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**Woodworking machines — Safety —**

Part 9:

**Circular saw benches (with and  
without sliding table)**

*Machines à bois — Sécurité —*

*Partie 9: Scies circulaires à table de menuisier (avec et sans table  
mobile)*

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ISO copyright office  
CP 401 • Ch. de Blandonnet 8  
CH-1214 Vernier, Geneva  
Phone: +41 22 749 01 11  
Fax: +41 22 749 09 47  
Email: [copyright@iso.org](mailto:copyright@iso.org)  
Website: [www.iso.org](http://www.iso.org)

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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](http://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](http://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 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](http://www.iso.org/iso/foreword.html).

This document was prepared by Technical Committee ISO/TC 39, *Machine tools*, Subcommittee SC 4, *Woodworking machines*.

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](http://www.iso.org/members.html).

This document is intended to be used in conjunction with ISO 19085-1:2017, 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 document.

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 without correspondence to 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 847-1:2017.

# Woodworking machines — Safety —

## Part 9:

## Circular saw benches (with and without sliding table)

### 1 Scope

This document gives the safety requirements and measures for stationary and displaceable circular saw benches (with or without sliding table and/or demountable power feed unit), also known as “table saws” (in the USA), hereinafter referred to as “machines”, designed to cut wood and material with similar physical characteristics to wood.

NOTE 1 For the definition of stationary and displaceable machine, 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 these machines when they are 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 are taken into account.

NOTE 2 For relevant but not significant hazards, e.g. sharp edges of the machine frame, see ISO 12100:2010.

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

- device for the main saw blade and scoring saw blade to be raised and lowered through the table;
- 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 in one pass;
- demountable power feed unit;
- additional manually operated sliding table;
- powered work-piece clamping device.

NOTE 3 Circular saw benches are used for ripping, cross cutting, dimensioning and grooving.

This document does not apply to:

- a) transportable/displaceable machines intended for outdoor use on building sites;

NOTE 4 Building site saws (contractor saws) are covered by the requirements of ISO 19085-10:2018.

- b) hand held woodworking machines including any adaptation permitting their use in a different mode, i.e. bench mounting;
- c) machines intended for use in a potentially explosive atmosphere;
- d) machines manufactured before the date of its publication as an International Standard;
- e) transportable machines with a maximum saw blade diameter of  $\leq 315$  mm.

NOTE 5 Transportable motor-operated electric tools are dealt with in IEC 62841-1:2014 and IEC 62841-3-1:2014.

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

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

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

ISO 19085-1:2017, *Woodworking machines – Safety – Part-1: common requirements*

EN 847-1:2017, *Tools for woodworking — Safety requirements — Part 1: Milling tools, circular saw blades*

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

IEC 61800-5-2:2007, *Adjustable speed electrical power drive systems — Part 5-2: Safety requirements — Functional*

## 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 <https://www.iso.org/obp>
- IEC Electropedia: available at <http://www.electropedia.org/>

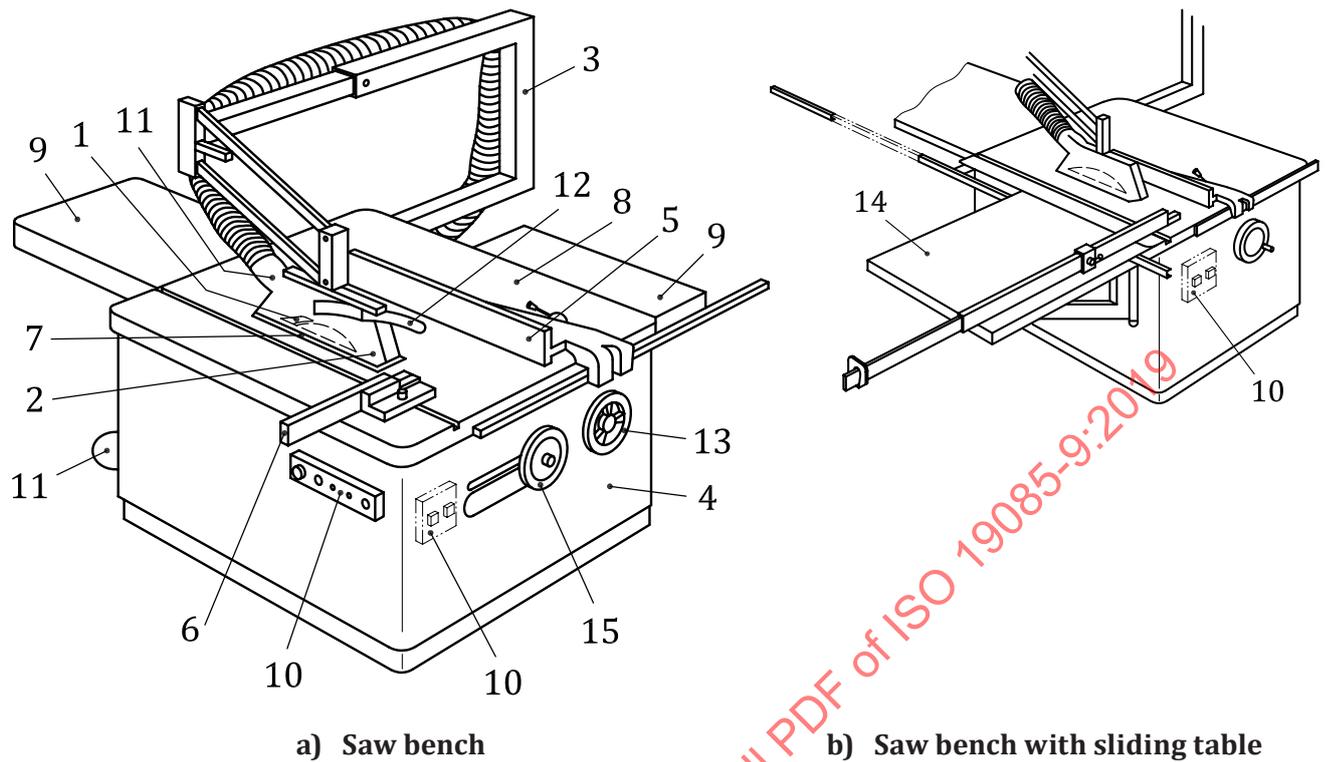
### 3.1 circular saw bench table saw

hand-fed machine fitted with a single main circular saw blade which is fixed in position during the cutting operation, and a horizontal table fixed during operation

Note 1 to entry: Example is given in [Figure 1](#). The saw blade is mounted on a horizontal spindle below the table.

### 3.2 grooving

making of a cut in the surface of the work-piece not deep enough to pass through, using the saw blade or a milling tool

**Key**

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

**Figure 1 — Examples of a circular saw bench****3.3****initiation control**

control which, after actuation, enables the provision of 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 12100:2010), identified by risk assessment as significant for the machines as defined in Clause 1 and which require action to eliminate or reduce the risk. This document deals with these significant hazards by defining safety requirements and/or measures or by reference to relevant standards. These hazards are listed in [Table 1](#).

