

First edition
2017-07

Corrected version
2017-11

Woodworking machines — Safety —

Part 2:

**Horizontal beam panel circular sawing
machines**

Machines à bois — Sécurité —

Partie 2: Scies circulaires à panneaux horizontales à presseur

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Reference number
ISO 19085-2:2017(E)

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Foreword

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

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

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

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

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

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

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

This corrected version of ISO 19085-2:2017 incorporates the following corrections:

- [Figures 5](#) and [9](#) have been changed.

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 document can either

- confirm as a whole,
- confirm with additions,
- exclude in total, or
- replace with specific text

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

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

- “This subclause of ISO 19085-1:2017 applies”;
- “This subclause of ISO 19085-1:2017 applies with the following additions”, or “This subclause of ISO 19085-1:2017 applies with the following additions, subdivided into further specific subclauses.”;
- “This subclause of ISO 19085-1:2017 does not apply.”;
- “This subclause of ISO 19085-1:2017 is replaced by the following text.”, or “This subclause of ISO 19085-1:2017 is replaced by the following text, subdivided into further specific subclauses.”.

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

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

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

Woodworking machines — Safety —

Part 2:

Horizontal beam panel circular sawing machines

1 Scope

This document gives the safety requirements and measures for horizontal beam panel circular sawing machines with the saw carriage of the front cutting line mounted below the work-piece support, which are manually and/or powered loaded and manually unloaded, hereinafter referred to as “machines”.

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

NOTE 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/additional working units, whose hazards have been dealt with:

- side pressure device;
- device for powered unloading;
- unit for scoring;
- unit for post-formed/soft-formed edge pre-cutting;
- panel turning device;
- front side turn table;
- pushing out device;
- pneumatic clamping of the saw blade;
- powered panel loading device;
- device for grooving by milling tool;
- one or more additional cutting lines inside the machine for longitudinal and/or head cut (before the transversal cutting line);
- work-piece vacuum clamping as part of a front side turn table or of a panel loading device.

The machines are designed for cutting panels consisting of

- a) solid wood,
- b) material with similar physical characteristics to wood (see ISO 19085-1:2017, 3.2),
- c) gypsum boards, gypsum bounded fibreboards,
- d) composite boards made from the materials listed above, and
- e) composite materials with core consisting of e.g. polyurethane or mineral material laminated with light alloy.

This document does not deal with hazards related to

- specific features that differ from the dashed list above,
- the machining of panels with milling tools for grooving,
- powered unloading of panels,
- rear half of split pressure beam on the front cutting line,
- the combination of a single machine being used with any other machine (as part of a line).

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

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 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 14118:2000, *Safety of machinery — Prevention of unexpected start-up*

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

EN 847-1:2013, *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*

3 Terms and definitions

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

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

- ISO Online browsing platform: available at <http://www.iso.org/obp>
- IEC Electropedia: available at <http://www.electropedia.org/>

3.1

horizontal beam panel sawing machine

machine, designed for cutting panels, fitted with one travelling *saw carriage* (3.6) per cutting line incorporating one or more circular saw blades

Note 1 to entry: The work-piece is supported in the horizontal plane and may be mechanically positioned by a panel pusher for the cuts and held in position during cutting by a pressure beam. The cutting stroke is power driven. Before the cutting stroke commences, the saw blade is automatically raised/lowered and is retracted or out of operation for the return stroke. The cut takes place only in a single straight line. For examples, see [Figure 1](#). The work-piece is loaded manually and/or by means of a powered panel loading device and manually unloaded. The machine may have any of the devices/additional working units listed in the scope.

3.2**manual loading**

operation where the operator puts the work-piece directly on the work-piece support from the front side of the machine, i.e. there is no intermediate loading device, which keeps the operator away from the machine front cutting line of at least 1 500 mm during operation

3.3**manual unloading**

operation where the operator removes the work-piece directly from the work-piece support, i.e. there is no intermediate unloading device, which keeps the operator away from the machine front cutting line of at least 1 500 mm during operation

3.4**powered loading**

operation where the work-pieces are put on the work-piece support mechanically and power driven, by e.g. a lifting unit or a loading device, normally a lifting platform

3.5**powered unloading**

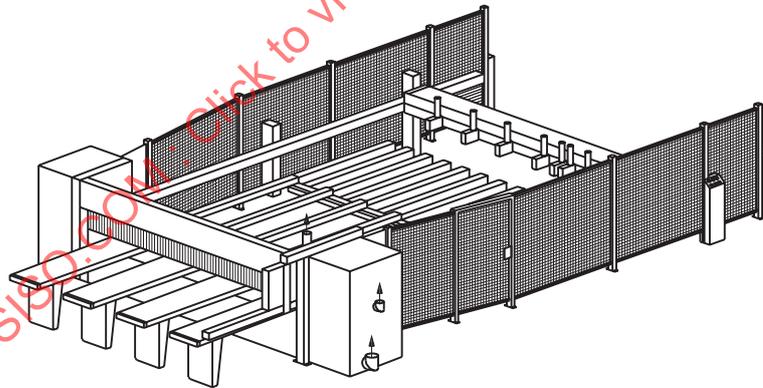
operation where the work-pieces are removed from the work-piece support mechanically and power driven, by e.g. a lifting unit or an unloading device

3.6**saw carriage**

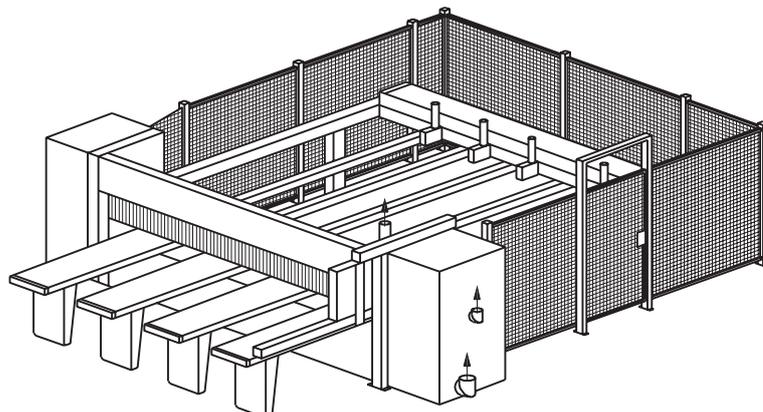
supporting unit of the saw blades, which performs the cutting stroke

3.7**main saw blade**

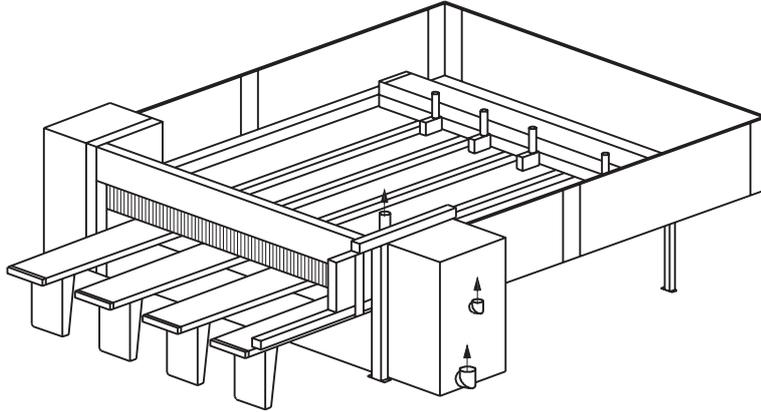
circular saw blade which is used for separating the work-piece



