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

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

This second edition cancels and replaces the first edition (ISO 19085-2:2017), which has been technically revised. The main changes compared to the previous edition are as follows:

- the Scope now specifies that machines are intended for continuous production use, and other additional working units have been added, as well as special workable materials and an exclusion;
- the list of significant hazards has been moved to new [Annex A](#);
- the structure has been simplified, in particular in [5.6](#);
- machines without panel pusher have been included and fully covered in [5.6.4](#);
- other loading devices have been considered in [5.6.9.1](#), [5.6.9.2](#) and new [subclause 5.6.9.3](#);
- requirements on minimum gaps at the unloading area have been added in new [subclause 5.6.10](#);
- Subclause [6.2](#) has been updated and a new full noise test code has been added in [Annex F](#).

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.

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

Introduction

The ISO 19085 series 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 to be provided to the user by the manufacturer.

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

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

- machine manufacturers (small, medium and large enterprises);
- health and safety bodies (regulators, accident prevention organisations, market surveillance etc.)

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

- machine users/employers (small, medium and large enterprises);
- machine users/employees (e.g. trade unions, organizations for people with special needs);
- service providers, e. g. for maintenance (small, medium and large enterprises);
- consumers (in case of machinery intended for use by consumers).

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

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

When requirements of this type-C standard are different from those which are stated in type-A or type-B standards, 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, to the extent specified in the Scope of the applicable part of ISO 19085.

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

[Clauses 1](#) to [3](#) are specific to each part and, therefore, replace ISO 19085-1:2021, Clauses 1 to 3.

For [Clauses 4](#) to [7](#) and the annexes, ISO 19085-1:2021, Clauses 4 to 7 and Annexes, each subclause can be:

- confirmed as a whole;
- confirmed with additions;
- excluded in total; or
- replaced with specific text.

This is indicated by one of the following possible statements:

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

- “ISO 19085-1:2021, [subclause/Annex], applies with the following additions.” or “ISO 19085-1:2021, [subclause/Annex], applies with the following additions, subdivided into further specific subclauses.”;
- “ISO 19085-1:2021, [subclause/Annex], does not apply.”;
- “ISO 19085-1:2021, [subclause/Annex], is replaced by the following text.” or “ISO 19085-1:2021, [subclause/Annex], is replaced by the following text, subdivided into further specific subclauses.”.

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

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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 workpiece support, which are manually and/or powered loaded and manually unloaded, capable of continuous production use, as defined in 3.1 and hereinafter referred to as “machines”.

This document deals with all significant hazards, hazardous situations and events as listed in Annex A, 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.

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);
- workpiece vacuum clamping as part of a front side turn table or of a panel loading device;
- panel pusher;
- independent panel pushers;
- additional panel pushers mounted on the panel pusher carriage;
- additional panel pusher with integrated label printer device;
- lifting platform;
- device for automatic loading of thin panels;
- device for base board unloading by gravity;

- device for base board powered unloading;
- device for panel unloading in limited space condition;
- loading or pre-loading roller conveyors;
- pressure beam with additional flaps to increase dust extraction efficiency;
- saw blade cooling system by air or water-air or oil-air;
- vibrating conveyor with/without trimming unit for offcuts management;
- predisposition for top loading/unloading by an external system directly on the machine table and/or on the machine preloading roller conveyor and/or on the machine lifting table.

NOTE base board is a support panel underlying the panel stack, to protect the panels from damages during transportation.

The machines are designed for cutting panels consisting of:

- a) solid wood;
- b) material with similar physical characteristics to wood (see ISO 19085-1:2021, 3.2);
- c) gypsum boards, gypsum bounded fibreboards;
- d) composite materials, with core consisting of e.g. polyurethane or mineral material, laminated with light alloy;
- e) cardboard;
- f) foam board;
- g) matrix engineered mineral boards, silicate boards;
- h) polymer-matrix composite materials and reinforced thermoplastic/thermoset/elastomeric materials;
- i) aluminium light alloy plates with a maximum thickness of 10 mm;
- j) composite boards made from the materials listed above.

This document does not deal with hazards related to:

- specific features different from those listed 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;
- machines manufactured prior to the date of its publication.

2 Normative references

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

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

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

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

ISO 14118:2017, *Safety of machinery — Prevention of unexpected start-up*

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

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

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 12100:2010, ISO 13849-1:2015, ISO 19085-1:2021 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 <https://www.electropedia.org/>

3.1

horizontal beam panel circular sawing machine

machine designed for cutting panels, fitted with one travelling *saw carriage* (3.4) per cutting line incorporating one or more circular saw blades, with horizontal workpiece support and with a *pressure beam* (3.5) holding the workpiece in position during cutting

Note 1 to entry: The workpiece can be mechanically positioned by a *panel pusher* (3.6) for the cuts. The cutting stroke is power driven. Before the cutting stroke commences, the saw blade is automatically raised and is lowered below the workpiece support for the return stroke. Examples are shown in [Figure 1](#).

3.2

manual loading

operation where the operator puts the workpiece directly on the workpiece support from the front side of the machine, or onto an intermediate loading device that cannot keep 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 workpiece directly from the workpiece support, or from an intermediate unloading device that cannot keep the operator away from the machine front cutting line of at least 1 500 mm during operation