Table 1 — List of significant hazards

No.	Hazards, hazardous situations and hazardous events	ISO 12100:2010	Relevant section of ISO 19085-9:2019
<b>1</b>	<b>Mechanical hazards</b> related to		
	— Machine parts or work-pieces due to		
	a) shape	6.2.2.1, 6.2.2.2, 6.3	<a href="#">6.3</a> , <a href="#">6.6</a> , <a href="#">6.8</a> , <a href="#">6.9.2</a> , <a href="#">6.10</a> , <a href="#">6.11</a> , <a href="#">7.5</a>
	b) relative location		<a href="#">5.2</a> , <a href="#">6.6</a> , <a href="#">7.5</a> , <a href="#">8.3.2</a> , Annex I
	d) mass and velocity (kinetic energy of elements in controlled or uncontrolled motion)		<a href="#">5.13</a> , <a href="#">6.4</a> , <a href="#">6.6</a>
	e) mechanical strength		<a href="#">6.2</a> , <a href="#">6.3</a> , <a href="#">6.4</a> , <a href="#">6.9</a> , <a href="#">6.10</a> , Annex D, Annex F
	— Accumulation of energy inside the machinery due to		
	f) liquids and gases under pressure	6.2.10, 6.3.5.4	<a href="#">6.8</a> , <a href="#">7.7</a> , <a href="#">7.8</a>
1.1	Crushing hazard		<a href="#">6.6.4</a>
1.2	Shearing hazard		<a href="#">6.6.4</a>
1.3	Cutting or severing hazard		<a href="#">6.6.2</a> , <a href="#">6.10</a> , <a href="#">6.11</a> , <a href="#">8.3.2</a>
1.4	Entanglement hazard		<a href="#">6.6</a> , <a href="#">8.3.2</a>
1.5	Drawing-in or trapping hazard		<a href="#">6.6</a> , <a href="#">8.3.2</a>
1.6	Impact hazard		<a href="#">6.7</a> , <a href="#">8.3.2</a>
1.8	Friction or abrasion hazard		<a href="#">8.3.2</a>
<b>2</b>	<b>Electrical hazards</b> due to		
2.1	Contact of persons with live parts (direct contact)	6.2.9, 6.3.5.4	<a href="#">7.4</a>
2.2	Contact of persons with parts which have become live under faulty conditions (indirect contact)	6.2.9	<a href="#">7.4</a>
2.4	Electrostatic phenomena	6.2.9	<a href="#">7.9</a>
<b>4</b>	<b>Hazards generated by noise</b> , resulting in		
4.1	Hearing loss (deafness), other physiological disorders (loss of balance, loss of awareness)	6.2.2.2, 6.3	<a href="#">7.2</a>
4.2	Interference with speech communication, acoustic signals		<a href="#">8.3</a>
<b>6</b>	<b>Hazards generated by radiation</b>		
6.5	Lasers	6.3.4.5	<a href="#">7.10</a>
<b>7</b>	<b>Hazards generated by materials and substances</b> (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	<a href="#">7.3</a> , <a href="#">8.3</a>
7.2	Fire hazard	6.2.4	<a href="#">7.1</a>
<b>8</b>	<b>Hazards generated by neglecting ergonomic principles</b> 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	<a href="#">5.2</a> , <a href="#">7.5</a>
8.2	Hand-arm or foot-leg anatomy	6.2.8.3	<a href="#">7.5</a>
8.4	Local lighting	6.2.8.6	<a href="#">8.3</a>
8.5	Mental overload and underload, stress	6.2.8.5	<a href="#">8.3</a>
8.6	Human error, human behaviour	6.2.8, 6.2.11.8, 6.2.11.10, 6.3.5.2, 6.4	<a href="#">8.3</a>

Table 1 (continued)

No.	Hazards, hazardous situations and hazardous events	ISO 12100:2010	Relevant section of ISO 19085-9:2019
8.7	Design, location or identification of manual controls	6.2.8, f), 6.2.11.8	<a href="#">5.2</a> , <a href="#">7.5</a>
8.8	Design or location of visual display units	6.2.8, 6.4.2	<a href="#">5.2</a> , <a href="#">7.5</a>
9	<b>Combination of hazards</b>	6.3.2.1	<a href="#">5.1</a> , <a href="#">6.6</a> , <a href="#">7.13</a> , <a href="#">7.14</a>
10	<b>Unexpected start up</b> , unexpected overrun/overspeed (or any similar malfunction) from		
10.1	Failure/disorder of the control system	6.2.11, 6.3.5.4	<a href="#">5.1</a> , <a href="#">7.13</a>
10.2	Restoration of energy supply after an interruption	6.2.11.4	<a href="#">5.8</a> , <a href="#">7.7</a>
10.3	External influences on electrical equipment	6.2.11.11	<a href="#">5.1</a> , <a href="#">7.9</a>
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	<a href="#">7.5</a> , <a href="#">8.3</a>
11	<b>Impossibility of stopping the machine in the best possible conditions</b>	6.2.11.1, 6.2.11.3, 6.3.5.2	<a href="#">5.4</a> , <a href="#">7.12</a>
12	<b>Variations in the rotational speed of tools</b>	6.2.2.2, 6.2.3	<a href="#">5.7</a>
13	<b>Failure of the power supply</b>	6.2.11.1, 6.2.11.4	<a href="#">5.8</a>
14	<b>Failure of the control circuit</b>	6.2.11, 6.3.5.4	<a href="#">5.1</a>
15	<b>Errors of fitting</b>	6.2.7, 6.4.5	<a href="#">7.12</a>
16	<b>Break-up during operation</b>	6.2.3	<a href="#">6.2</a>
17	<b>Falling or ejected objects or fluids</b>	6.2.3, 6.2.10	<a href="#">6.9</a>
18	<b>Loss of stability/overturning of machinery</b>	6.3.2.6	<a href="#">6.1</a> , <a href="#">8.3</a> , <a href="#">Annex C</a>

## 5 Safety requirements and measures for controls

### 5.1 Safety and reliability of control systems

This subclause of ISO 19085-1:2017 applies ([Annex A](#) is replaced).

### 5.2 Control devices

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

The electrical control devices except the main switch shall be located:

- a) For machines designed to be used without a sliding table, either:
  - 1) in the shaded area marked X or in the shaded area marked Y in [Figure 2](#); or
  - 2) on a movable control panel;
- b) For machines equipped with a sliding table and/or where provision is made for the use of a sliding table, either:
  - 1) in the shaded area marked Y in [Figure 2](#); or
  - 2) on a movable control panel.

A normal stop control device shall be located adjacent to each start control device.

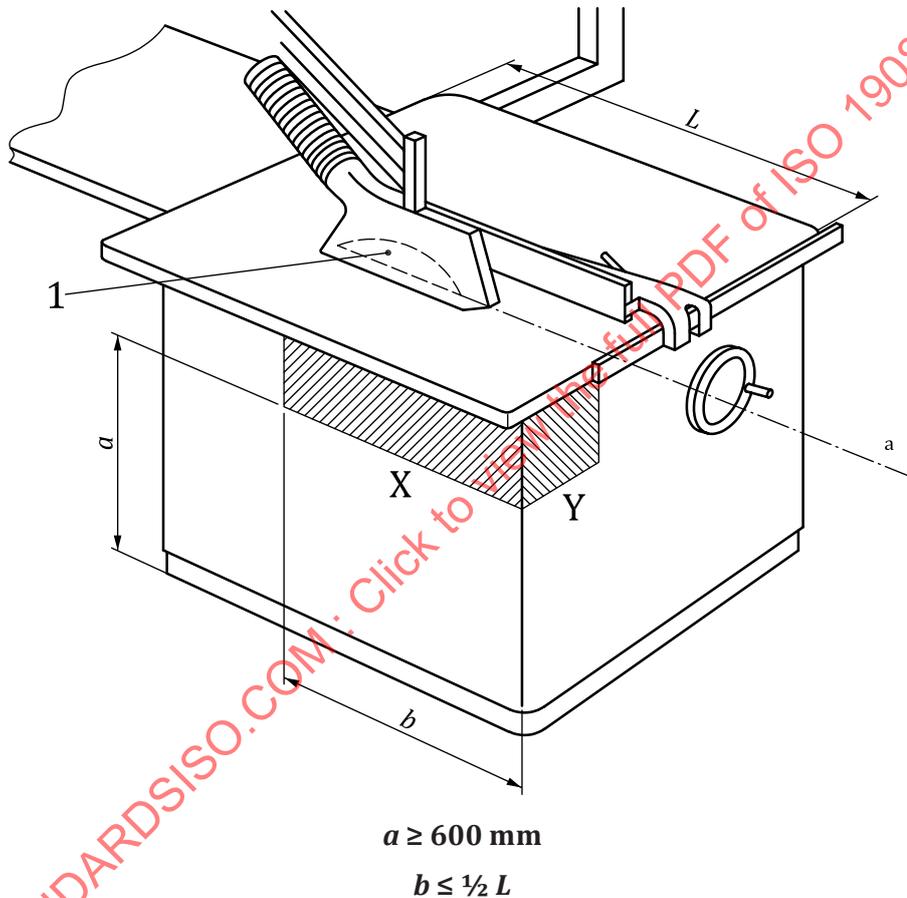
The shaded areas X and Y are located below the table at a distance of at least 50 mm from the table top and more than 600 mm above the floor (see  $a$  in Figure 2) and:

- i) on the left side of the machine (area X) and extending not more than half of the table length,  $L$  (see  $b$  in Figure 2);
- ii) on the front side of the machine (area Y) on the left of the cutting line.

The movable control panel fixed to the machine shall be located so that:

- its front face is at a distance from the front edge of the table not exceeding 700 mm;
- its upper surface is at a distance from the floor level not exceeding 1 800 mm.