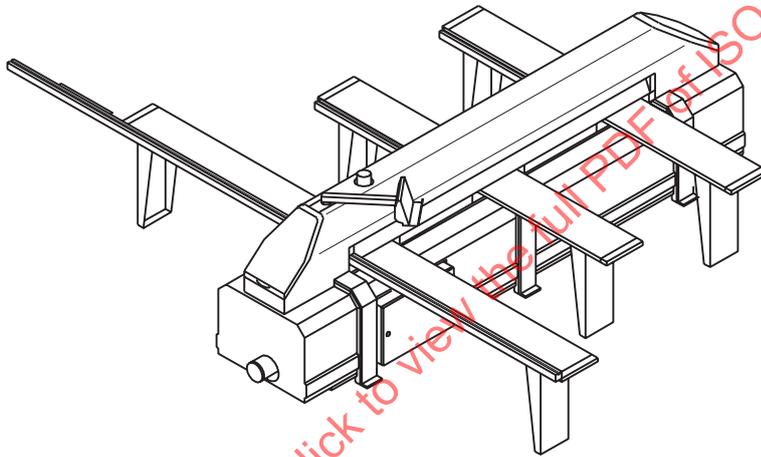
a) Example of a machine with panel loading from the rear side by a powered loading device and with perimeter fence and light barrier



b) Example of a machine with panel loading from the front side and perimeter fence



c) Example of a machine with panel loading from the front and with distance guards mounted on the machine frame



d) Example of a machine without panel pusher

Figure 1 — Examples of horizontal beam panel saws

3.8

saw carriage rest position

position in either the left or the right side of the machine body and outside of the cutting area to which the *saw carriage* (3.6) may return at the end of each *cutting cycle* (3.11)

3.9

saw blade rest position

position of the saw blade below the machine table

3.10

pressure beam rest position

highest position of the *pressure beam* (3.15)

3.11

cutting cycle

single cut operation consisting of vertical movements of the saw blades and horizontal movements of the *saw carriage* (3.6)

3.12**front cutting line**

cutting line closest to the operator's position

Note 1 to entry: See [Figure 2](#).

3.13**longitudinal cutting line**

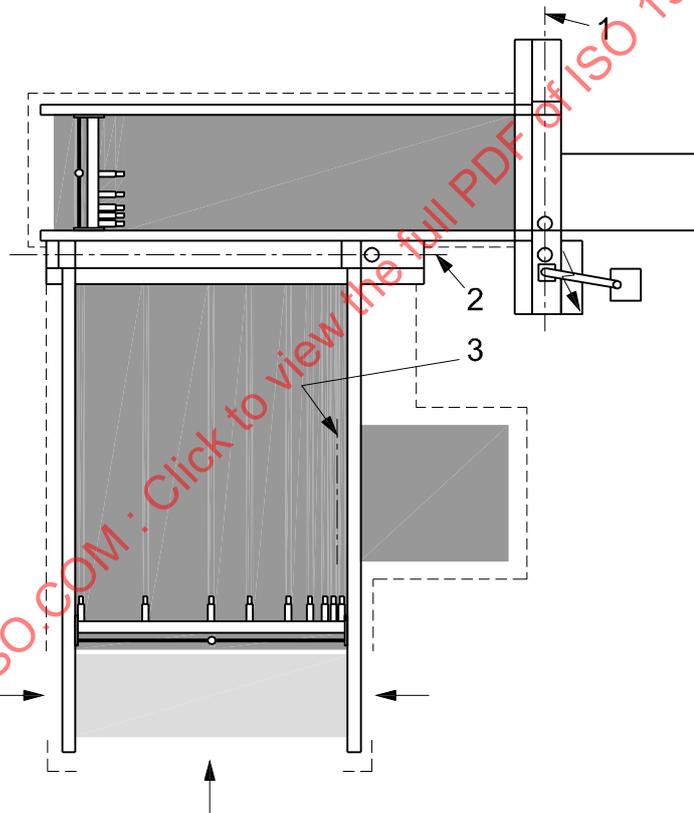
additional cutting line inside the machine

Note 1 to entry: A machine may be fitted with more longitudinal cutting lines. See [Figure 2](#).

3.14**head cutting line**

first cutting line to divide a panel before further cuts, where the *saw carriage* (3.6) can be mounted below or above the work-piece support

Note 1 to entry: See [Figure 2](#).

**Key**

- 1 front cutting line
- 2 longitudinal cutting line
- 3 head cutting line

Figure 2 — Horizontal beam panel saw cutting lines

3.15**pressure beam**

work-piece clamping device extending across the full working width of the machine with the function to hold the work-piece down to the work-piece support during cutting

Note 1 to entry: The pressure beam is also part of the safeguarding of the saw blades in the cutting area.

3.16

panel pusher

movable work-piece guiding device used to position the work-piece over the line of cut, and fitted with holding devices e.g. collets for holding the work-piece in position

Note 1 to entry: The positioning of the panel pusher may be under NC control.

3.17

side pressure device

power operated movable work-piece guiding device to push the work-piece against the fence for right-angled cuts

3.18

panel turning device

device integrated into the rear work-piece support to turn the panel for e.g. rectangular cut

3.19

pushing out device

movable device to move last residues of a panel towards the front of the *pressure beam* (3.15) for easy take off by the operator

Note 1 to entry: The same function can be achieved by telescopic collets or by collets with extended length mounted on the panel pusher.

3.20

powered panel loading device

device where the panel stack is put e.g. by a fork-lift truck or by a lifting unit either direct to a lifting platform or to a powered roller table which feeds the stack to the lifting table

Note 1 to entry: The lifting platform moves the uppermost panel or the required number of panels into a position which enables the panel pusher to bring the panels into the cutting position. The lifting platform itself can be fitted with an own panel pusher. The control circuits of the loading device are connected to the control circuits of the machine.

3.21

front side turn table

table, mostly with air cushion, able to move power-driven parallel to the cutting line and turn by 90° for ergonomic positioning of very heavy work-pieces or piles of panels

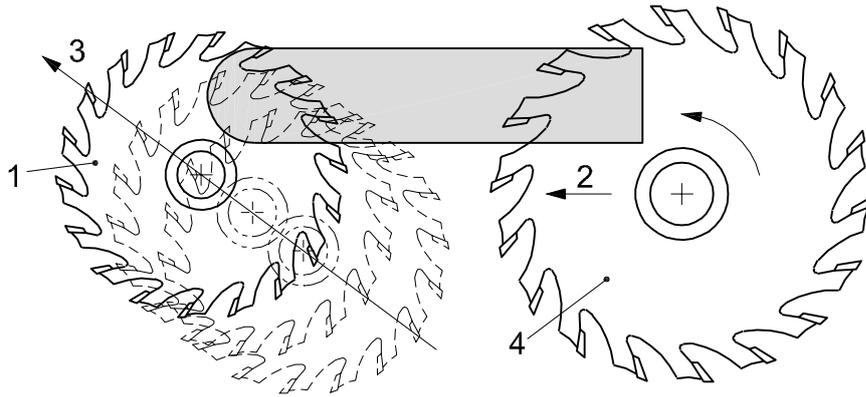
3.22

post-formed edge pre-cutting

soft-formed edge pre-cutting

cut made by a separate saw blade in the front profiled edge of the work-piece deep enough to prevent surface damage when the *main saw blade* (3.7) makes its cut

Note 1 to entry: See [Figure 3](#).

**Key**

- | | | | |
|---|--|---|------------------------------------|
| 1 | postformed/soft-formed edge pre-cutting saw blade | 2 | feed direction of the saw carriage |
| 3 | movement of post-formed/soft-formed edge pre-cutting saw blade | 4 | main saw blade |

Figure 3 — Post-formed/soft-formed edge pre-cutting

3.23**post-formed/soft-formed edge pre-cutting saw blade**

saw blade used for post-formed edge pre-cutting

Note 1 to entry: This may be the scoring saw blade or a separate saw blade, specifically for this purpose.

3.24**control power-on**

control that after activation enables providing power to machines actuators, also on a lower control level, e.g. by the PLC

4 List of significant hazards

This clause contains all significant hazards, hazardous situations and events (see ISO 12100), identified by risk assessment as significant for the machines as defined in the Scope and which require action to eliminate or reduce the risk. This document deals with these significant hazards by defining safety requirements and measures or by reference to relevant standards. These hazards are listed in [Table 1](#).