3.4

saw carriage

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

3.5

pressure beam

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

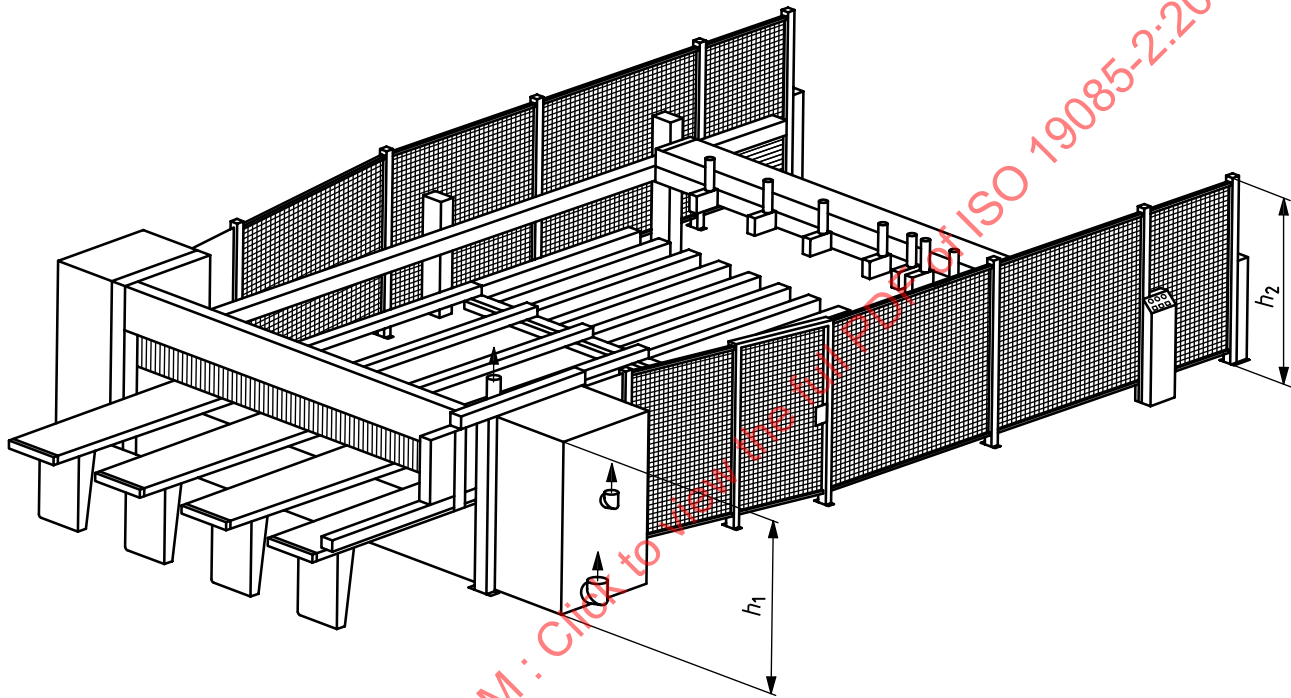
Note 1 to entry: The pressure beam is also part of the safeguarding of the saw blades in the cutting area.

3.6

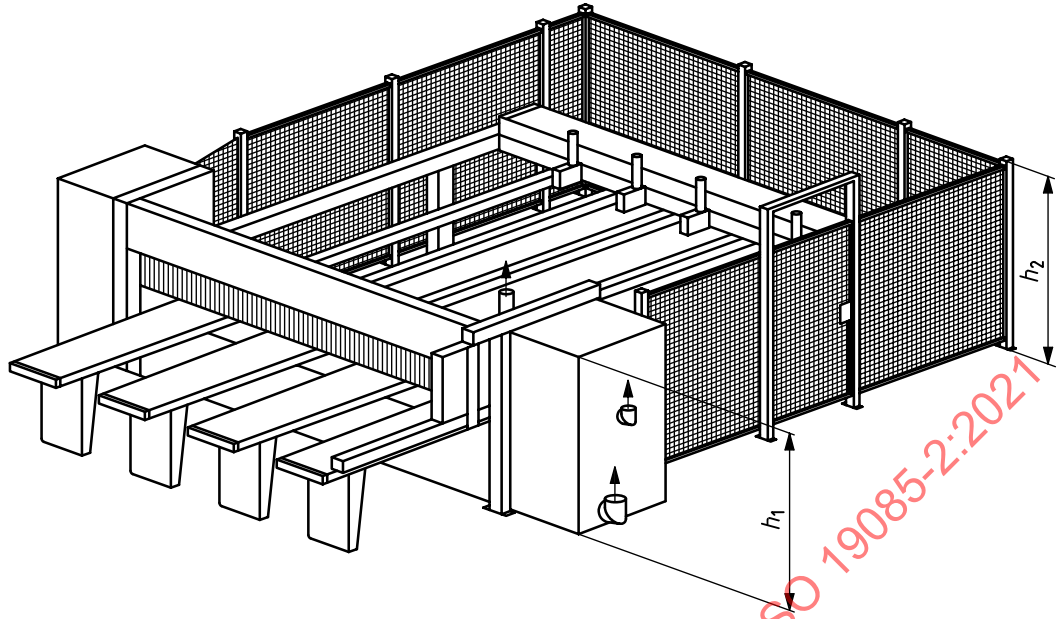
panel pusher

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

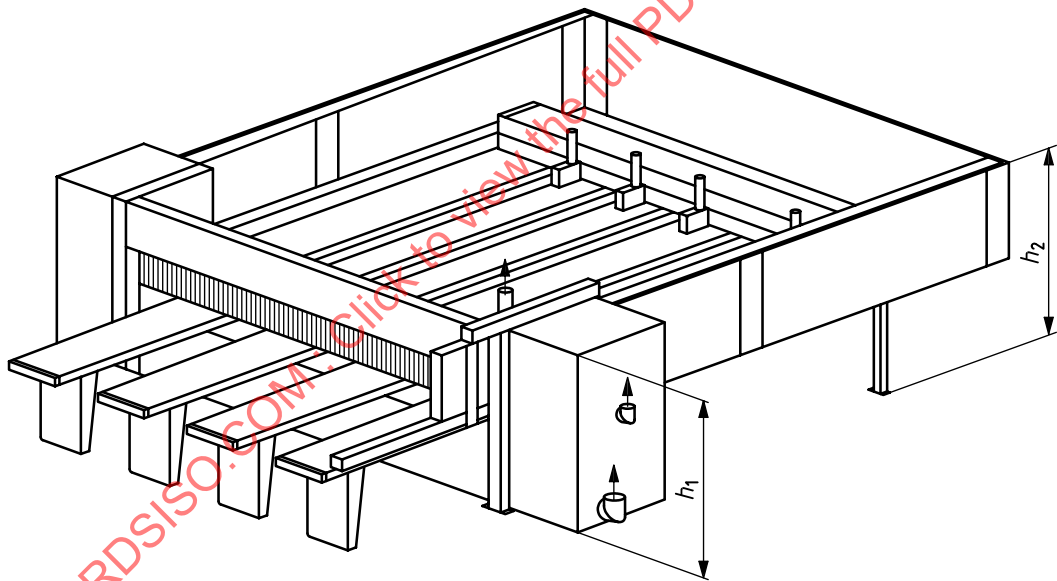
Note 1 to entry: The positioning of the panel pusher can be under NC control.