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



**Key**

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

**Figure 2 — Position of control devices**

**5.3 Start**

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

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

The SRP/CS for interlocking between the scoring saw blade drive and the main saw blade drive 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.

## **5.4 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 does not apply.

## **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.

## **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 parts 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 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, measurement, 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  $PL_r = c$ .

*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 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<sup>-2</sup>.

*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.

For machines with a device for grooving with milling tools, milling tool flanges shall be provided.

The diameter of the flanges shall be at least 1,4 times the bore diameter of the milling tool.

Loosening of the milling tool shall be prevented, e.g. by using a positive connection between the front flange and the spindle.

*Verification:* By checking the relevant drawings, by measurement 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.

For machines with a device for grooving with a milling tool, it needs 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 at least  $PL_r = b$ . In this case, an emergency stop control device shall be positioned in the vicinity of the hold-to-run control device.

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

### 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.

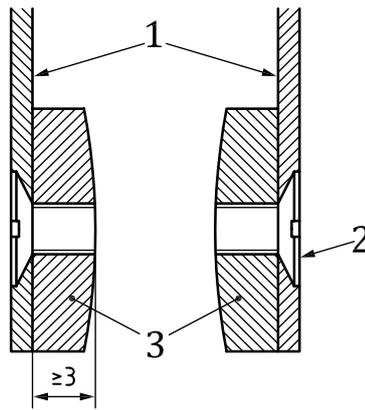
#### 6.6.2.1 Access to the saw blade above the machine table

##### 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 4](#)) 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 set in [Annex F](#).
- 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 at least 3 mm wide and shall, by design, prevent the saw blade teeth from cutting into the saw blade guard in case it gets displaced from the line of cut (see [Figure 3](#)). If the rib is replaceable, the fixing arrangement shall be such that it does not damage the saw blade, e.g. brass screws.

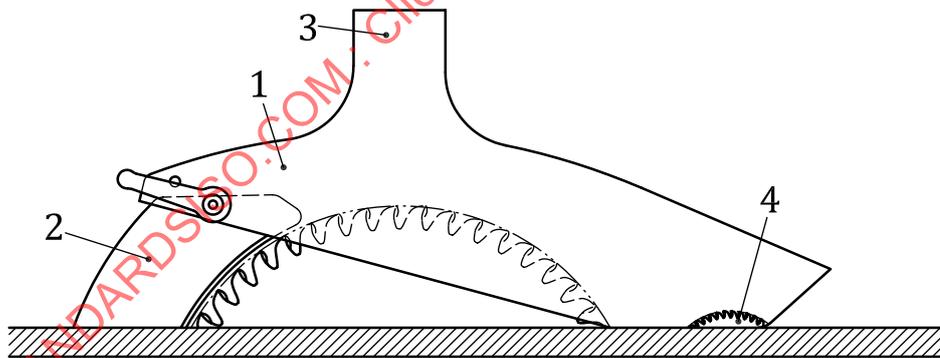


**Key**

- 1 side walls
- 2 fixing screws
- 3 ribbings

**Figure 3 — Example of replaceable ribs at the underside of saw blade guard side walls**

- 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 work-piece 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.



**Key**

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

**Figure 4 — Example of riving knife mounted 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.

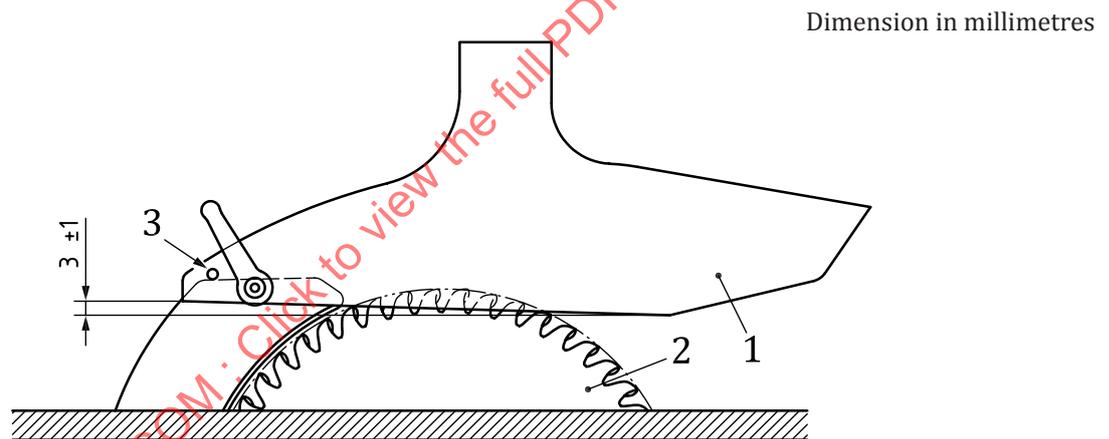
On machines with a saw blade guard mounted on the riving knife and having the device to adjust the saw blade height, coverage of the saw blade during grooving shall be made possible by providing mountings for fixing a safety appliance [see 6.11 and 8.3.2 i)].

**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 F.

#### 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 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 to the scoring saw blade (see Figure 4). It can 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 work-piece 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 5). This requirement shall be fulfilled at all possible vertical positions of the saw blade.



#### Key

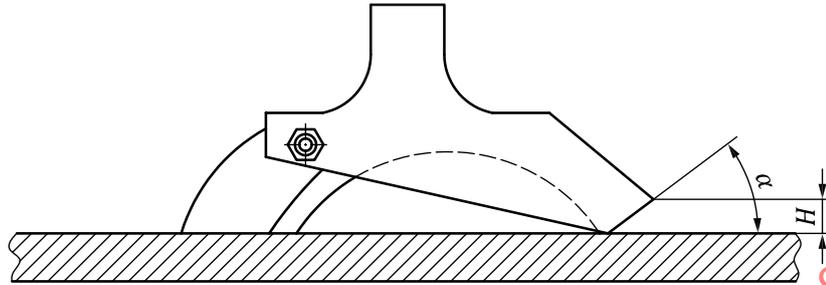
- 1 saw blade guard adjusted for maximum cutting capacity
- 2 saw blade
- 3 example of end stop

**Figure 5 — Riving knife mounted saw blade guard raised to its 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 work-piece 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 6](#)) shall be such, that the saw blade guard can be raised by a work-piece with a thickness of 20 % of the maximum cutting depth for which the machine is designed;
- 2) the angle,  $\alpha$ , shall be not more than 45°.



**Key**

- $\alpha$  in-feed end lead-in maximum angle
- $H$  in-feed end minimum lead-in height

**Figure 6 — Dimensions for the “lead-in” at the front edge of riving knife mounted saw blade guards**

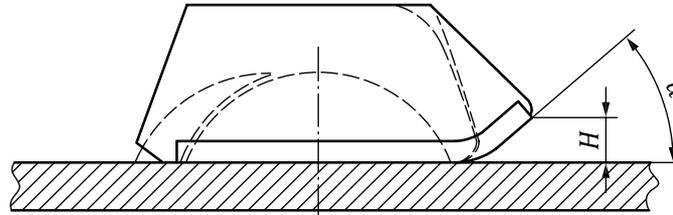
*Verification:* By checking the relevant drawings, inspection of the machine and relevant functional testing of the machine.

**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 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 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 work-piece be uneven. This can be achieved, for example, by:
  - 1) providing “lead-ins”; the front lead-in shall be in accordance with the following requirements (see [Figure 7](#)):
    - i) the minimum height,  $H$ , shall be such, that the saw blade guard can be raised by a work-piece with a thickness of 20 % of the maximum cutting depth for which the machine is designed;

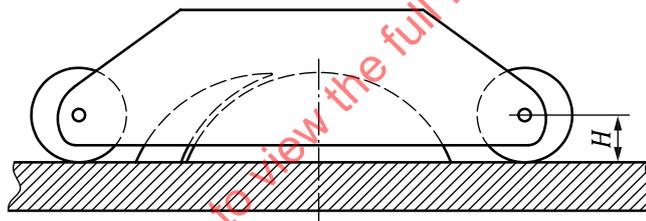
- ii) the angle,  $\alpha$ , shall be not more than  $45^\circ$ ;
- 2) equipping the saw blade guard with rollers (see [Figure 8](#)); the minimum radius,  $H$ , of the rollers shall be such, that the saw blade guard can be raised by a work-piece with a thickness of 20 % of the maximum cutting depth for which the machine is designed; or
- 3) providing an automatically adjustable saw blade guard, e.g. of the kind with a three-roller climbers on the front edge.