Table 1 — List of significant hazards

No.	Hazards, hazardous situations and hazardous events	ISO 12100:2010	Relevant section of ISO 19085-2:2017
1	Mechanical hazards related to		
	— Machine parts or work-pieces due to		
	a) shape	6.2.2.1, 6.2.2.2, 6.3	5.2 , 6.3 , 6.6 , 6.10 , 8.2 , 8.3 , Annex F
	b) relative location		5.2 , 5.3 , 5.8 , 6.6 , 8.2
	c) mass and stability (potential energy of elements which may move under the effect of gravity)		5.8 , 5.9
	d) mass and velocity (kinetic energy of elements in controlled or uncontrolled motion)		5.3 , 5.8 , 6.10 , 6.6
	e) mechanical strength		6.2 , Annex D
	— Accumulation of energy inside the machinery due to		
	f) liquids and gases under pressure	6.2.10, 6.3.5.4	7.7 , 7.8
1.1	Crushing hazard		5.3 , 5.4 , 5.8 , 6.4 , 6.10 , 6.6 , 6.6.3 , 7.12 , 7.13
1.2	Shearing hazard		5.3 , 5.4 , 6.4 , 6.10 , 6.6 , 6.6.3 , 7.12 , 7.13
1.3	Cutting or severing hazard		5.3 , 5.4 , 5.5 , 5.8 , 6.4 , 6.6 , 6.6.3 , 7.12 , 7.13
1.4	Entanglement hazard		5.4 , 5.5 , 6.6 , 6.6.3 , 7.12 , 7.13
1.5	Drawing-in or trapping hazard		5.3 , 5.4 , 5.5 , 6.4 , 6.6 , 6.6.3 , 7.12 , 7.13
1.6	Impact hazard		5.3 , 6.10 , 7.12
1.9	High pressure fluid injection or ejection hazard	6.2.10	5.4 , 6.10 , 7.9 , 7.12
2	Electrical hazards due to		
2.1	Contact of persons with live parts (direct contact)	6.2.9, 6.3.5.4	7.4 , 7.12
2.2	Contact of persons with parts which have become live under faulty conditions (indirect contact)	6.2.9	7.4 , 7.12
2.4	Electrostatic phenomena	6.2.9	7.11
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	7.2
4.2	Interference with speech communication, acoustic signals		8.3
6	Hazards generated by radiation		
6.5	Laser	6.3.4.5	7.10
7	Hazards generated by materials and substances (and their constituent elements) processed or used by the machinery		
7.1	Hazards from contact with or inhalation of harmful fluids and dusts	6.2.3 b, 6.2.4	7.3 , 8.3
7.2	Fire	6.2.4	7.1

Table 1 (continued)

No.	Hazards, hazardous situations and hazardous events	ISO 12100:2010	Relevant section of ISO 19085-2:2017
8	Hazards generated by neglecting ergonomic principles in machinery design		
8.1	Unhealthy postures or excessive effort	6.2.7, 6.2.8.2, 6.2.11.12, 6.3.5.5, 6.3.5.6	5.2 , 7.5
8.2	Hand-arm or foot-leg anatomy	6.2.8.3	7.5
8.4	Local lighting	6.2.8.6	8.3
8.5	Mental overload and underload, stress	6.2.8.5	8.3
8.6	Human error, human behaviour	6.2.8, 6.2.11.8, 6.2.11.10, 6.3.5.2, 6.4	8.3
8.7	Design, location or identification of manual controls	6.2.8.7, 6.2.11.8	5.2
8.8	Design or location of visual display units	6.2.8.8, 6.4.2	5.2
9	Combination of hazards	6.3.2.1	5.3 , 5.5 , 5.7 , 5.8 , 6.6 , 7.12 , 7.13
10	Unexpected start-up , unexpected overrun/overspeed (or any similar malfunction) from		
10.1	Failure/disorder of the control system	6.2.11, 6.3.5.4	5.1 , 7.12
10.2	Restoration of energy supply after an interruption	6.2.11.4	5.9 , 7.7
10.3	External influences on electrical equipment	6.2.11.11	5.1 , 7.9
10.4	Other external influences (gravity)	6.2.12.2	6.10
10.5	Errors in the software	6.2.11.7	5.1
10.6	Errors made by the operator (due to mismatch of machinery with human characteristics and abilities; see 8.6)	6.2.8, 6.2.11.8, 6.2.11.10, 6.3.5.2, 6	5.2 , 7.5 , 8.3
11	Impossibility of stopping the machine in the best possible conditions	6.2.11.1, 6.2.11.3, 6.3.5.2	5.4 , 5.5 , 7.12
12	Variations in the rotational speed of tools	6.2.2.2, 6.3.3	5.7
13	Failure of the power supply	6.2.11.1, 6.2.11.4	5.9
14	Failure of the control circuit	6.2.11, 6.3.5.4	5.1
15	Errors of fitting	6.2.7, 6.4.5	7.12
16	Break-up during operation	6.2.3	6.9
17	Falling or ejected objects or fluids	6.2.3, 6.2.10	5.8 , 8.3
18	Loss of stability/overturning of machinery	6.3.2.6	6.1

5 Safety requirements and measures for controls

5.1 Safety and reliability of control systems

This subclause of ISO 19085-1:2017 applies.

5.2 Control devices

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

The following electrical control devices of the machine shall be positioned together on the main control panel, located at the front side of the machine such that the working area is visible from this position by the operator

- for start and stop of the cycle,
- for control power-on,

- for normal stop,
- for the movement of the panel pusher,
- for saw spindle speed changing,
- for the side pressure, and
- for the pushing out device.

Emergency stop control devices shall be provided on the main control panel, on any auxiliary control panel, and at the following positions unless the main control panel or an auxiliary control panel is placed there already:

- a) on the front of the machine: at both sides of the loading/unloading opening;
- b) on the rear side of the machine with panel pusher: at one side of any access opening;
- c) on the rear side of the machine without panel pusher: at both sides of the loading/unloading opening.

An additional cycle start control device may be fitted on the front side, connected to one of the air cushion tables. It shall be supplemented by a stop or an emergency stop control device adjacent to it. The cycle start control device may be a push button or push bar (as long as cushion table maximum) and shall in any case be fitted with protection means against inadvertent actuation as specified in ISO 14118.

On machines without panel pusher, if more than one cycle start control device is available, only one of them shall be active at a time.

5.3 Start

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

5.3.1 General

Control power-on activation shall only be possible if all relevant safeguards are in place and are operational. This is achieved by the interlocking arrangements described in 6.5 and 6.6. The control power-on device shall be protected against unintended actuation, e.g. by shroud.

Cycle start or restart shall only be possible after actuation of a control device provided for that purpose, and after power-on activation.

The saw blades shall not leave their rest position before the drive motor has been started, unless the saw carriage is in its rest position.

For electrically operated machines, the requirements of IEC 60204-1:2005, 9.2.5.2 apply, but the exceptions described in IEC 60204-1:2005, 9.2.5.2 are not relevant.

The SRP/CS for control power-on shall achieve $PL_r = c$.

The SRP/CS for the interlocking of the saw blade feed and the tool drive shall achieve $PL_r = c$.

NOTE No PL is required for cycle start.

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

5.3.2 Operating conditions

During operation, all following conditions shall be met in the front cutting line.

- a) The pressure beam shall not leave its rest position as long as the safety curtain has not reached its guarding position.
- b) The saw blades or the saw carriage shall not leave their rest position as long as the pressure beam has not reached its clamping position/pressure.
- c) The pressure beam shall not release its clamping pressure as long as the saw blades or the saw carriage are not in their rest position.
- d) The safety curtain shall not leave its guarding position as long as the saw blades or the saw carriage have not reached their rest positions.

As an alternative to b), the following requirements shall be fulfilled.

- e) The saw blades or the saw carriage shall not leave their rest positions as long as the pressure beam has not left its rest position or they shall be interlocked with the pressure beam clamping position so that if they move when the pressure beam is not in its clamping position, their movement shall be stopped immediately.
- f) It shall be ensured, e.g. by interlocking or by design, that the saw blades do not protrude from the slot in the machine table before the pressure beam has reached its clamping position.

Since the above interlocks c) and d) accept a simultaneous opening of the safety curtain and the pressure beam, the opening of the pressure beam shall not cause any shearing or crushing hazards. Otherwise, the safety curtain shall not open before the pressure beam has reached its rest position.

The SRP/CS for the interlocking arrangements in a), b), c), d) and e) shall achieve $PL_r = c$; the SRP/CS for the interlocking in f) shall achieve $PL_r = b$.