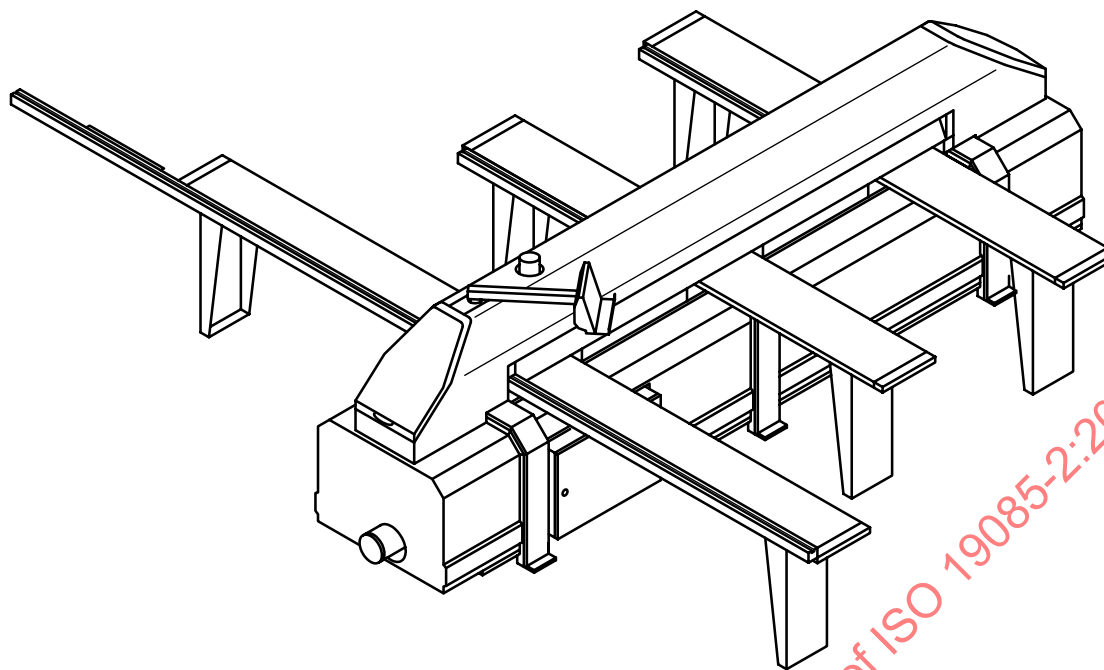
a) Example of a machine with panel pusher and panel loading from the rear side by a powered loading device and with perimeter fence and light barrier



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



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



d) Example of a machine without panel pusher

Key

h_1 height of the front side fixed guards

h_2 height of the perimeter fence

Figure 1 — Examples of horizontal beam panel saws

3.7

cutting cycle

single cut operation consisting of vertical movements of the saw blades and horizontal movements of the *saw carriage* (3.4)

3.8

rest position

<saw carriage> position in either the left or the right side of the machine body and outside of the cutting area to which the *saw carriage* (3.4) can return at the end of each *cutting cycle* (3.7)

3.9

rest position

<saw blade> position of the saw blade below the machine table

3.10

pressure beam rest position

highest position of the *pressure beam* (3.5)

3.11

front cutting line

cutting line closest to the operator's position

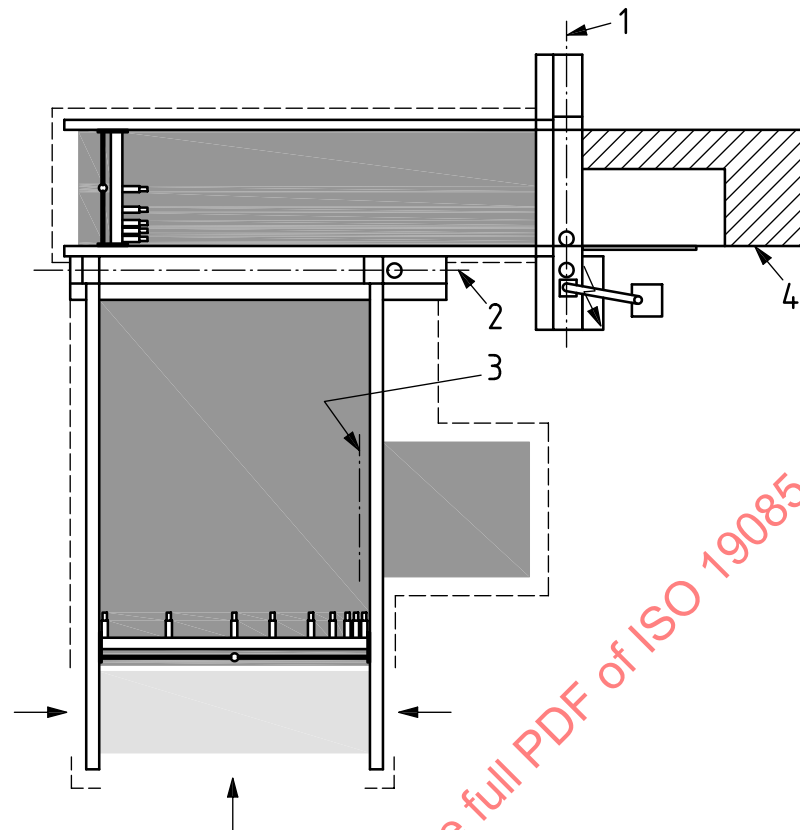
Note 1 to entry: See [Figure 2](#), key 1.

