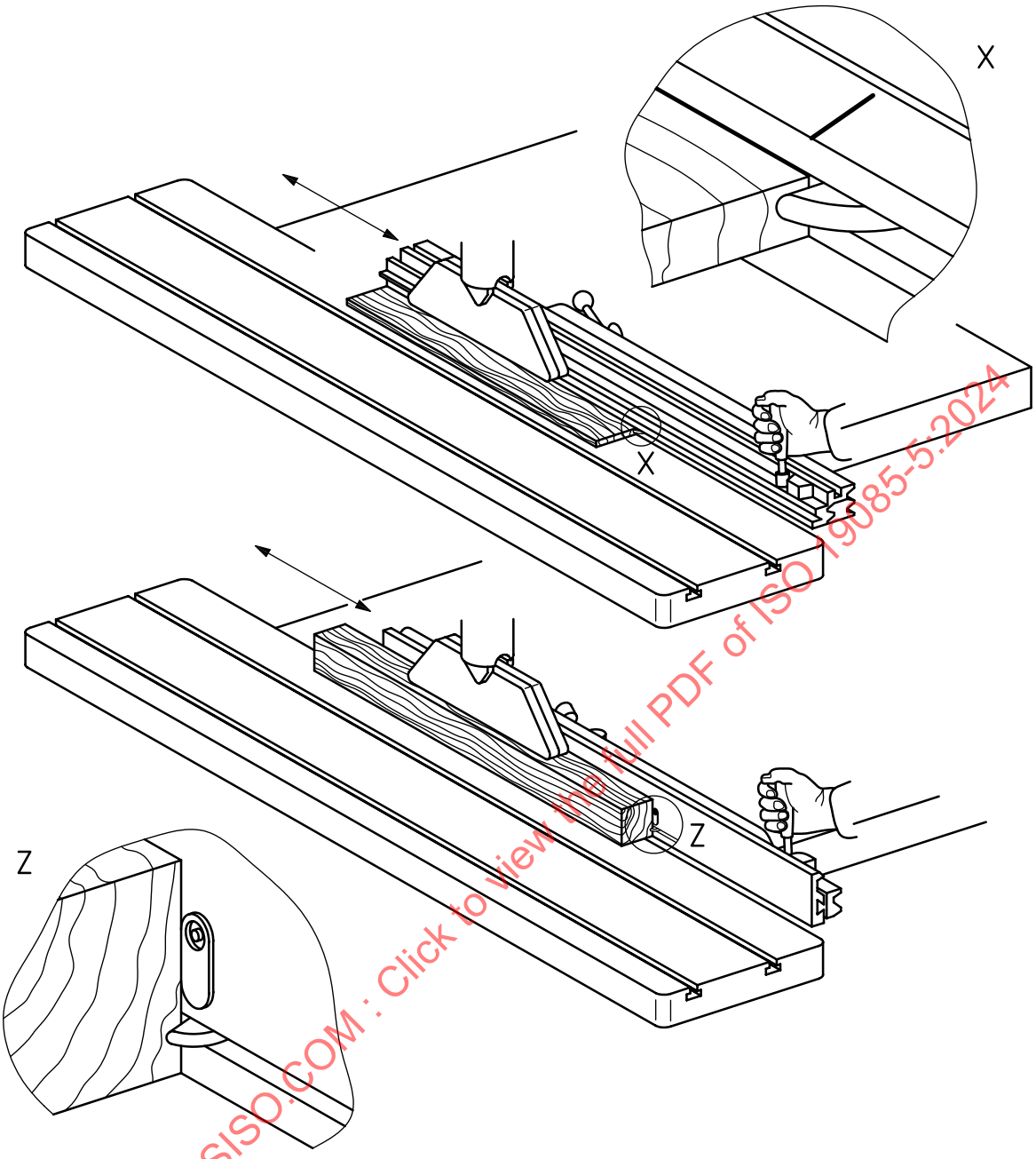
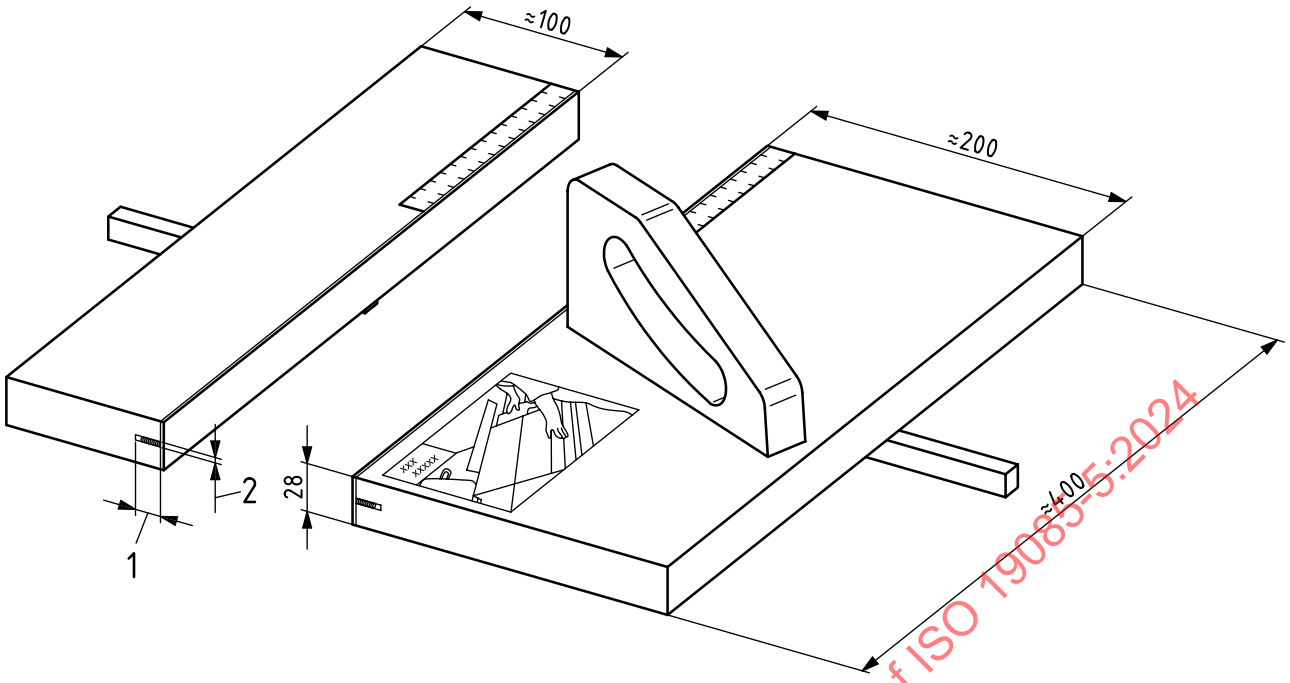