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

5.4 Safe stops

5.4.1 General

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

The stopping sequence shall be applied in the following order, whereby a), b) and e) may be initiated simultaneously:

- a) stop any saw carriage traversing movement and retract the saw blades to its/their rest position;
- b) cut power to the saw blades spindle drive motors unless STO or SS1 is used, actuate the brakes (if provided; see 6.4), release clamping pressure of the pressure beams;
- c) return pressure beams to its/their rest position;
- d) cut power to the brakes (if electrical and if provided) after the saw blades has come to rest e.g. by a time delay;
- e) cut power to the other machine actuators.

If a time delay device is used, 5.12 applies.

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

ISO 19085-2:2017(E)

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 does not apply.

5.7.2 Spindle speed changing by incremental speed change motor

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

5.7.3 Infinitely variable speed by frequency inverter

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

On machines equipped with an infinitely variable speed control (i.e. frequency inverter) for tool drives, before starting tool drives the selected tool speeds shall be indicated at the main control panel.

The SRP/CS for indication of selected speed shall achieve $PL_r = b$.

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

5.8 Failure of any power supply

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

Requirements for clamping are related to machine pressure beams.

The pressure beam in the front cutting line shall remain in its rest position even when power is lost to its actuators.

A supply interruption shall not lead to any dangerous movement, e.g. returning of the saw blade to its rest position when the moveable guard for saw blade changing is open.

Since the control system may be in an undefined state during power supply failure, this shall be achieved by mechanical means, e.g. return valves or valves with spring reset, blocking devices or self-locking threads.

In case of any power supply failure, the following exceptions may apply to the stopping sequence described in [5.4.1](#):

- movement in c) may be initiated simultaneously to a) b) and e) if the safety curtain remains in its guarding position; or
- saw blades may not retract to their rest position if the safety curtain remains in its guarding position and pressure beam does not leave its clamping position.

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

5.9 Manual reset control

This subclause of ISO 19085-1:2017 applies.

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 applies.

5.12 Time delay

This subclause of ISO 19085-1:2017 applies.

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 does not apply.

6.2 Risk of break-up during operation

This subclause of ISO 19085-1:2017 applies.

6.3 Tool holder and tool design

6.3.1 General

This subclause of ISO 19085-1:2017 applies.

6.3.2 Spindle locking

This subclause of ISO 19085-1:2017 applies.

ISO 19085-2:2017(E)

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.

6.4 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 is replaced by the following specific text.

Maximum run-down time shall be 90 s.

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 applies.

6.5.3 Hold-to-run control

This subclause of ISO 19085-1:2017 applies.

6.5.4 Two-hand control

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

6.5.5 Electro-sensitive protective equipment (ESPE)

This subclause of ISO 19085-1:2017 applies.

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 applies.

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 Safeguarding of the saw blades outside the cutting area

Access to the saw blades outside the cutting area, i.e. when the saw carriages are in the rest position or in the saw blades changing position, shall be prevented by fixed guards.

Any gap in these guards shall be designed in accordance with the safety distances given in ISO 13857:2008, Table 4.

Access to the tool, e.g. for saw blade changing, shall be provided. The relevant opening in the fixed guard shall be guarded by a movable guard with interlocking and guard locking.

Any powered movement required for saw blade changing shall only be possible with the relevant moveable guards closed.

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

6.6.2.2 Safeguarding of the saw blades in the cutting area

For front cutting line, access to the saw blades in the cutting area from the operator side of the machine shall be hindered by a deterring/impeding device in the form of a sectional safety curtain consisting of individual stripes. On machines where access is possible to the cutting area from the rear side of the pressure beam, a second sectional safety curtain shall be fitted at the rear side of the pressure beam.

Access to the saw blades from above the sectional safety curtains shall be prevented by fixed guards.

The slots in the machine table and in the vertical side through which the saw blades project during cutting operation shall be designed in accordance with the safety distances in ISO 13857:2008, Table 4. As an exception, the safety distance from the table surface to the saw blades in their rest positions may be reduced to 20 mm if the maximum slot width in the table is ≤ 10 mm.

The sectional safety curtain shall meet the following requirements:

- a) it shall cover the full cutting width of the machine;
- b) the maximum effective width of each stripe shall not exceed 50 mm;
- c) in the guarding position, the lower edge of the individual stripes shall be able to lie on the work-piece or on the work-piece support where no work-piece is present irrespective of the position of the pressure beam (see [Figure 4](#));
- d) the stripes shall be made of polycarbonate or ABS and fulfil the rigidity test requirement described in [Annex F](#).

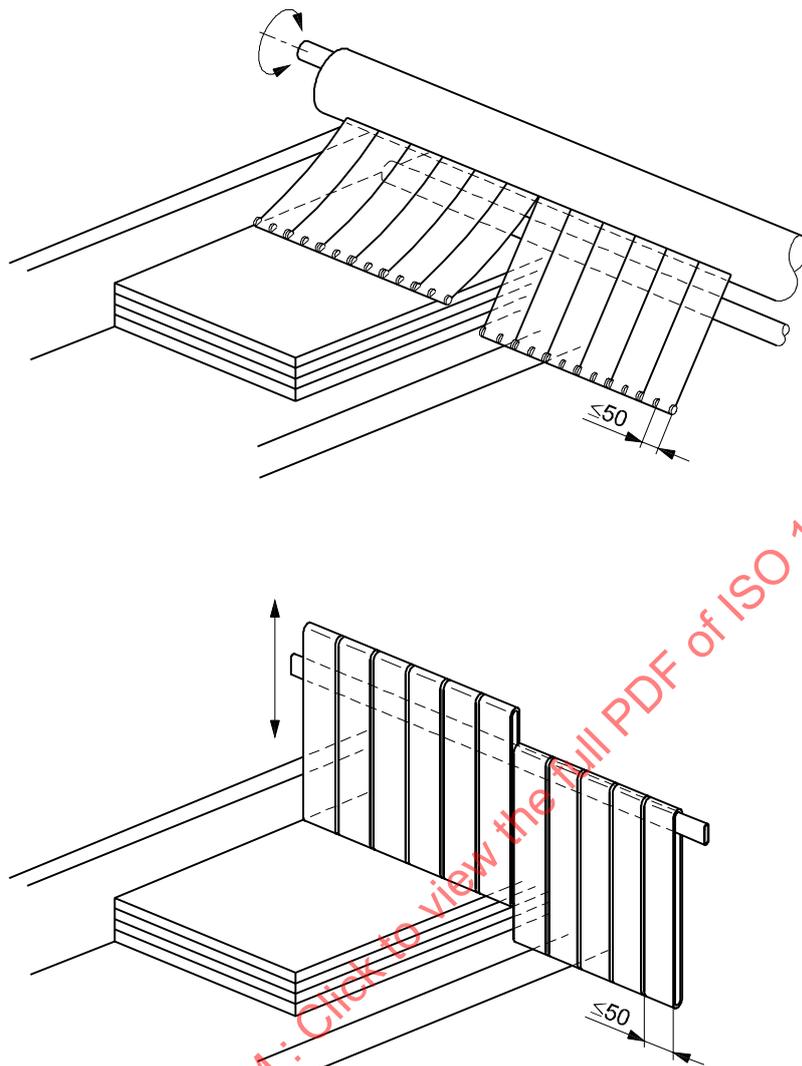


Figure 4 — Safety curtain

Access to the saw blades in the cutting area at the longitudinal and the head cutting line shall be prevented by fixed and interlocking movable guards.

This may usually be achieved by the same means that prevent access to the rear side of a machine with panel pusher, i.e. a perimeter fence with or without access doors (see 6.6.4.5).

Verification: By checking the relevant drawings and/or circuit diagrams, measurement, inspection of the machine, relevant functional testing of the machine and performing rigidity test given in Annex F.