**Key**

- $\alpha$  in-feed end lead-in maximum angle
- $H$  in-feed end minimum lead-in height

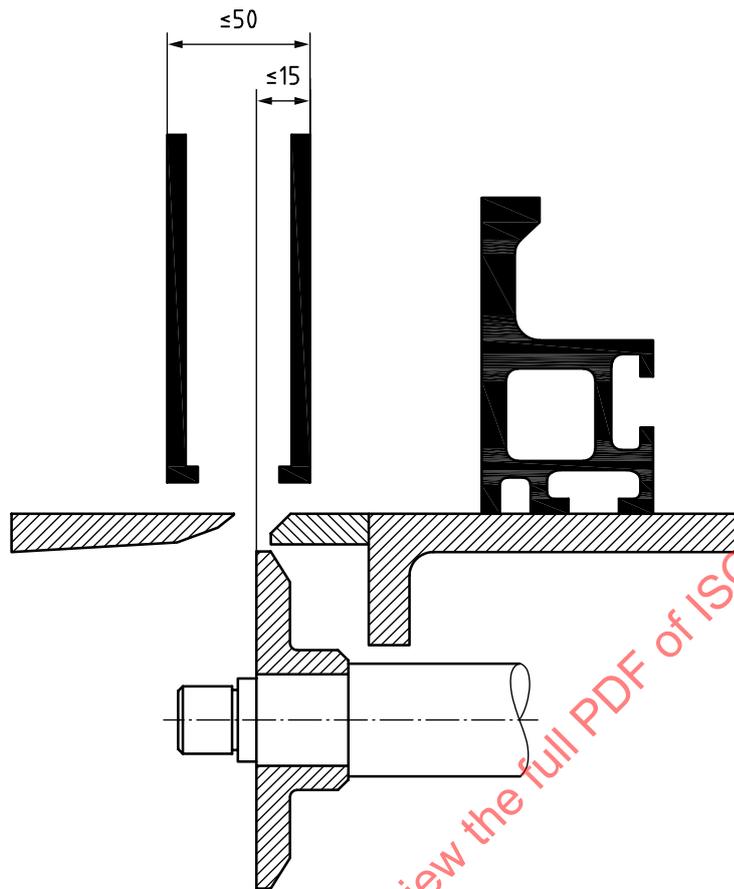
**Figure 7 — Dimensions of the “lead-in” at the front edge of saw blade guards mounted to the table separately from the riving knife**



**Key**

- $H$  in-feed end minimum lead-in roller radius

**Figure 8 — Dimensions of the roller at the front edge of saw blade guards mounted to the table separately from the riving knife**



**Figure 9 — Maximum width of the saw blade guard on machines with the saw blade guard mounted separately from the riving knife and with a non-tilting saw blade**

- 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 9](#)).
- h) When an automatically adjustable saw blade guard is provided, the following requirements shall be fulfilled:
  - 1) it shall rise up when feeding the work-piece for any work-piece height up to maximum cutting capacity;
  - 2) pre-adjusting it manually shall be possible in any height position.

For machines with a device to tilt the saw blade or with a device 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.

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 dismantled 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:** 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 in the table slot lining

The total width of the slot,  $L$ , (see [Figure 10](#)) shall not exceed 12 mm. The table bevel edges shall not exceed 4 mm (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.

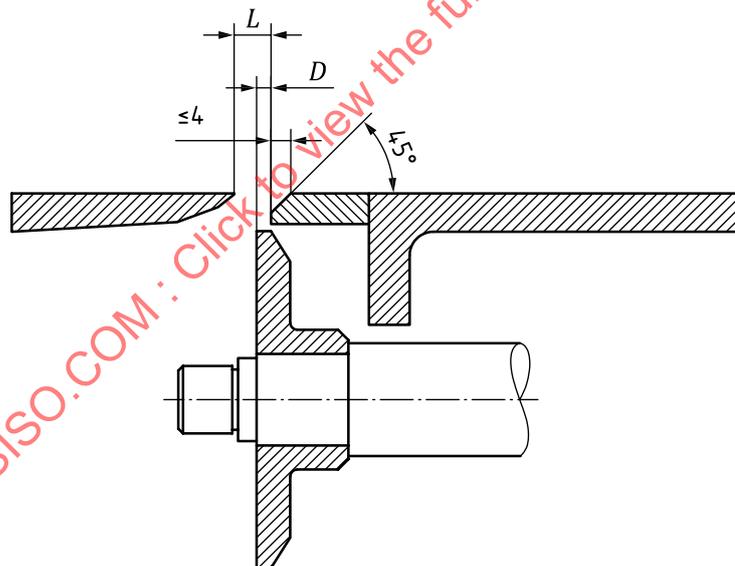
As an exception, the width of the slot may exceed the above dimension up to a maximum of 25 mm when the machine is equipped with a milling tool for grooving. In this case, an additional table insert for grooving shall be provided.

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

In cases where the saw blade is changed from above the table, the table insert shall have a minimum width on the non-fixed flange side in accordance with the dimension "c" in [Annex G](#).

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

Dimensions in millimetres



#### Key

- $L$  total width of the table slot
- $D$  distance between fixed saw flange and table edge

**Figure 10 — Width of table slot and distance between fixed saw flange and table slot edge**

#### 6.6.2.2 Access to the saw blade below the machine table

Access to the part of the tools (saw blade, milling tool) below the table shall be prevented by fixed guards and/or by interlocking movable guards.

For saw blade changing from above the table, the interlocking movable guard may be a table insert – interlocked but not attached to the machine – close to the tool.

*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 rotational speed of the saw blade by changing the belt position.

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

### 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 hazards 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) it shall 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 13854:2017 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 for the movement of the fences within the crushing and shearing area for the arm/hand/finger, or
- b) a mechanically actuated trip device (PSPE), which shall meet the following requirements:
  - 1) it shall be located on the fixed parts of the machine, e.g. frame or integrated sliding table at table level;
  - 2) the crushing and shearing force shall not exceed 150 N.

**NOTE** Crushing and shearing hazards for arms, hand and finger according to ISO 13854:2017 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 position of the rip fence within the crushing and shearing area for the 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 text.

The speed for the power-operated movement of the fences shall be lower than or equal to 25 m min<sup>-1</sup>.

*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.

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 4413:2010 or ISO 4414:2010, respectively, shall be met.

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

## 6.9 Measures against ejection

### 6.9.1 General

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

Anti-splinter device is 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 class A

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

#### 6.9.2.3 Guards class B

This subclause of ISO 19085-1:2017 applies.

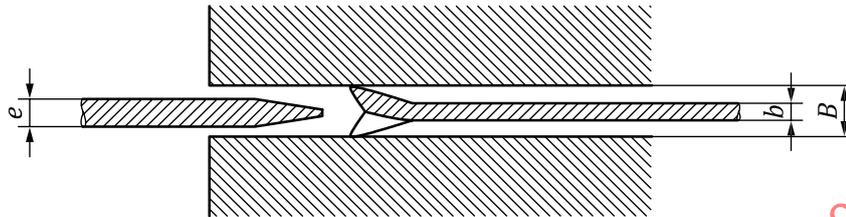
### 6.9.3 Anti-kickback devices

Subclause specific to this part of ISO 19085.

To reduce the risk of kickback, 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.

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

- a) Riving knives shall be manufactured from steel with an ultimate tensile strength of  $580 \text{ N mm}^{-2}$  or of a comparable material, have flat sides (within  $0,2 \text{ mm}$  per  $100 \text{ mm}$ ) and shall have a thickness less than the width of cut (kerf) and at least  $0,2 \text{ mm}$  greater than the saw blade plate (see [Figure 11](#)).