Figure 22 — Example 1 of a safety device for cutting

Dimensions in millimetres



Key

1 notch depth 8 mm

2 notch width 3 mm

Figure 23 — Example 2 of a safety device for cutting

Verification is done by checking relevant drawings, measurements and inspecting the machine.

6 Safety requirements and measures for protection against other hazards

6.1 Fire

ISO 19085-1:2021, 6.1, applies with the following additions.

See also 6.12 for avoiding contact between the main saw blade and the scoring saw blade, and 5.2 for avoiding sparks as result of contact between the saw blade and the machine table slot lining.

Verification is done by checking relevant drawings, inspecting the machine and relevant functional testing of the machine.

6.2 Noise

6.2.1 Noise reduction at the design stage

ISO 19085-1:2021, 6.2.1, applies.

6.2.2 Noise emission measurement and declaration

ISO 19085-1:2021, 6.2.2, applies with the following additions.

The noise test for the machines shall be carried out in accordance with the code given in Annex F.

6.3 Emission of chips and dust

ISO 19085-1:2021, 6.3, 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).

A proper chips and dust extraction can be obtained with the recommended total air flow rates specified in Table 2.

Table 2 — Relation between the maximum saw blade diameter and the total air flow rate

Maximum saw blade diameter d mm	Minimum airflow m^3h^{-1}
≤315	850
315 < d < 400	1 100
≥400	1 400

Verification is done by checking relevant drawings, inspecting the machine and relevant functional testing of the machine.