6.6.3 Guarding of drives

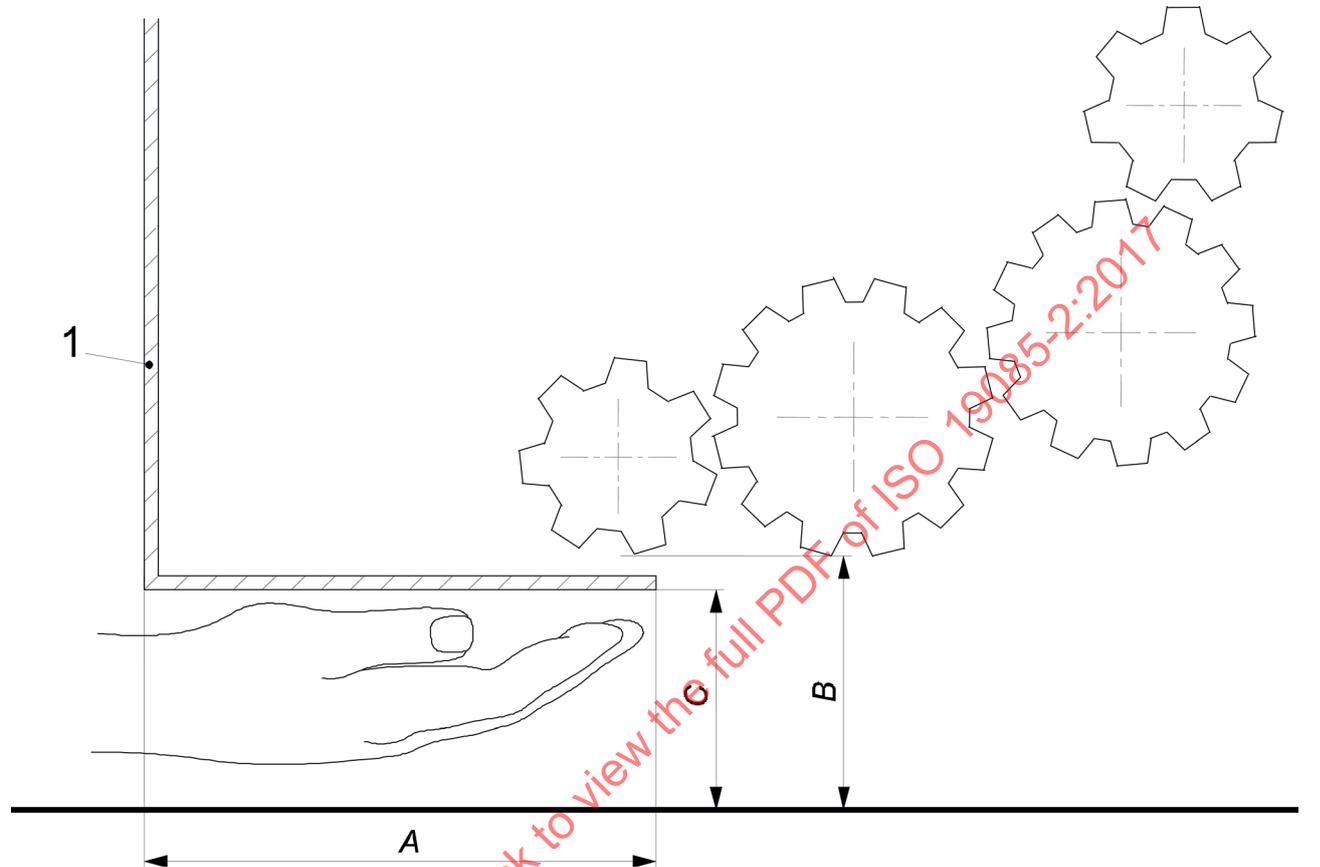
This subclause of ISO 19085-1:2017 applies with the following additions.

Access to moving parts, e.g. the saw carriage, from the bottom side of the machine shall be prevented by the following means (see Figure 5).

- a) If the distance A from the edge of the housing to any hazardous point is less than 230 mm (i.e. length of the hand), the requirements of ISO 13857:2008 apply.

- b) If the distance A is at least 230 mm and all hazardous points have a height B of at least 120 mm above the floor, the gap C between the floor and the housing shall be not greater than 120 mm.

NOTE Some minimum clearance between the machine and the floor is needed for effective cleaning.



Key

- | | |
|---|---|
| A safety distance to hazard points | C acceptable gap height between floor and machine housing |
| B lowest distance between hazard points and floor | 1 machine housing |

NOTE If $A \geq 230\text{mm}$ and $B \geq 120\text{mm}$, then $C_{\text{max.}} = 120\text{ mm}$.

Figure 5 — Examples of guarding of drives, option b)

At least one opening, covered by a moveable or a dismantable guard with interlocking without guard locking, shall be provided in the machine body. The opening shall be in the section of the machine where maintenance of the saw carriage is possible and where cleaning is most effective. Access to the saw blades shall not be possible through this opening.

When a dismantable interlocked guard is provided, it shall not be possible to re-mount it in a wrong way.

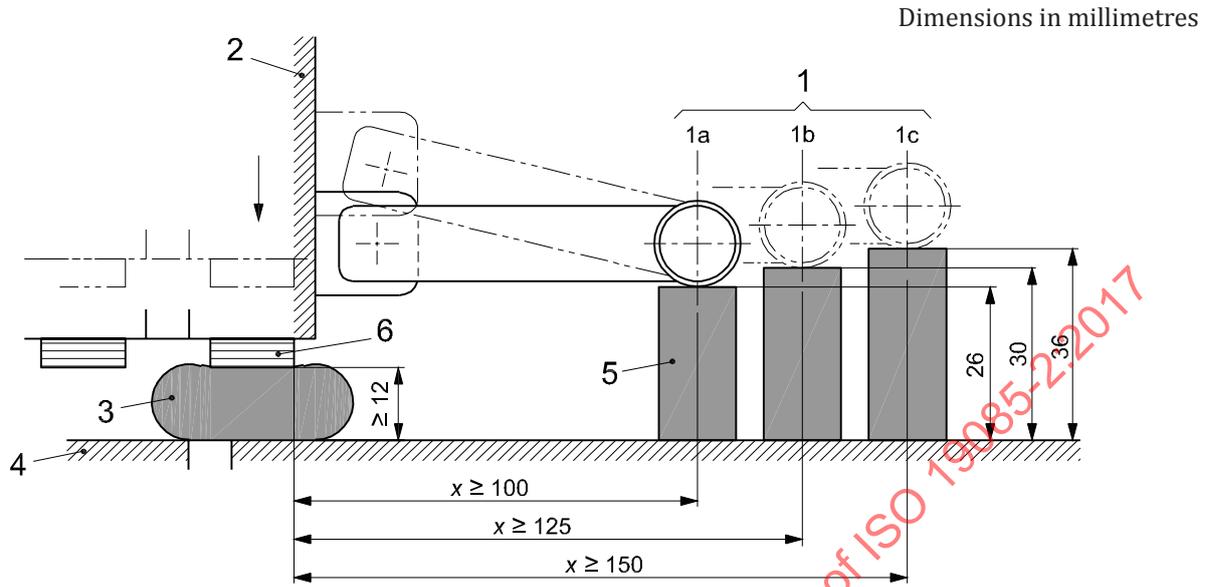
6.6.4 Guarding of shearing and/or crushing zones

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

6.6.4.1 Safeguarding of the pressure beam

Crushing and trapping hazard caused by the downward movement of the pressure beam shall be avoided by providing a mechanically actuated trip device (trip bar) on each side of the machine where

the operators can reach the cutting line during normal operation. Possible positions of the trip bar sensor are shown in [Figure 6](#).



Key

- | | |
|---|---|
| 1 possible positions of trip bar sensor | 4 work-piece support |
| 2 pressure beam | 5 rigid distance block |
| 3 modelling clay block | 6 lower rigid part of the pressure beam |

Figure 6 — Dimensions of trip bar

The mechanically actuated trip device (trip bar) shall be in accordance with the following requirements.

- a) It shall extend at least over the full length of the pressure beam.
- b) The force to actuate the trip bar shall not exceed 50 N wherever applied over the full length of it.
- c) When its sensor is activated during the downward movement, the pressure beam shall stop before the distance between the lower part of the pressure beam and the work-piece support (see [Figure 6](#)) is less than 12 mm, and shall return to its rest position.