3.12

head cutting line

first cutting line to divide a panel before further cuts, where the *saw carriage* (3.4) can be mounted below or above the workpiece support

Note 1 to entry: See [Figure 2](#), key 3.

**Key**

- | | | | |
|---|---------------------------|---|-------------------|
| 1 | front cutting line | 3 | head cutting line |
| 2 | longitudinal cutting line | 4 | unloading area |

Figure 2 — Horizontal beam panel saw cutting lines**3.13****side pressure device**

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

3.14**panel turning device**

device integrated into the rear workpiece support to turn the panel for e.g. rectangular cut

3.15**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 workpieces or stacks of panels

3.16**pushing out device**

movable device to move the last residues of a panel towards the front of the *pressure beam* (3.5) 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.

4 Safety requirements and measures for controls

4.1 Safety and reliability of control systems

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

Table B.1 replaces ISO 19085-1:2021, Table B.1.

4.2 Control devices

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

The following electrical control devices of the machine, if any, 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;
- for the pushing out device;
- for hold-to-run of the downward movement of the pressure beam.

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 of the machine, at one of the air-cushion tables. It shall be supplemented by a normal stop or an emergency stop control device adjacent to it.

If more than one additional control device for cycle start is provided at the air-cushion tables, only one shall be active at a time.

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 14118:2017.

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.

The SRP/CS for selecting the active additional cycle-start control device may not achieve any PL.

4.3 Start

4.3.1 Direct start

ISO 19085-1:2021, 4.3.1, does not apply.

4.3.2 Start via control power-on

ISO 19085-1:2021, 4.3.2, applies with the following additions.

When the saw carriage is out of its rest position, the saw blades shall not leave their rest position before the saw blades rotation has been started.

When a saw blade is out of its rest position, the saw carriage shall not leave its rest position before the saw blades rotation has been started.

The SRP/CS for the interlocking of the saw blades movement out of their rest position with the saw blades rotation and the saw carriage position shall achieve $PL_r = b$.

The SRP/CS for the interlocking of the saw carriage movement out of its rest position with the saw blades rotation and the saw blades 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.

4.3.3 Operating conditions

Subclause specific to this document.

During operation, the conditions from a) to e) 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) When the saw carriage is out of its rest position, the saw blades shall not leave their rest position as long as the pressure beam has not reached its clamping position or clamping pressure.
- c) When a saw blade is out of its rest position, the saw carriage shall not leave its rest position as long as the pressure beam has not reached its clamping position or clamping pressure.
- d) The pressure beam shall not release its clamping position or clamping pressure as long as the saw blades or the saw carriage are not in their rest position.
- e) 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 requirements in f) and h) shall be fulfilled.

As an alternative to c), the requirements in g) and h) shall be fulfilled.

- f) When the saw carriage is out of its rest position, the saw blades 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.
- g) when a saw blade is out of its rest position, the saw carriage shall not leave its rest positions as long as the pressure beam has not left its rest position or it shall be interlocked with the pressure beam clamping position so that if it moves when the pressure beam is not in its clamping position, its movement shall be stopped immediately.
- h) 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 in d) and e) 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) to g) shall achieve $PL_r = c$. The SRP/CS for the interlocking in h) shall achieve $PL_r = b$.

For machines without panel pusher and without trip bar for safeguarding the pressure beam, as an alternative to a), b) and c), the following requirements shall be fulfilled.

- i) The pressure beam shall touch the workpiece or the table not less than 1 s after the safety curtain lower edge.
- j) When the saw carriage is out of its rest position, the saw blades shall not leave their rest position as long as the pressure beam has not reached its clamping position or clamping pressure and the cutting cycle has been started by the operator.
- k) When a saw blade is out of its rest position, the saw carriage shall not leave its rest position as long as the pressure beam has not reached its clamping position or clamping pressure and the cutting cycle has been started by the operator.

The SRP/CS for interlocking of movement in j) of the saw blades out of their rest positions with pressure beam clamping position or clamping pressure and with cutting cycle start and with saw carriage position, shall achieve $PL_r = c$.

The SRP/CS for interlocking of movement in k) of the saw carriage out of its rest positions with pressure beam clamping position or clamping pressure and with cutting cycle start and with saw blades position shall achieve $PL_r = c$.

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

4.4 Safe stops

4.4.1 General

ISO 19085-1:2021, 4.4.1, 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 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 5.4), release clamping pressure of the pressure beams;
- c) return pressure beams to their rest position;
- d) cut power to the brakes (if provided and electrical) after the saw blades has come to rest e.g. by a time delay;
- e) cut power to the other machine actuators except the clamps of the panel pusher.

If a time delay device is used, subclause 4.12 applies.

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

4.4.2 Normal stop

ISO 19085-1:2021, 4.4.2, applies.

4.4.3 Operational stop

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

4.4.4 Emergency stop

ISO 19085-1:2021, 4.4.4, applies.

4.5 Braking function of tools

ISO 19085-1:2021, 4.5, applies.

4.6 Mode selection

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

4.7 Tool speed changing**4.7.1 Speed changing by shifting the belts on the pulleys**

ISO 19085-1:2021, 4.7.1, does not apply.

4.7.2 Speed changing by incremental speed change motor

ISO 19085-1:2021, 4.7.2, does not apply.