6.4 Electricity

ISO 19085-1:2021, 6.4, applies.

6.5 Ergonomics and handling

ISO 19085-1:2021, 6.5, applies with the following additions.

The height of the workpiece support shall be between 850 mm and 950 mm above the floor level.

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 5.11 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 used for normal operation shall 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 handle or a grip to move it in the desired position.

Verification is done by checking the relevant drawings, inspecting the machine and relevant functional testing of the machine.

6.6 Lighting

ISO 19085-1:2021, 6.6, does not apply.

6.7 Pneumatics

ISO 19085-1:2021, 6.7, applies.

6.8 Hydraulics

ISO 19085-1:2021, 6.8, does not apply.

6.9 Electromagnetic compatibility

ISO 19085-1:2021, 6.9, applies.

6.10 Laser

ISO 19085-1:2021, 6.10, applies.

6.11 Static electricity

ISO 19085-1:2021, 6.11, applies.

6.12 Errors of fitting

ISO 19085-1:2021, 6.12, applies with the following additions.

When a scoring saw blade is mounted, it shall not be possible to mount a main saw blade that would come in contact with it, taking into account all height adjustment positions of the saw blades.

Verification is done by checking relevant drawings, inspecting the machine and relevant functional testing of the machine.

6.13 Isolation

ISO 19085-1:2021, 6.13, applies.

6.14 Maintenance

ISO 19085-1:2021, 6.14, applies.

6.15 Relevant but not significant hazards

ISO 19085-1:2021, 6.15, applies.

7 Information for use

7.1 Warning devices

ISO 19085-1:2021, 7.1, applies.

7.2 Marking

7.2.1 General

ISO 19085-1:2021, 7.2.1, applies.

7.2.2 Additional markings

ISO 19085-1:2021, 7.2.2, applies with the following additions.

The following additional information shall be marked:

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

b) bore diameter of the saw blades;

c) 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;

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

e) 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.

f) a warning on residual risk, if any, of crushing and shearing hazard of hand operated sliding table with other parts of the machine (see ISO 7010:2019, Table 1, W24).

7.3 Instruction handbook

7.3.1 General

ISO 19085-1:2021, 7.3.1, applies.

7.3.2 Additional information

ISO 19085-1:2021, 7.3.2, is replaced by the following text.

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

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) instruction to stop the machine whilst unattended;

c) instruction that before manually changing any tool, the spindles shall be stopped until standstill of all tools and that unintended start shall be prevented;

d) instructions for safe operation shall also include a description of the proper use of

   1) the sliding table, whether manually or power-operated (where fitted),

   2) 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 24), and

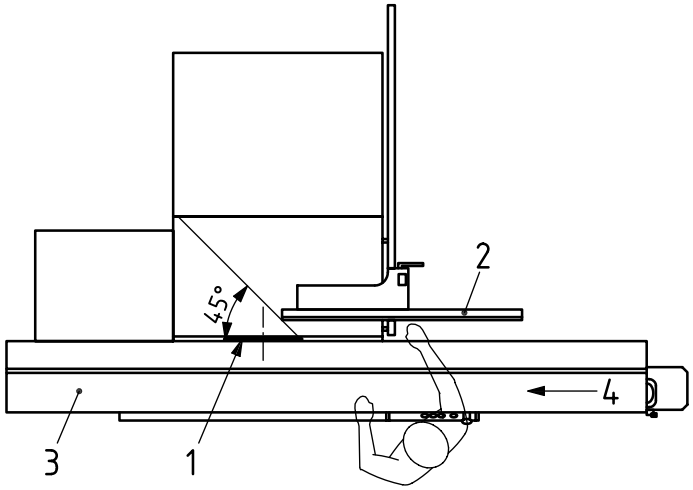
      ii) during sawing using cross-cut fence, the front end of the rip fence to be positioned before the front end of the saw blade (see Figure 25) or not in contact with the workpiece (retracted position);

   3) cross-cut fence;

   4) demountable power feed;

   5) safety appliances provided in accordance with 5.11;