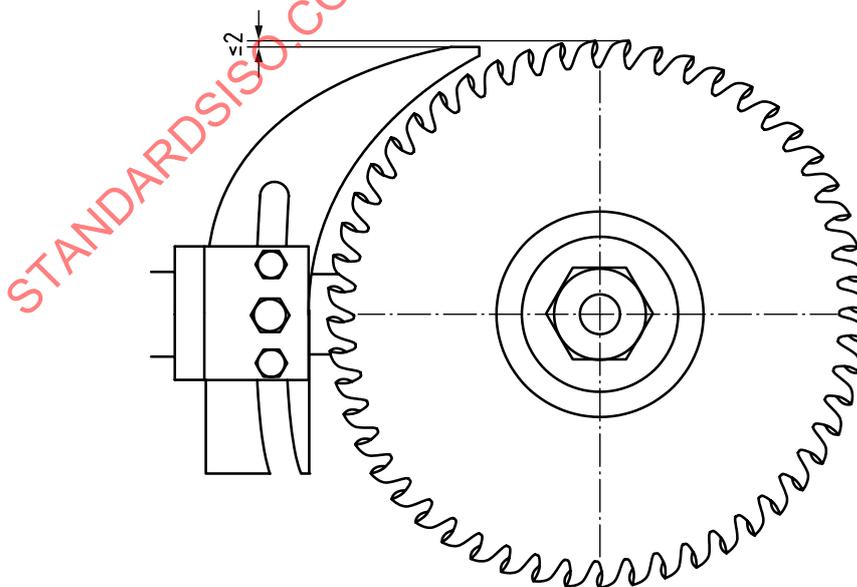
**Key**

- e* riving knife thickness
- b* saw blade plate
- B* kerf (width of saw blade cut)

**Figure 11 — Riving knife thickness in relation to saw blade dimensions**

- b) They shall be of constant thickness (within  $\pm 0,1 \text{ mm}$ ) throughout their working length; their leading edges 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  $0 \text{ mm}$  and  $2 \text{ mm}$  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 12](#) and [8.3.2 f](#))]. 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](#)).

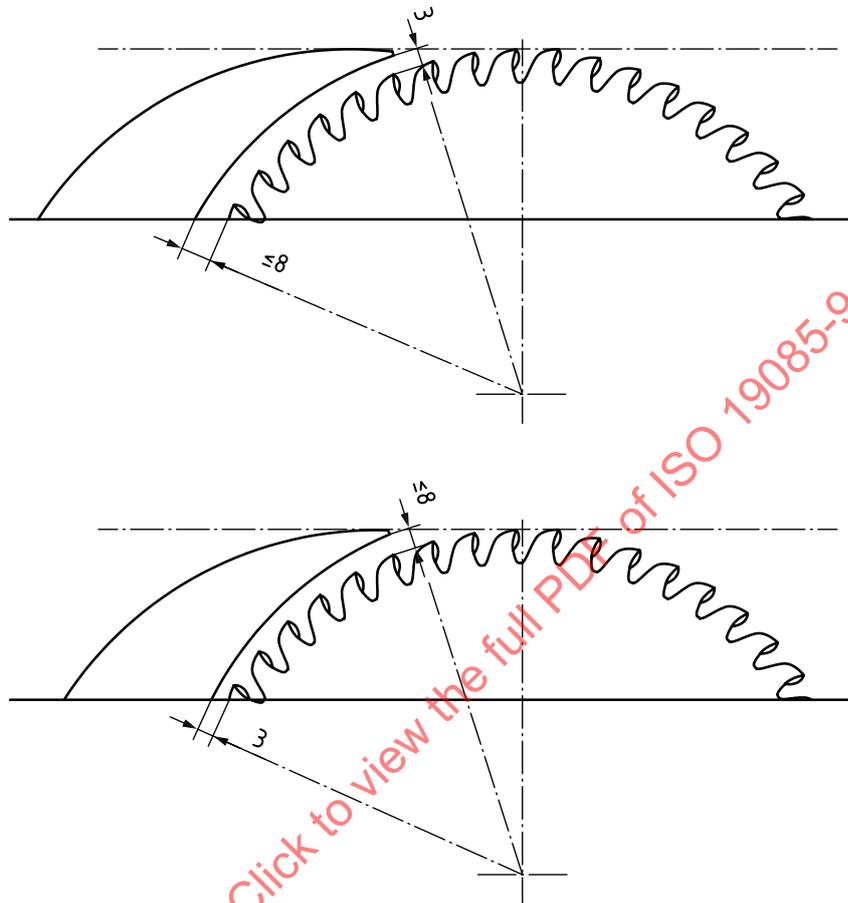
Dimensions in millimetres



**Figure 12 — Riving knife height adjustment**

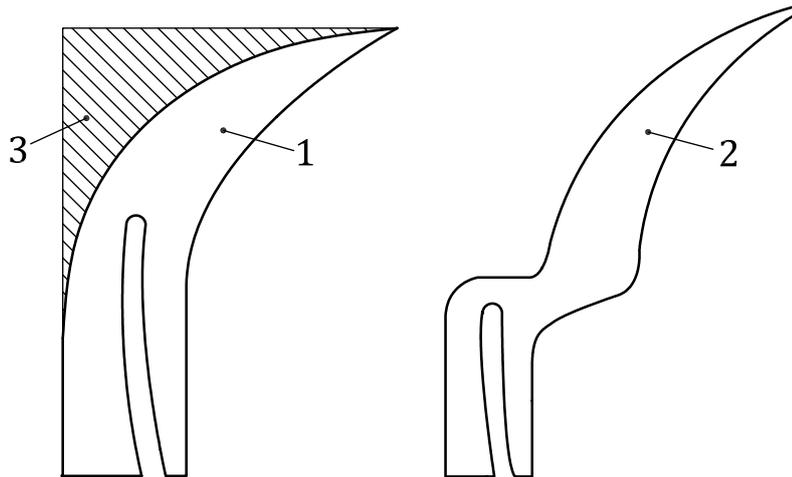
- d) They shall be designed to be mounted and adjusted so that the gap between them and the saw blade shall be at least 3 mm and shall not exceed 8 mm, measured radially through the centre of the saw spindle in the area above the table (see [Figure 13](#)).

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 could weaken it (see [Figure 14](#)).

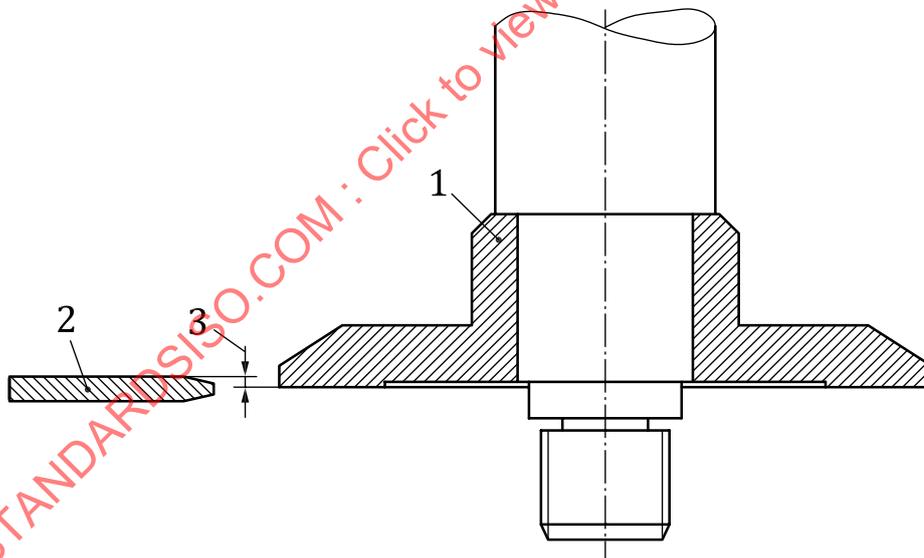


**Key**

- 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 14 — Example of shape of riving knife**

- f) Their mounting arrangement shall provide a positive offset of their position relative to the fixed saw flange of not more than 0,5 mm (see key item 3 of [Figure 15](#)); this offset shall be maintained with the rise, fall and tilt of the saw blade.