4.7.3 Infinitely variable speed by frequency inverter

ISO 19085-1:2021, 4.7.3, is replaced by the following specific text.

On machines equipped with an infinitely variable speed control (i.e. frequency inverter) for tool drives, before manually starting the tool drives, the selected tool speeds shall be indicated at the main control panel, except in case of automatic tool drives speed selection by a production program.

The SRP/CS for indication of manually 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.

4.8 Failure of any power supply

ISO 19085-1:2021, 4.8, 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 [4.4.1](#):

- movement in c) may be initiated simultaneously to a) b) and e) if the safety curtain remains in its guarding position; or
- saw blades are allowed not to 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.

4.9 Manual reset control

ISO 19085-1:2021, 4.9, applies.

4.10 Standstill detection and monitoring

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

4.11 Machine moving parts speed monitoring

ISO 19085-1:2021, 4.11, applies.

4.12 Time delay

ISO 19085-1:2021, 4.12, applies.

4.13 Teleservice

ISO 19085-1:2021, 4.13, applies.

5 Safety requirements and measures for protection against mechanical hazards

5.1 Stability

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

The requirements on an integrated device for moving the machine do not apply.

5.2 Risk of break-up during operation

ISO 19085-1:2021, 5.2, applies.

5.3 Tool and tool fixing design

5.3.1 General

ISO 19085-1:2021, 5.3.1, applies.

5.3.2 Spindle locking

ISO 19085-1:2021, 5.3.2, applies.

5.3.3 Circular saw blade fixing device

ISO 19085-1:2021, 5.3.3, applies.

5.3.4 Flange dimension for circular saw blades

ISO 19085-1:2021, 5.3.4, applies.

5.4 Braking

5.4.1 Braking of tools

ISO 19085-1:2021, 5.4.1, applies.

5.4.2 Maximum run-down time

ISO 19085-1:2021, 5.4.2, is replaced by the following text.

Maximum run-down time shall be 90 s.

5.4.3 Brake release

ISO 19085-1:2021, 5.4.3, applies.

5.5 Safeguards

5.5.1 Fixed guards

ISO 19085-1:2021, 5.5.1, applies.

5.5.2 Interlocking movable guards

5.5.2.1 General

ISO 19085-1:2021, 5.5.2.1, applies.

5.5.2.2 Movable guards with interlocking

ISO 19085-1:2021, 5.5.2.2, applies.

5.5.2.3 Movable guards with interlocking and guard locking

ISO 19085-1:2021, 5.5.2.3, applies.

5.5.3 Hold-to-run control

ISO 19085-1:2021, 5.5.3, applies.

5.5.4 Two-hand control

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

5.5.5 Electro-sensitive protective equipment (ESPE)

ISO 19085-1:2021, 5.5.5, applies.

5.5.6 Pressure-sensitive protective equipment (PSPE)

ISO 19085-1:2021, 5.5.6, applies.

5.5.7 Enabling control

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

5.6 Prevention of access to hazardous moving parts

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

5.6.1 Safeguarding 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 13857:2019, 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.

5.6.2 Safeguarding the saw blades in the cutting area

For front cutting line, if the saw blade is in its rest position, it shall not protrude from the slot in the machine table, even with the saw carriage being not in its rest position. The slots in the machine table and in the vertical sides, through which the saw blades project during cutting operation, shall be designed in accordance with the safety distances in ISO 13857:2019, 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.

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 without panel pusher, 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 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 workpiece or on the workpiece support where no workpiece is present irrespective of the position of the pressure beam (see [Figure 3](#));
- d) the stripes shall be made of polycarbonate or ABS and fulfil the rigidity test requirement described in [Annex G](#).