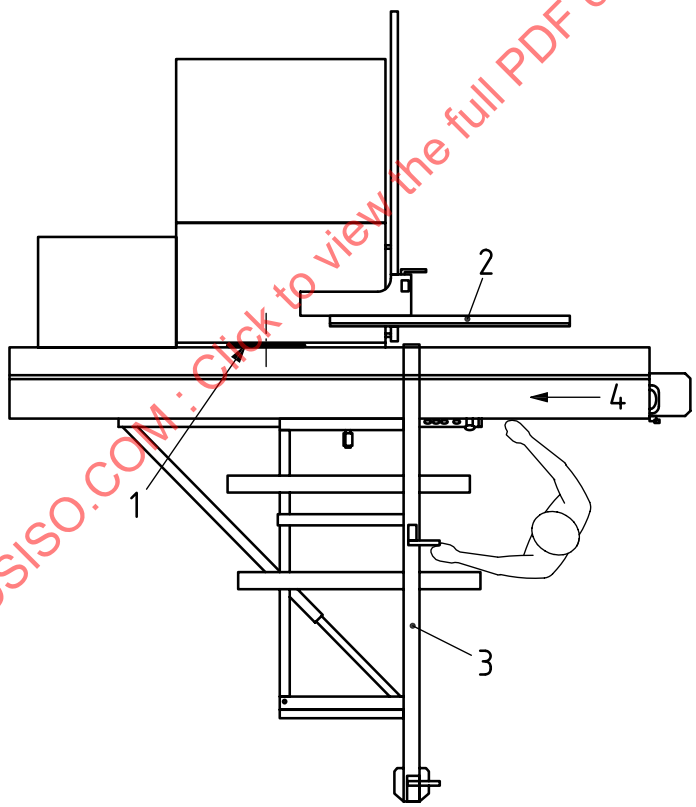
   6) clamping devices on machines with saw blade capable of being tilted towards both sides;



Key

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

Figure 24 — Position 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 25 — Position of the rip fence to avoid kickback when using the cross-cut fence

e) 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;

f) on machines with a facility for grooving with milling tools, to use only milling tools for hand feed with a cutting width of no more than 20 mm, marked MAN in accordance with EN 847-1:2017;

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

h) guidance on the selection of the correct riving knife for different saw blade dimensions;

i) instructions that the riving knife shall be used, and adjusted 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;

j) 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;

k) 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;

l) 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 of easily machinable material (see ISO 19085-1:2021, 3.3),

   3) of a length of 400 mm, and

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

m) on machines with the facility for tilting the saw blade, 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;

n) on machines with the facility for tilting the saw blade, instruction to adjust the rip fence and the cross-cut fence to the correct positions to avoid contact with the tilted saw blade.

Verification is done by checking the instruction handbook and relevant drawings.

Annex A
(informative)

List of significant hazards

ISO 19085-1:2021, Annex A, is replaced by the following text.

Table A.1 lists all significant hazards, hazardous situations and events (see ISO 12100:2010), identified by risk assessment as significant for dimension saws, and which require action to eliminate or reduce the risk.

Table A.1 — List of significant hazards

No.	Hazards, hazardous situations and hazardous events	Subclause of ISO 12100:2010	Subclause of this document
1	Mechanical hazards related to — machine parts or workpieces due to		
	a) shape	6.2.2.1, 6.2.2.2, 6.3	5.3, 5.6, 5.10, 6.15, 7.2, 7.3
	b) relative location		4.2, 5.6, 6.5, 7.2
	c) mass and stability (potential energy of elements which may move under effect of gravity)		4.9
	d) mass and velocity (kinetic energy of elements in controlled or uncontrolled motion)		4.3, 4.8, 5.4, 5.6, 5.10
	e) mechanical strength		5.9
	— Accumulation of energy inside the machinery due to liquids and gases under pressure	6.2.10, 6.3.5.4	4.8, 6.7, 6.13
1.1	Crushing hazard		4.14, 5.4, 5.6, 5.8, 5.10, 6.13
1.2	Shearing hazard		4.14, 5.4, 5.6, 5.10, 6.13
1.3	Cutting or severing hazard		4.3, 4.5, 4.8, 5.3, 5.4, 5.6, 6.13
1.4	Entanglement hazard		4.4, 4.5, 5.6, 5.10, 6.13
1.5	Drawing-in or trapping hazard		4.3, 4.4, 4.5, 5.4, 5.6, 5.10, 6.13
1.6	Impact hazard		4.11, 5.10
1.9	High pressure fluid injection or ejection hazard		5.9, 6.13
2	Electrical hazards due to		
2.1	Contact of persons with live parts (direct contact)	6.2.9, 6.3.5.4	6.4, 6.13
2.2	Contact of persons with parts which have become live under faulty conditions (indirect contact)	6.2.9	6.4, 6.13
2.4	Electrostatic phenomena	6.2.9	6.11
4	Hazards generated by noise, resulting in		
4.1	Hearing loss (deafness), other physiological disorders (loss of balance, loss of awareness)	6.2.2.2, 6.3	6.2, 7.1, 7.3
4.2	Accidents due to interference with speech communication, acoustic signals		
6	Hazards generated by radiation		
6.5	Laser	6.3.4.5	6.10
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	6.3, 7.3