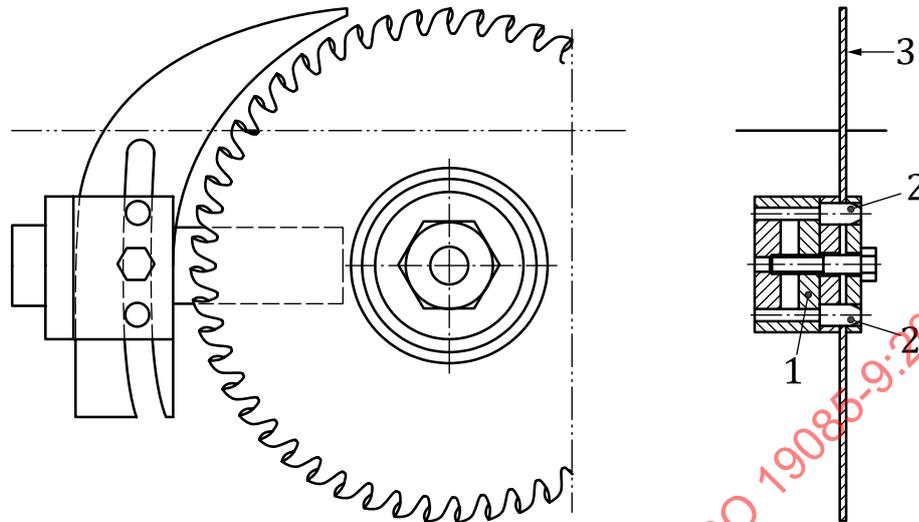
**Key**

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

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

- g) Riving knives and their mounting shall be longitudinally stable (see [H.1](#)).
- h) Riving knives and their mounting shall be laterally stable (see [H.2](#)).

- i) 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 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 of the riving knife rigidity tests according to [Annex H](#).

## 6.10 Work-piece supports and guide

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

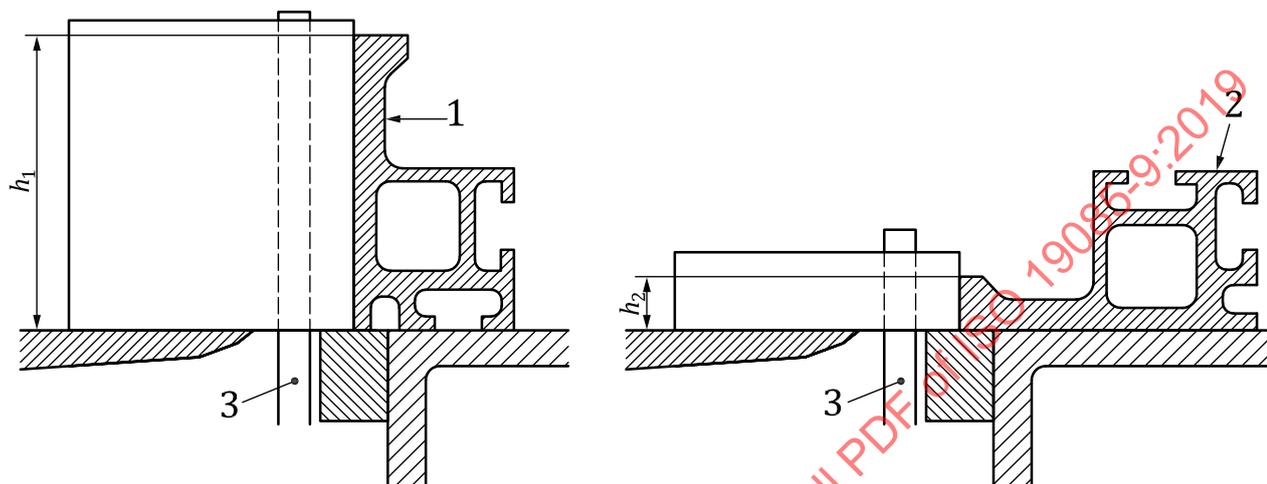
### 6.10.1 Rip fence

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

The rip fence shall fulfil the following requirements.

- a) It shall be made of 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 at least to a point in line with the rear edge of the main saw blade at table level, and rearwards to a point at table level which is in line with the first cutting tooth of the largest main 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,  $h_2$ , for shallow or angled cutting and a higher one with a height,  $h_1$ , for deep cutting (see [Figure 17](#)); the height  $h_2$  shall be between 5 mm and 15 mm and the height  $h_1$  shall be:
  - 1) minimum 30 mm for machines designed to be used with saw blades of maximum diameter up to 200 mm;

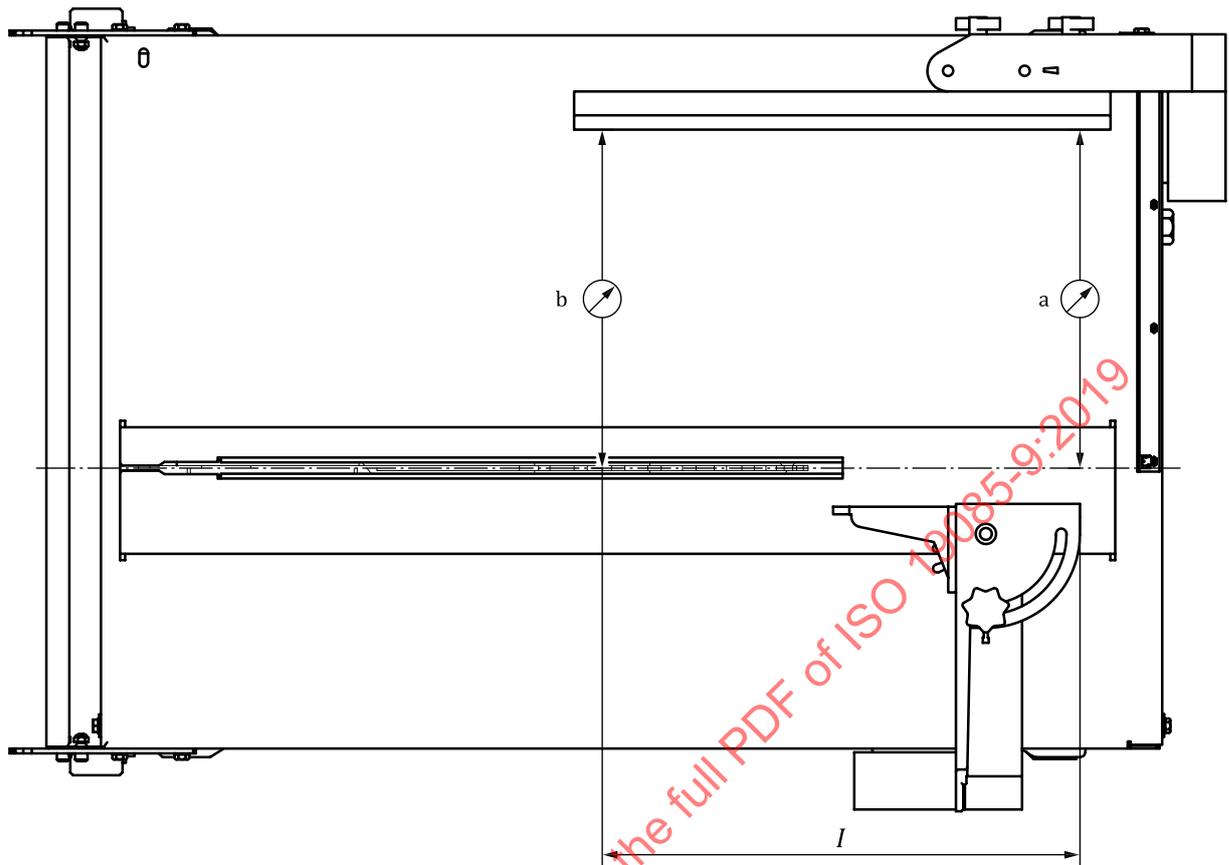
- 2) minimum 50 mm for machines designed to be used with saw blades of maximum diameter up to 315 mm;
  - 3) minimum 90 mm for machines designed to be used with saw blades of maximum diameter higher than 315 mm.
- d) After adjustment, its work-piece guiding surface shall remain in a vertical plane and be parallel to the cutting line of the saw blade where a deviation  $e_k > e_j$  from exact parallelism is necessary in order to prevent jamming (see <sup>a</sup> and <sup>b</sup> in [Figure 18](#)).