Verification: Depending on the chosen position of the trip bar sensor, a rigid distance block with the height of either

- 26 mm if the sensor position 1 a) (see [Figure 6](#)) is chosen, or
- 30 mm if the sensor position 1 b) is chosen, or
- 36 mm if the sensor position 1 c) is chosen

shall be positioned so that it activates the trip bar sensor in the middle of its length. The downward movement of the pressure beam with its maximum speed is initiated and the smallest distance between the pressure beam and the work-piece support is recorded, e.g. using a modelling clay block. The test shall be repeated with the distance block at the left and at the right end of the sensor. In not any of the three tests, the measured distance shall be less than 12 mm.

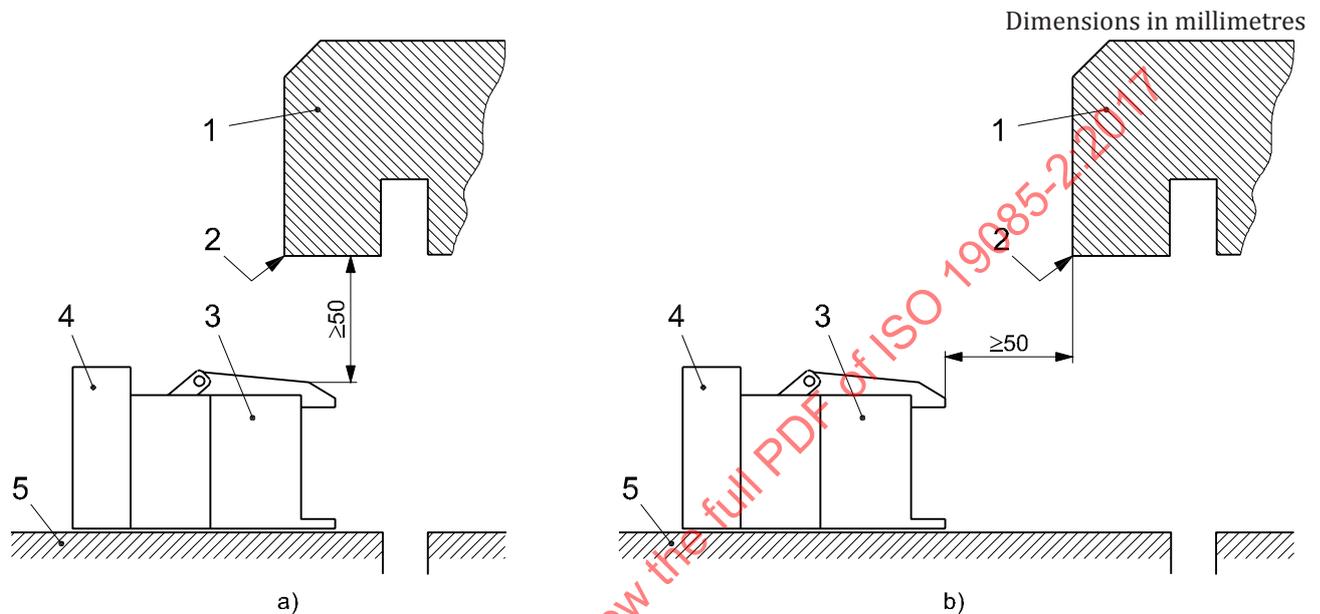
The SRP/CS for the stop of the movement of the pressure beam in c) shall achieve $PL_r = c$.

The SRP/CS for the return movement of the pressure beam in c) shall achieve $PL_r = b$.

Crushing and trapping hazards caused by the forward movement of the panel pusher and pressure beam shall be avoided either by

- a safety distance of more than 50 mm from the pressure beam in its rest position (see [Figure 7](#)), or
- interlocking of the forward movement with the sectional safety curtain in its guarding position.

The SRP/CS for interlocking of the forward movement with the safety curtain guarding position shall achieve $PL_R = b$.



Key

- | | | | |
|---|---------------------------------------|---|-----------------------------------|
| 1 | pressure beam | 4 | panel pusher in foremost position |
| 2 | rear bottom edge of the pressure beam | 5 | work-piece support |
| 3 | collet in foremost position | | |

Figure 7 — Panel pusher position relative to pressure beam

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 Safeguarding of the side pressure device

If the machine is fitted with a power-driven side pressure device in the front cutting line, access to crushing and shearing points between the side pressure device and the pressure beam and the work-piece and/or the work-piece support shall be prevented by interlocking any powered movement of the side pressure device with safety curtain guarding position.

The SRP/CS for interlocking of any powered movement of the side pressure device with safety curtain guarding position shall achieve $PL_R = c$.

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

6.6.4.3 Safeguarding of the front side turn table

If the machine is fitted with a front side turn table, access to any crushing and shearing points between this device and fixed parts shall be prevented by hold-to-run control according to [6.5.3](#) located outside the front side turn table moving area.

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

6.6.4.4 Safeguarding of the pushing out device

If the machine is fitted with a pushing out device, the following requirements shall be met.

- a) When it is in the working position, the pushing out device movement shall only be possible if the pressure beam is in its rest position and the sectional safety curtain is in its open position in case the safety sectional curtain movement is vertical.
- b) The forward movement of the pushing out device shall be limited so that shearing and/or crushing hazards between the pushing out device and the front edge of the work-piece support are avoided.

The SRP/CS for interlocking of the pushing out device movement with the pressure beam rest position and the curtain open position shall achieve $PL_r = b$.

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

6.6.4.5 Safeguarding the rear of the machine with panel pusher (except loading zone)

With the exception of rear side work-piece loading zones, access to any dangerous point on the rear of the machine, i.e. pressure beam, panel pusher, collets, panel turning device and pushing out device, shall be prevented either by distance guards in form of perimeter fence [for example, see [Figure 1 a\)](#) and [Figure 1 b\)](#)] or by fixed guards mounted on the machine frame [for example, see [Figure 1 c\)](#)].

If a perimeter fence is provided, the following requirements shall be met.

- a) The perimeter fence shall have a minimum height of 1 800 mm from the floor level.
- b) It shall extend down to a maximum distance of 180 mm from the floor level.
- c) Access door shall be provided, unless access to the rear of the machine for maintenance and servicing purposes is possible via an opening provided for loading of the work-pieces which is safeguarded by the measures described in [6.6.4.6](#). The access door shall be interlocked with all dangerous movements, e.g. panel pusher movement, saw blade rotation and loading device movements. If the run-down time of any hazardous movement inside the protected zone is more than 2 s, guard locking in addition to the interlocking of the access door is required. A reset control device according to [5.9](#) shall be provided and located as stated in [5.2](#).

If fixed guards are mounted on the machine frame, the following requirements shall be met.

- The fixed guards top edge shall have a minimum height of 1 800 mm from the floor level.
- The machine table shall be guarded to prevent access to any moving part from the bottom side.