Table A.1 *(continued)*

No.	Hazards, hazardous situations and hazardous events	Subclause of ISO 12100:2010	Subclause of this document
7.2	Fire hazard	6.2.4	6.1
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	4.2, 6.5
8.2	Hand-arm or foot-leg anatomy	6.2.8.3	6.5
8.4	Local lighting	6.2.8.6	7.3
8.5	Mental overload and underload, stress	6.2.8.5	7.3
8.6	Human error, human behaviour	6.2.8, 6.2.11.8, 6.2.11.10, 6.3.5.2, 6.4	7.3
8.7	Design, location or identification of manual controls	6.2.8 f), 6.2.11.8	4.2
8.8	Design or location of visual display units	6.2.8, 6.4.2	4.2
9	Combination of hazards	6.3.2.1	4.3, 4.4, 4.7, 4.8, 5.6, 6.13, 6.14
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	4.1, 4.14, 6.13
10.2	Restoration of energy supply after an interruption	6.2.11.4	4.8, 6.7
10.3	External influences on electrical equipment	6.2.11.11	4.1, 6.9
10.4	Other external influences (gravity)	6.2.12.2	5.10
10.5	Errors in the software	6.2.11.7	4.1, 4.14
10.6	Errors made by the operator (due to a 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	4.2, 6.5, 7.3
11	Impossibility of stopping the machine in the best possible conditions	6.2.11.1, 6.2.11.3, 6.3.5.2	4.4, 4.5, 6.13
12	Variation in the rotational speed of tools	6.2.2.2, 6.3.3	4.7
13	Failure of the power supply	6.2.11.1, 6.2.11.4	4.8
14	Failure of the control circuit	6.2.11, 6.3.5.4	4.1
15	Errors of fitting	6.2.7, 6.4.5	6.12
16	Break-up during operation	6.2.3	5.2, 5.9
17	Falling or ejected objects or fluids	6.2.3, 6.2.10	4.8, 7.3
18	Loss of stability/overturning of machinery	6.3.2.6	5.1

Annex B
(informative)

Performance level required

ISO 19085-1:2021, Annex B, is replaced by the following text.

Table B.1 summarizes the performance level required for each safety function. Refer to Clauses 4 and 5 for full requirements.