Key

- 1 rip fence in high position for deep cutting
- 2 rip fence in low position for shallow or angled cutting
- 3 saw blade
- $h_1$  height of the higher guiding surface
- $h_2$  height of the lower guiding surface

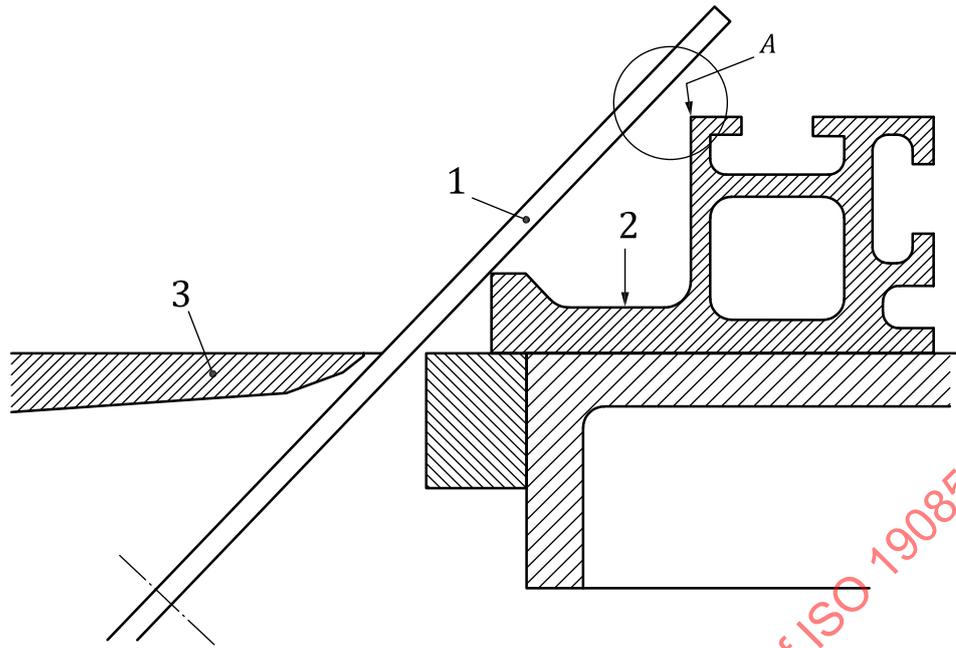
Figure 17 — Minimum dimensions of the high and low guiding parts of the fence

**Key**

- $l$  measuring distance
- a Measuring point for  $e_j$ .
- b Measuring point for  $e_k$ .

**Figure 18 — 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 19](#) when the saw blade is fully tilted.



**Key**

- 1 saw blade in its maximum tilted position
- 2 rip fence in low position
- 3 machine table
- A reference contact point

**Figure 19 — Design of rip fence in low position**

- 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 work-piece guiding part of the fence.
- g) It shall have a minimum length equal to half the minimum machine table length,  $L$ , plus the radius of the biggest saw blade that can be mounted (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 machine shall be equipped with a cross-cut fence (fixed to the sliding table or removable, see, for example, key item 6 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.

If the work-piece 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 Machine table

The dimensions of the machine table shall be in accordance with the requirements of [Table G.1](#).

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

### 6.10.4 Extension table

Machines where the distance between the centre line of the saw spindle and the far end of the table is less than dimension X in [Figure G.1](#) shall be provided with an extension table in order to fulfil this requirement.

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

## 6.11 Safety appliances

Subclause specific to this part of ISO 19085.

A push stick (see [Figure 20](#)) and a push block handle (see [Figure 21](#)) shall be provided. Provision shall be made for storing the push stick and push block handle on the machine.

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 [8.3.2 i](#)] for the design characteristics of such a safety appliance].

As an alternative to a push block handle, other safety appliances for cutting may be provided (see [Figure 22](#)).

Dimensions in millimetres

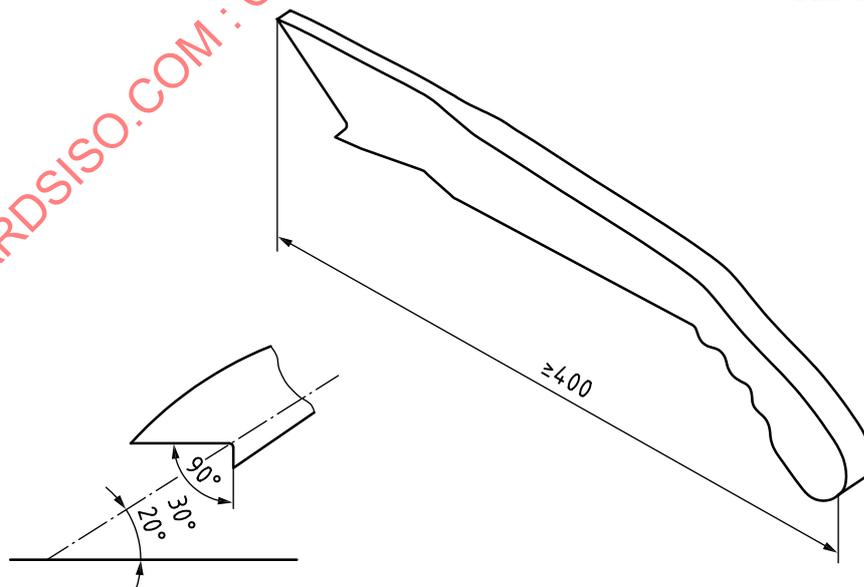
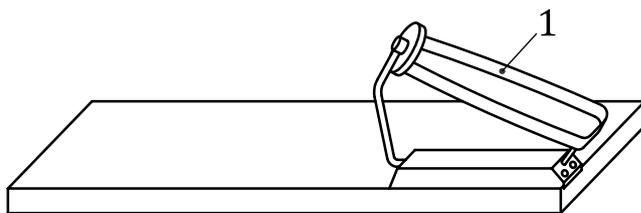


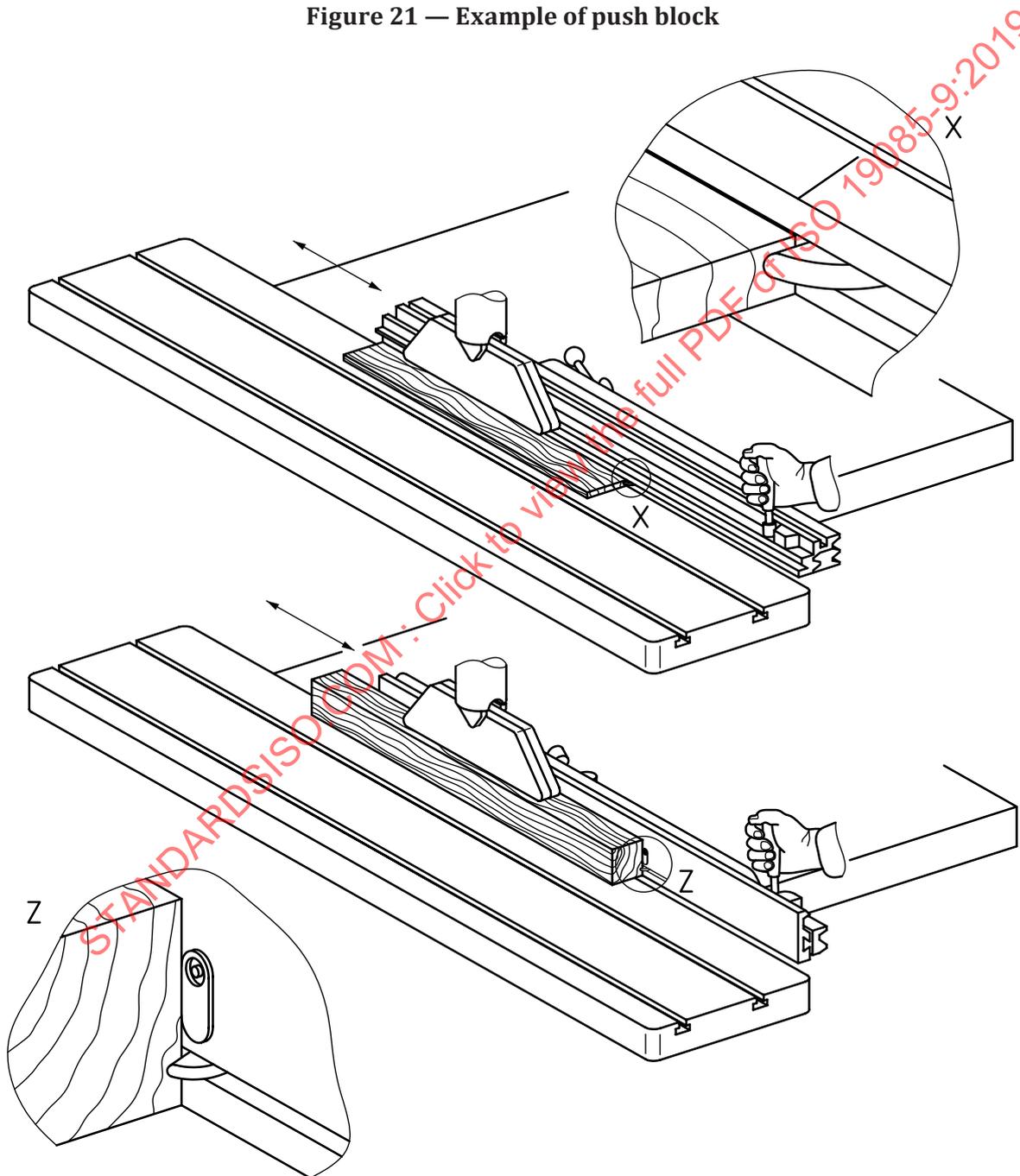
Figure 20 — Example of push stick



**Key**

1 push block handle

**Figure 21 — Example of push block**



**Figure 22 — Example 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.

Also see [7.12](#) for avoiding contact between the main saw blade and the scoring 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 [Figure 1](#)).