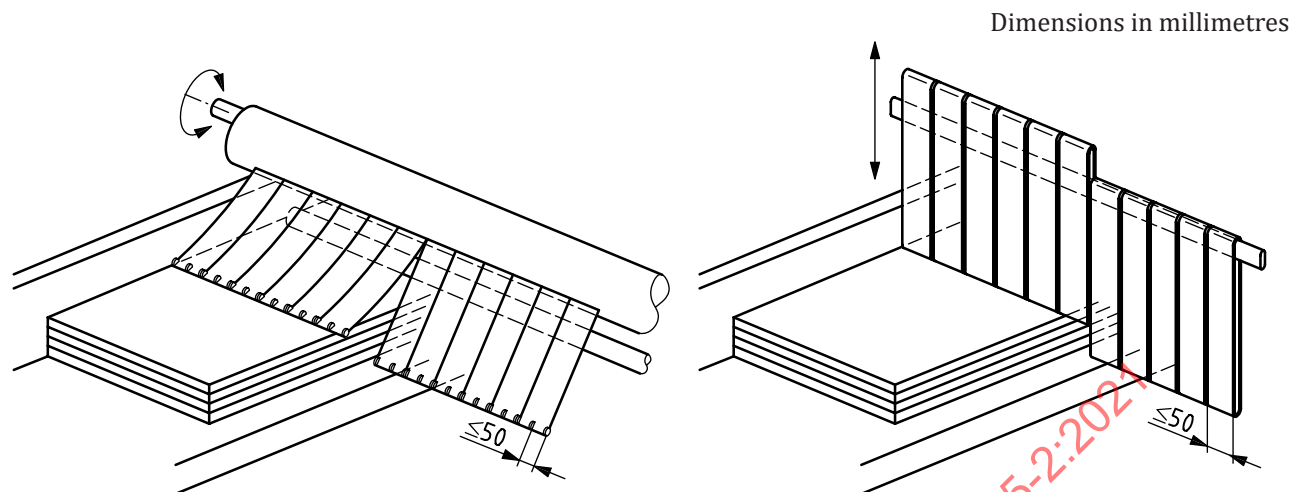


Figure 3 — Safety curtain

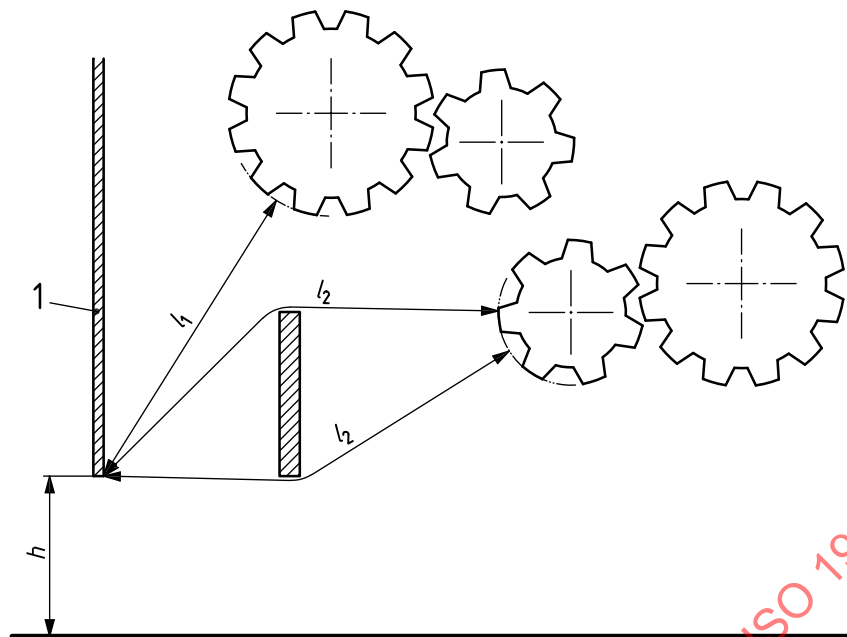
Access to the saw blades in the cutting area at longitudinal and head cutting lines shall be prevented by fixed and interlocking movable guards. This may usually be achieved by the same means that prevent access to the rear side of a machine with panel pusher, i.e. a perimeter fence with or without access doors (see 5.6.8).

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 G.

5.6.3 Safeguarding the moving parts at the front cutting line

Access to moving parts, e.g. the saw carriage, from the bottom side of the machine shall be prevented by all following measures (see Figure 4):

- all hazardous points shall have a height of at least 120 mm above the floor;
- the gap h of the lower edge of the housing from the floor shall be maximum 120 mm;
- the direct distance l_1 or the thread measure l_2 from the lower edge of the housing to any hazardous point shall be at least 230 mm.

**Key**

l_1	direct distance to hazard points	h	acceptable gap height between floor and machine housing
l_2	thread measure to hazard points	1	machine housing

Figure 4 — Examples of guarding underneath the machine

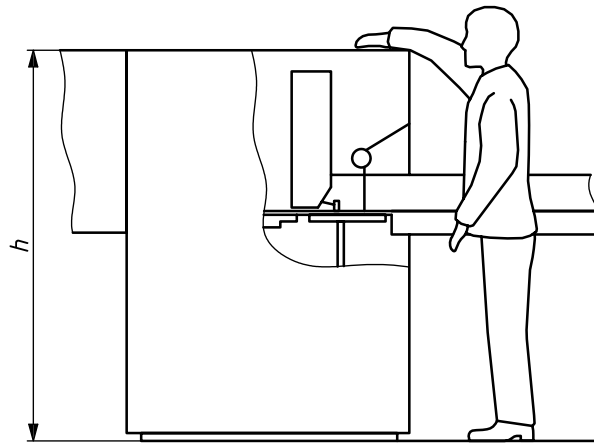
For other configurations and shapes, the requirements of ISO 13857:2008 shall apply.

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

At least one opening, covered by a moveable or a dismountable 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.

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

On machines with panel pusher, access across the machine body to the hazard area on the backside from the unloading area (Figure 2, key 4) shall be prevented by fixed guards having a height of at least 1 600 mm from the floor [see Figure 1 a), b), c), key h_1 and Figure 5, key h].

**Key** h front guard height**Figure 5 — Front guard height**

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

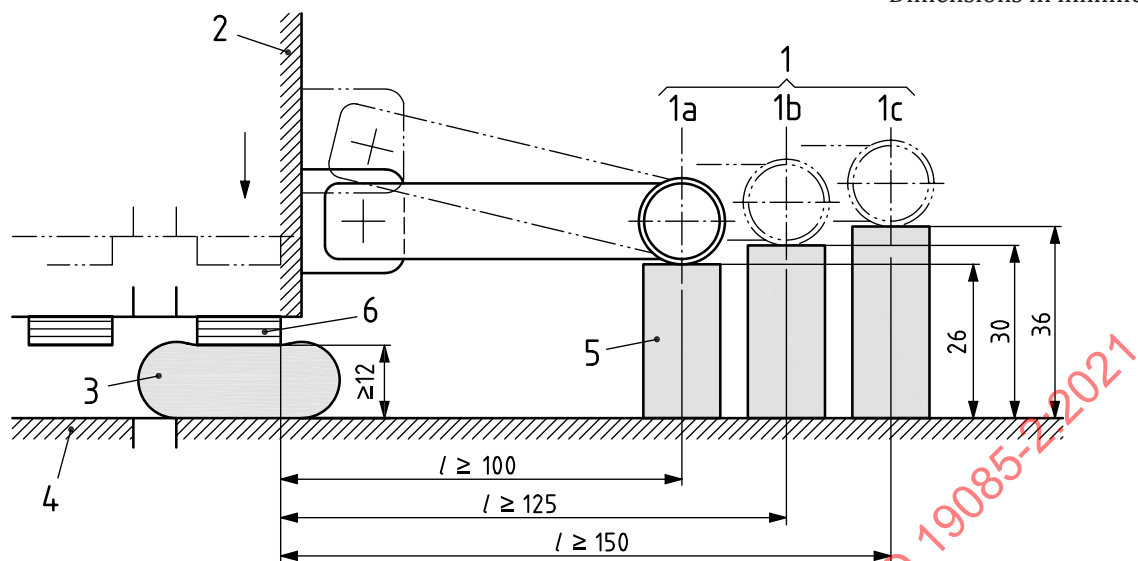
5.6.4 Safeguarding the pressure beam

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](#).