Table B.1 — Safety functions and performance level required

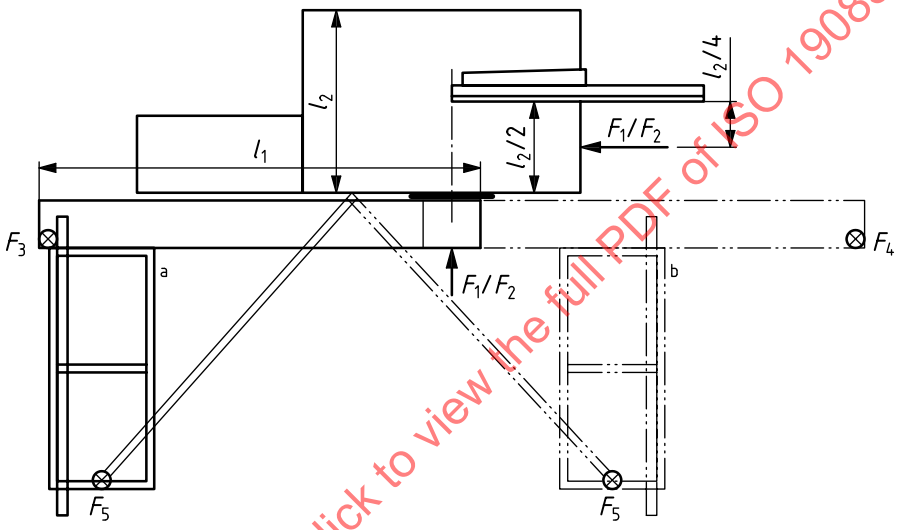
Area		Safety functions/devices	PL_r	Subclause of ISO 19085-1:2021	Subclause in this document
Start	1	Prevention of unexpected start	c	4.3.1	
	2	Interlocking of start with safeguards	c	4.3.1	
	3	Interlocking of powered feed with tool rotation	c	4.3.1	
	4	Interlocking of scoring saw blade drive with main saw blade drive	c		4.3.1
Stop	5	Normal stop (breaking function excluded)	c	4.4.2	
	6	Emergency stop (breaking function excluded)	c	4.4.4	
Tool braking	7	Activation of the brakes	c	4.5	
	8	Electric braking system (excluding PDS/SR)	b	4.5	
	9	SS1 of PDS/SR	c	4.5	
	10	Interlocking of brake release	c	5.4.3	
Spindle speed	11	Speed indication	b	4.7.1	
	12	Speed selection	c	4.7.2	
	13	Speed monitoring	c	4.7.3	
Controls	14	Speed monitoring of moving parts (except tools)	b	4.11	
	15	Time delay	c	4.12	
Axes movements	16	Initiation control	c		4.14.1
	17	Detection of the position of the rip fence within the collision area	c		4.14.1
	18	Limitation of concurrent movements under hold-to-run control	b		4.14.1
	19	Power cut-off by time delay	c		4.14.1
	20	Detection of crushing area for the body (500 mm)	c		4.14.2
	21	limiting the power-operated movement force (400 N)	c		4.14.2
	24	Detection of shearing/crushing area for arm /hand (120 mm) / finger (25 mm)	c		4.14.3
	25	limiting the power-operated movement force (150 N)	c		4.14.3
Safeguards	26	Interlocking of movable guards	c	5.5.2.2	
	27	Hold-to-run	b/c	5.5.3	
	28	Interlocking of dangerous movements with PSPE	c	5.5.6	
	29	Interlocking of the saw blade drives and the drive of the powered sliding table with the moveable guard	c		5.6.2
Sliding table	30	Interlocking of the saw blade drives with the sliding table stop override	c		5.10.6

Annex C
(normative)

Stability test

ISO 19085-1:2021, Annex C, is replaced by the following text.

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 F_1 and F_2 shall be applied in the plane of workpiece support and in the direction of feed in line with the machine tool. Subsequently, forces F_1 and F_2 are applied in the same plane but in perpendicular direction in the middle of the machine. Forces F_3, F_4 and F_5 are applied in vertical direction downwards at the places shown in Figure C.1.



Key

a, b	sliding table, cross-cut table and cross-cut fence in the forward and backward extreme positions
l_1	maximum optional length of sliding table (m)
l_2	machine table width
F_1/F_2	forces applied horizontally at table height, sliding table in position 1
F_3/F_5	forces applied vertically downwards, sliding table in position 1
F_4/F_5	forces applied vertically downwards, sliding table in position 2

Figure C.1 — Test conditions

Forces to be applied and conditions to be met to pass the test are specified in Table C.1.

Table C.1 — Force values and test conditions

Force N	Condition
F_1 = 100	no movement allowed
F_2 = 300	no tilting allowed (machine can move over the chipboard)
F_3, F_4, F_5 are equal to l_1 × 150, but not more than 300	no tilting allowed

Annex D
(normative)

Test for braking function

ISO 19085-1:2021, Annex D, applies.

Annex E
(normative)

Impact test for guards

ISO 19085-1:2021, Annex E, applies.