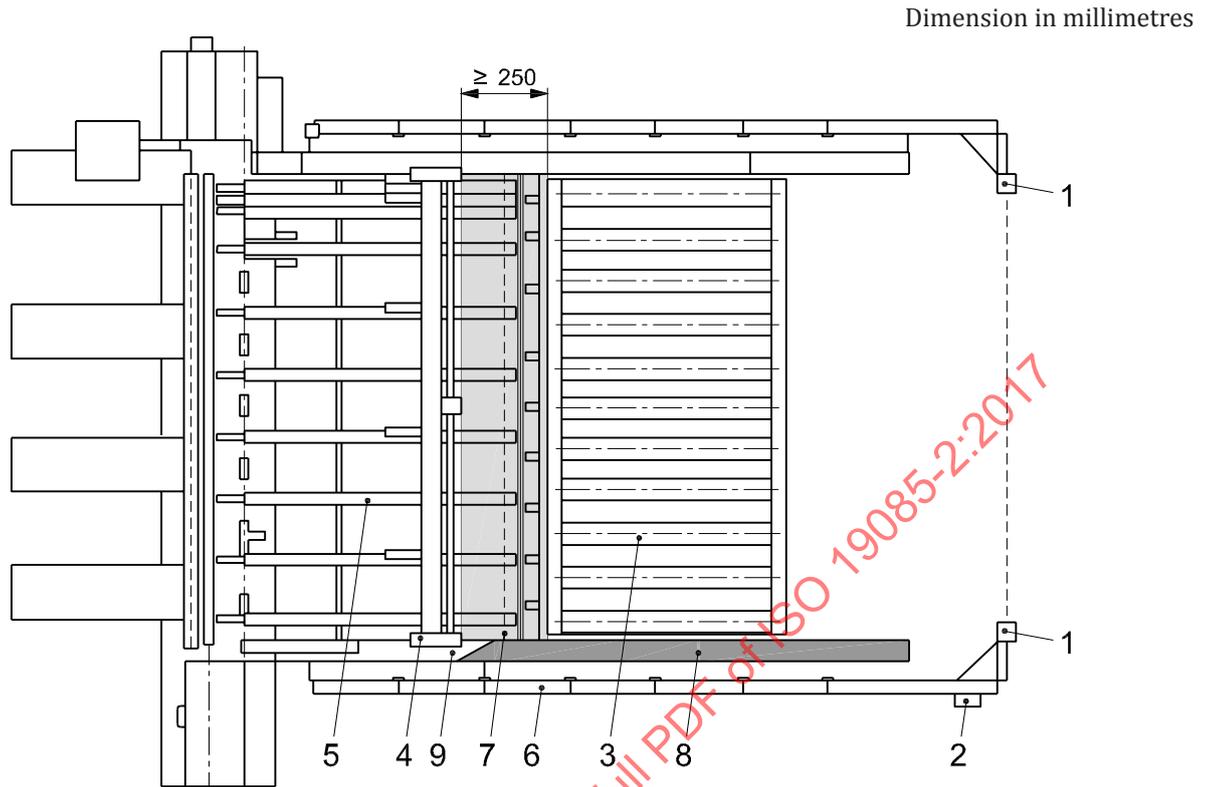
Any other opening provided in the rear side distance guard shall fulfil the safety distances according to ISO 13857:2008, Table 4.

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

6.6.4.6 Safeguarding of the loading zone at the rear of the machine with panel pusher

6.6.4.6.1 Panel stack loading directly on the lifting platform

The opening for direct loading of the panel stack on the lifting platform shall be safeguarded by an active opto-electronic protective device (light barrier – AOPD 1; see [Figure 8](#)).

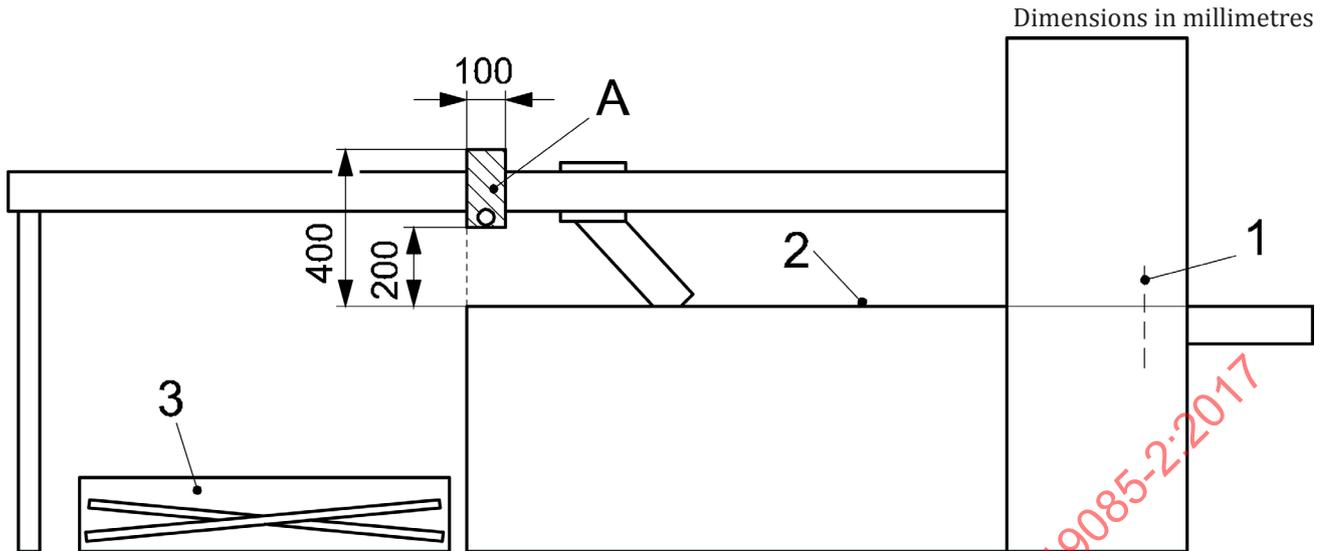
**Key**

- | | | | |
|---|-----------------------------------|---|--|
| 1 | AOPD 1 | 6 | fixed distance guarding (machine rear work-piece support and loading device) |
| 2 | reset control device for AOPD 1 | 7 | AOPD 2 |
| 3 | lifting platform | 8 | mechanical cam |
| 4 | panel pusher | 9 | position switch |
| 5 | work-piece support of the machine | | |

Figure 8 — Example of safeguarding of a loading device for panel stack loading directly on the lifting platform

The following requirements shall be fulfilled.

- a) AOPD 1 shall have at least two beams, one at 400 mm and the other at 900 mm height above the floor level. It shall be positioned at least 850 mm from any dangerous point of the protected zone. Alternatively, the distance may be reduced to 150 mm, if instead of the two-ray AOPD a light curtain is used with a resolution not greater than 40 mm with light beams from max. 200 mm to min. 1 600 mm above floor level.
- b) By triggering AOPD 1, e.g. when loading a panel stack upon the lifting platform, any dangerous movement at the rear side of the machine (e.g. caused by the lifting platform, the powered conveyer and the panel stack, the panel pusher in this area) shall be brought to a safe stop.
- c) An already commenced cutting cycle is allowed to be completed (see definition 3.11), afterwards the machine shall be stopped and a new cycle shall not start. As an exception, further cutting cycles are allowed after triggering of AOPD 1 if the following requirements are met.
 - 1) An additional light barrier, AOPD 2 (see Figure 8, key item 7 and Figure 9), shall be provided to impede the access to the area above the machine table.



Key

- | | | | |
|---|---------------|---|-----------------|
| 1 | cutting line | 3 | lifting table |
| 2 | machine table | A | area for AOPD 2 |

Figure 9 — Position of AOPD 2 (side view)

- 2) AOPD 2 shall have at least one beam positioned in the shaded area A of Figure 9 and shall extend above the complete machine width. Triggering of AOPD 2 shall cause a safe stop of the machine according to 5.4 not later than after completion of an already commenced cutting cycle.
 - 3) The speed of any backward movements of the panel pusher (away from the cutting line) shall be limited to 25 m/min.
 - 4) An additional safety device (e.g. mechanical cam and position switch; see Figure 8, key 8) shall be provided to stop any backward movement of the panel pusher so that no part of it shall come closer than 250 mm to the edge of the machine table.
- d) A manually operated reset control device for reactivating the AOPD 1 according to 5.9 located as stated in 5.2 shall be provided. A reset of AOPD 2 shall only be possible together with or after reset of AOPD 1.
- e) Any hazardous movements in the area of the lifting platform shall only be possible to start after reset of AOPD 1.

The SRP/CS for the safety function in c) 4), for AOPD 1 and AOPD 2 and for the reset function in d) and e) shall achieve $PL_r = c$.

The SRP/CS for the safety function in c) 3) shall achieve $PL_r = b$.

The SRP/CS for the safety function in c) first sentence shall achieve $PL_r = c$ if the additional safety device according to c) 4) is not provided.

The SRP/CS for the safety function in c) first sentence shall achieve $PL_r = b$ if the additional safety device according to c) 4) is provided.