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

NOTE The requirements of ISO 13857:2008 cannot be applied on the access through the dust extraction outlet due to the negative impact on the extraction of chips and dust.

A proper chips and dust extraction can be obtained with the following recommended air flow rates:

Maximum saw blade diameter, $D$ mm	Recommended air flow rate $\text{m}^3\text{h}^{-1}$
$D \leq 315$	$\geq 850$
$315 < D < 400$	$\geq 1\ 100$
$D \geq 400$	$\geq 1\ 400$

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

### 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  $\geq 850$  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 a\)](#).

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

Handles, levers and latches or mechanically adjustable units shall be reachable from the operator's position and not be located at the rear side of the machine.

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

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

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

### 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.

### 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 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 a tiltable saw blade and a saw blade guard mounted separately from the riving knife, a pictogram meaning "Change the guard before tilting the saw blade" or a message on the screen before tilting starts;
- e) on machines fitted with a device for grooving with milling tool, a pictogram meaning "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  $\text{min}^{-1}$  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.

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

### 8.3 Instruction handbook

#### 8.3.1 General

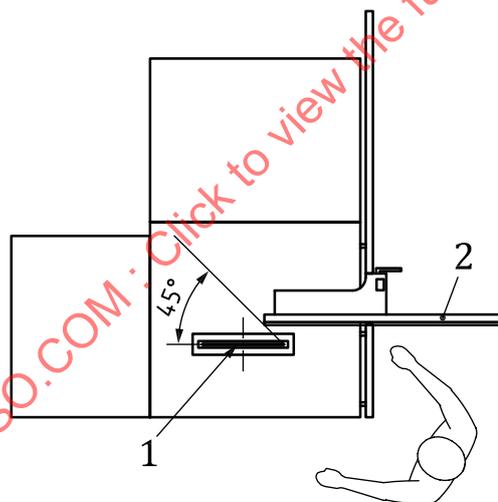
This subclause of ISO 19085-1:2017 applies.

### 8.3.2 Additional information

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

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

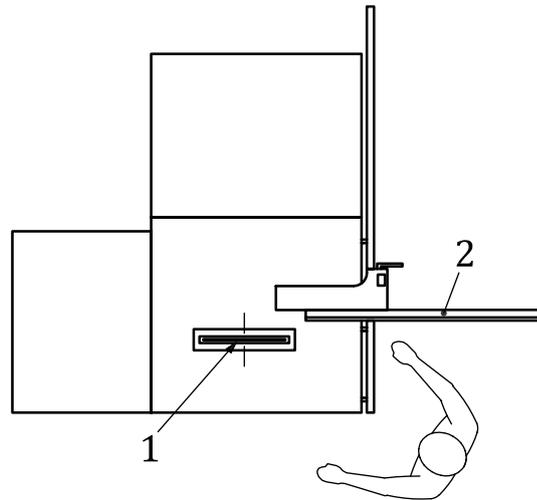
- a) instruction to refrain from working without the saw blade guard when sawing and to refrain from working with the safety appliance for grooving in the non-protective position when grooving;
- b) instruction for safe operations shall also include a description on proper use of:
  - 1) manually operated tables (if provided);
  - 2) cross-cut fence;
  - 3) demountable power feed unit;
  - 4) safety appliances provided according to [6.11](#);
  - 5) rip fence position to avoid kickback:
    - i) during ripping, the front end of the rip fence to be positioned close to an imaginary line at  $45^\circ$  on the table from the front end of the saw blade (see [Figure 23](#));
    - 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 24](#)) or not in contact with the work-piece (retracted position);



**Key**

- 1 saw blade
- 2 rip fence

**Figure 23 — Rip fence front end position during ripping**

**Key**

- 1 saw blade
- 2 rip fence

**Figure 24 — Rip fence front end position during cross-cutting**

- c) on machines with a device for grooving with milling tools, instruction that, for grooving only, milling tool for hand feed with a cutting width of less than or equal to 20 mm, marked MAN in accordance with EN 847-1:2017 shall be used;
- d) on machines with device for grooving with milling tools, instruction on how to set the machine for grooving and how to set the machine for return to normal sawing operation with particular attention to the remounting and adjusting the riving knife;
- e) guidance on the selection of the correct riving knife for particular saw blade dimensions;
- f) instructions that the riving knife shall be used and set, so that the distance between the riving knife and the saw blade shall be at least 3 mm and shall not exceed 8 mm and for machines with the saw blade guard mounted separately from the riving knife, set so that it reaches a level between 0 mm and 2 mm below the highest point on the periphery of the saw blade;
- g) instruction that push blocks or push sticks shall be used when cutting small work-pieces and in circumstances where it is necessary to push the work-piece against the fence;
- h) warning that when cross-cutting round stock it is necessary to secure the work-piece against rotation by using a suitable jig or holder and to use a suitable saw blade;
- i) design specifications for manufacturing the protective device for grooving with the saw blade in machines with riving knife mounted saw blade guard shall be given: 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;
  - 4) of a dimension square to the parallel fence of at least 200 mm;
- j) on machines with the device 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;

- k) on machines with the device 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.

Verification: By checking the instruction handbook and relevant drawings.

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## 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<sub>r</sub>) 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 performance level (PL) required**

Area	No.	Safety function/devices	PL <sub>r</sub>	Subclause of ISO 19085-1:2017	Subclause of ISO 19085-9:2019
Start	1	Interlocking of scoring saw blade with drive of main saw blade	c		<a href="#">5.3</a>
	2	Interlocking of starting 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 (braking function excluded)	c	5.4.2	
	6	Emergency stop (braking function excluded)	c	5.4.4	
Braking	7	Braking function	b/c	5.5	
	8	Interlocking of brake release	c	6.4.3	
Spindle speed	9	Speed indication (belt position)	b	5.7.1	
	10	Incremental speed changing	c	5.7.2	
	11	Infinitely variable speed monitoring	c	5.7.3	
Controls	12	Time delay	c	5.12	
Axes movements	13	Machine moving parts speed monitoring	b		<a href="#">5.11</a>
	14	Initiation control for power-operated axes (saw blades and fences)	c		<a href="#">5.13</a>
	15	Detection of collision area	c		<a href="#">5.13</a>
	16	Limitation of concurrent movements under hold-to-run control	b		<a href="#">5.13</a>
	17	Control system for cut of power under pre-set electronic control	c		<a href="#">5.13</a>
Safeguards	18	Interlocking of movable guards	c	6.5.2.2	<a href="#">6.6.2.2</a>
	19	Hold-to-run	b/c	6.5.3	<a href="#">6.5.3</a>
	20	Interlocking with PSPE	c	6.5.6	
Crushing/shearing hazards	21	Detection of shearing/crushing area for the body (500 mm)	c		<a href="#">6.6.4.1</a>
	22	Maximum crushing force of rip fence 400 N	c		<a href="#">6.6.4.1</a>
	23	Detection of shearing/crushing area for arm/hand (120 mm)/finger (25 mm)	c		<a href="#">6.6.4.2</a>
Clamping	24	Prevention of unexpected activation of the second stage clamping force	c	6.8	

**Annex B**  
(normative)

**Test for braking function**

This annex of ISO 19085-1:2017 applies.

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**Annex C**  
(normative)

**Stability test for displaceable machines**

This annex of ISO 19085-1:2017 applies.

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**Annex D**  
(normative)

**Impact test for guards**

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

The test shall be carried out with the projectile given in D.3.3.

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