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 workpiece support (see [Figure 6](#)) is less than 12 mm, and shall return to its rest position.

Dimensions in millimetres

**Key**

- | | | | |
|----------|--|---|---------------------------------------|
| 1 | possible positions of trip bar sensor: 1a, 1b, 1c. | 4 | workpiece support |
| 2 | pressure beam | 5 | rigid distance block |
| 3 | modelling clay block | 6 | lower rigid part of the pressure beam |
| <i>l</i> | horizontal distance of trip bar sensor to 6 | | |

Figure 6 — Dimensions of trip bar

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 $PL_r = b$.

For machines without panel pusher, as an alternative to the trip bar, the following means may be adopted to avoid crushing and trapping hazards caused by the downward movement of the pressure beam:

- 1) the downward movement of the pressure beam shall be controlled by a hold-to-run control;
- 2) releasing the hold-to-run control, the pressure beam shall return to its rest position, unless:
 - the pressure beam has reached the clamping position or clamping pressure; and
 - the cutting cycle has been started by the operator using a separate control device (see 4.3.3).

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

- a vertical gap of not less than 50 mm from the lower surface of the pressure beam in its rest position to the panel pusher upper surface [see Figure 7 a)];
- a horizontal gap of not less than 50 mm from the rear surface of the pressure beam in its rest position to the upper surface of the collet in the foremost position [see Figure 7 b)] and a vertical gap of not less than 50 mm from the lower surface of the pressure beam in its rest position to the upper surface of the panel stack with the maximum thickness allowed [see Figure 7 c)];
- limiting the forward movement of the panel pusher to a maximum of 5 mm increment at each activation of the control device. The SRP/CS for this limited movement shall achieve $PL_r = b$; 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 $PL_r = b$.

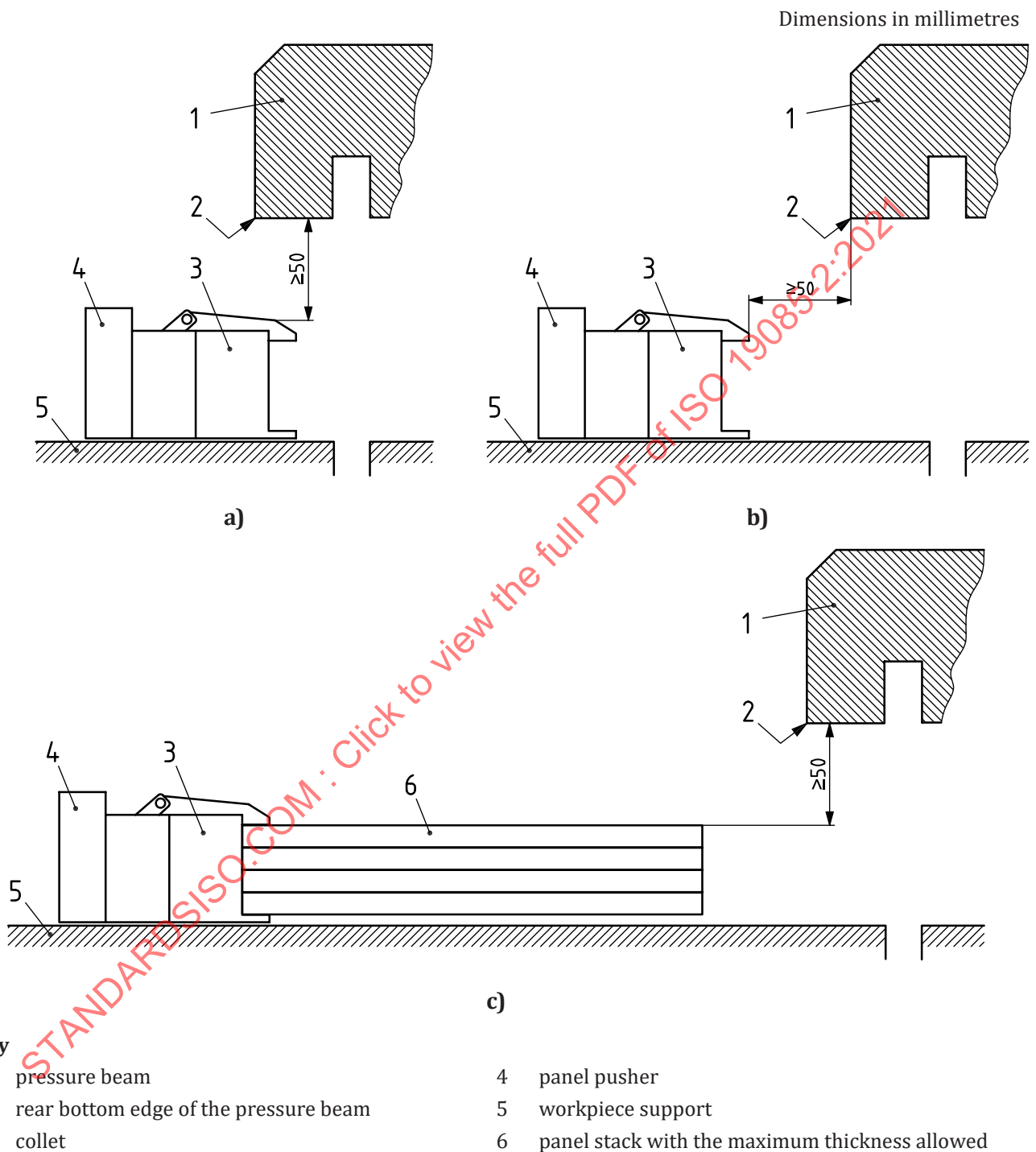


Figure 7 — Panel pusher position relative to pressure beam

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

For trip bar, with reference to [Figure 6](#), depending on the chosen position of the trip bar sensor, a rigid distance block with height as follows shall be positioned so that it activates the trip bar sensor in the middle of its length:

- 26 mm if the sensor position 1 a) is chosen, with distance $l \geq 100$ mm;
- 30 mm if the sensor position 1 b) is chosen, with distance $l \geq 125$ mm; or
- 36 mm if the sensor position 1 c) is chosen, with distance $l \geq 150$ mm.