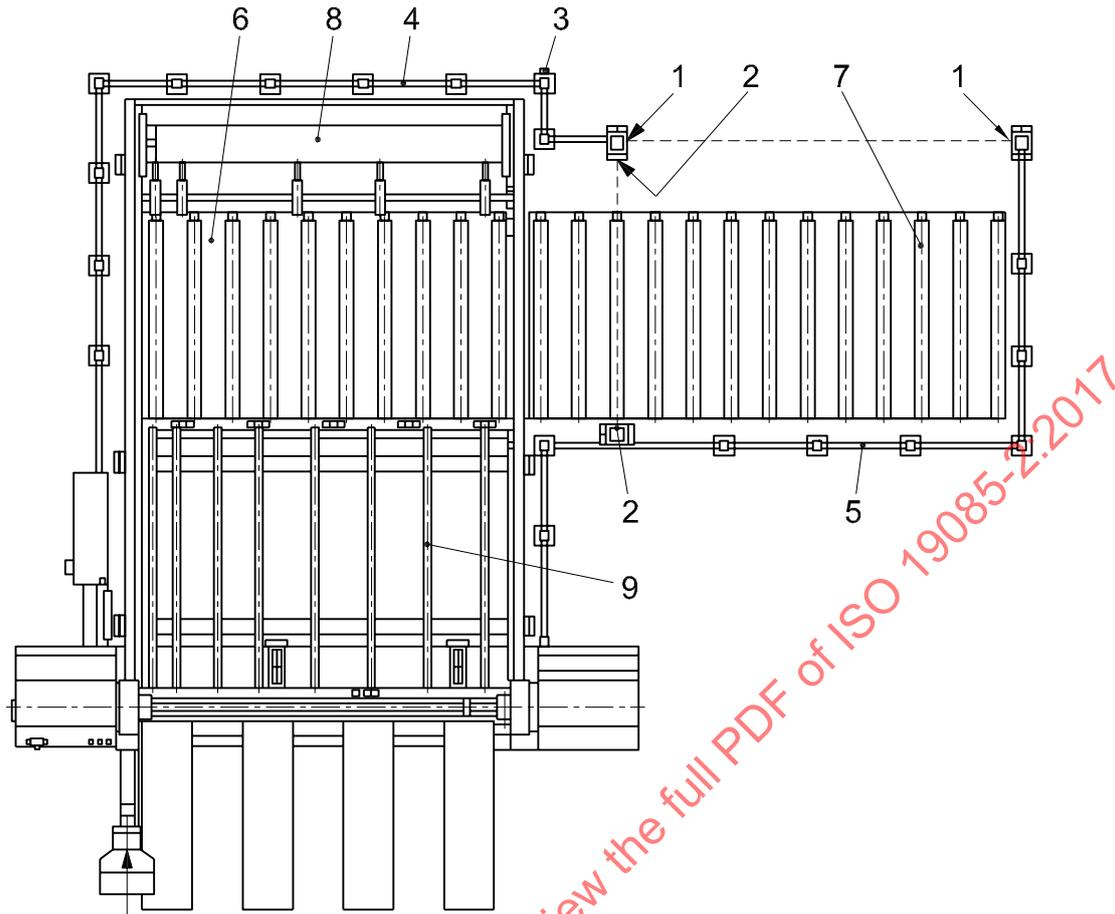
Verification: By checking the relevant drawings and/or circuit diagrams, inspection of the machine, measurement and relevant functional testing of the machine.

6.6.4.6.2 Panel stack loading on powered roller conveyor

The opening for loading the panel stack on the roller conveyor and the opening necessary for moving the panel stack from the roller conveyor to the lifting platform shall be safeguarded by two active opto-electronic protective devices (AOPD 1 and AOPD 2; see [Figure 10](#)) with the following requirements.

- a) They shall have at least two beams, one at 400 mm and the other at 900 mm from the floor level for AOPD 1, from roller conveyor upper level for AOPD 2.
- b) The AOPD1 shall be positioned at least 850 mm from any dangerous point of the protected zone.
- c) The AOPD2 shall be positioned at least 1 000 mm from any dangerous point of the protected zone.
- d) If AOPD1 and AOPD2 are light curtains from 200 mm to 1 600 mm with a resolution not greater than 40 mm, they shall be installed at a distance of at least 150 mm from any dangerous point inside the protected areas.
- e) When the AOPD 1 is triggered, e.g. during loading a panel stack to the roller conveyor, any dangerous movement in the corresponding protected zone (e.g. powered driven rollers or panel stack movement) shall be brought to a safe stop according to [5.4](#) and AOPD 2 shall get operative. If AOPD2 gets triggered, the complete machine shall be brought to a safe stop.
- f) A manually operated reset control device for reactivating the AOPD 1 according to [5.9](#) located as stated in [5.2](#) shall be provided. The reset of AOPD1 shall make AOPD2 inoperative.

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



Key

- | | |
|---|-------------------------------------|
| 1 AOPD 1 for loading opening | 6 lifting platform |
| 2 AOPD 2 for opening between roller conveyor and lifting platform | 7 powered roller conveyor |
| 3 reset control device for AOPD 1 | 8 panel pusher |
| 4 fixed distance guarding zone 1 (machine rear work-piece support and loading device) | 9 work-piece support of the machine |
| 5 fixed distance guarding zone 2 (powered roller conveyor) | |

Figure 10 — Example of safeguarding of a loading device with panel stack loading through an automatic roller conveyor

6.7 Impact hazard

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

The requirement of 25 m min⁻¹ limited speed applies to the movements of the panel pushers and of the pushing out device in the direction of the operator.

The pushing devices of the panel pusher may be liftable to allow movement of the panel pusher across the panel or the stack. In this case, no interference with the loaded panels is possible and the speed limitation does not apply.

The SRP/CS for the interlocking of the position of panel pusher with the speed monitoring shall achieve PL_r = c.

Where additional panel pushers are mounted to the normal panel pusher carriage,

- their relative stroke shall be limited to 1 200 mm, and

— the total speed shall not exceed 40 m min⁻¹.

6.8 Clamping devices

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

Requirements for clamping apply to the panel pusher clamping devices if they are closer than 500 mm to the cutting line unless the safety curtain is in its guarding position.

The SRP/CS for interlocking of the clamping requirements with the distance to the cutting line or the safety curtain guarding position shall achieve $PL_r = b$.

6.9 Measures against ejection

6.9.1 General

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

From the examples given in ISO 19085-1:2017, only guards are 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.

In addition, guards used to prevent ejection in the cutting line direction shall be of class A.

If a chips and dust extraction outlet is facing the cutting line, it shall be either enclosed by the above guard or made of class A materials and characteristics according to [6.9.2.2](#).

6.9.2.2 Guards of class A

This subclause of ISO 19085-1:2017 applies.

6.9.2.3 Guards of class B

This subclause of ISO 19085-1:2017 applies.

6.10 Work-piece supports and guides

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

The requirements in this subclause do not apply on machines in the longitudinal and the head cutting line.

At the front of the machine and at the rear side of machine without panel pusher, a work-piece support shall be provided, which shall have a width of at least 200 mm, measured at right angle to the cutting line.

At the front of the machine and at the rear side of machine without panel pusher, an extension table or tables shall be fitted to provide support for work-pieces. This is achieved by

- a) a fixed extension table fitted over the whole length of the cutting line,
- b) a fixed extension table fitted adjacent to the fence; and one or more fixed or moveable extension tables, or
- c) a front side turn table.

The length of each extension table (dimension perpendicular to the front cutting line) shall be at least 1,35 m and the width shall be at least 0,5 m. As an exception, a width of 0,4 m for movable extension table is acceptable if the total width of the fixed and movable extension table is at least 1 m.

Movable extension tables shall be so constructed as to allow them to be moved parallel to the cutting line.

Shearing and crushing hazards created by work-pieces moving along the fence and the support table shall be prevented by the design of the machine, e.g. by avoidance of recessions and interruptions.

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

Sparks as a result of contact between the tool and fixed machine parts shall be avoided in accordance with the requirements of [6.2](#).

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 P.

7.3 Emission of chips and dust

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

The pressure beam shall include a capture device for collecting the chips and dust which is fitted with an extraction outlet to connect it to a separate chip and dust collection system.

The saw carriages shall include a capture device for collecting the chips and dust which is connected to an extraction channel in the machine frame. This extraction channel shall be provided with a further extraction outlet.

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 does not apply.

7.5 Ergonomics and handling

This subclause of ISO 19085-1:2017 applies.

7.6 Lighting

This subclause of ISO 19085-1:2017 applies.

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.

7.13 Isolation

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

Where pneumatic energy is used, a quick action coupling shall never be used.

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 specific text.