The downward movement of the pressure beam with its maximum speed is initiated and the smallest vertical distance between the pressure beam and the workpiece 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. The measured distance shall be less than 12 mm in none of the three tests.

5.6.5 Safeguarding 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 workpiece and/or the workpiece 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.

5.6.6 Safeguarding 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 [5.5.3](#) 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.

5.6.7 Safeguarding the pushing out device

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

- 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 are avoided between the pushing out device and the front edge of the workpiece support.

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.

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

With the exception of rear side workpiece loading zones, access to any dangerous point on the rear of the machine, e.g. pressure beam, panel pusher, collets, panel turning device and pushing out device, shall be prevented either by fixed guards in form of a 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 fulfilled.

- a) The perimeter fence shall have a minimum height [Figure 1 a) and b), key h_2] of 1 800 mm from the floor level, or 1 600 mm if in combination with a horizontal prolongation inward of 200 mm at the top edge.
- 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 workpieces which is safeguarded by the measures described in 5.6.9. 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 4.9 shall be provided and located as stated in 4.2.

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 [Figure 1 c), key h_2] of 1 800 mm from the floor level, or 1 600 mm if in combination with a horizontal prolongation inward of 200 mm at the top edge;
- The machine table shall be guarded to prevent access to any moving part from the bottom side.

Any other opening provided in the fixed guards at the rear side shall fulfil the safety distances according to ISO 13857:2019, Table 4.

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

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

5.6.9.1 Panel stack loading directly on the lifting platform or on the rear pre-loading roller conveyors

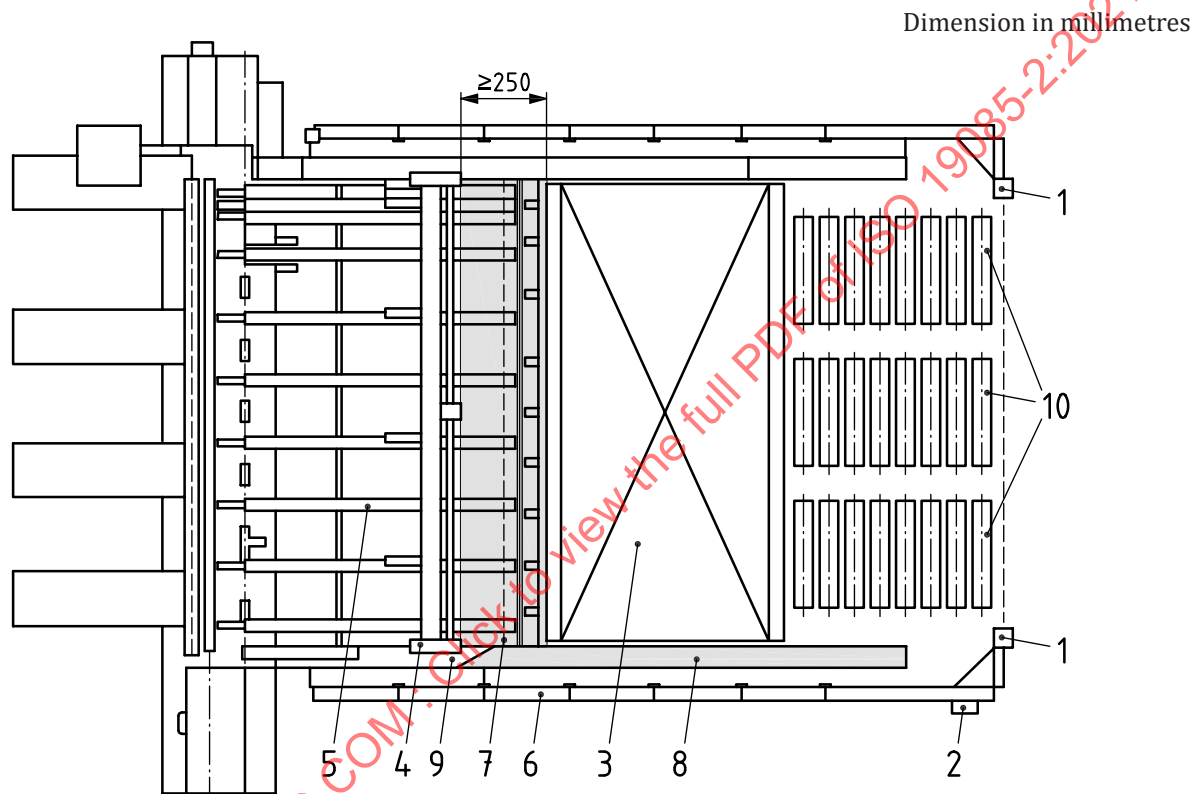
The opening for loading of the panel stack directly on the lifting platform or on the rear pre-loading roller conveyors (if any) shall be safeguarded by an active opto-electronic protective device (light barrier – AOPD 1; see Figure 8).

The following requirements shall be fulfilled.

- a) AOPD 1 shall have at least two beams, at heights of 400 mm and 900 mm 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-beams AOPD a light curtain is used with a resolution not greater than 40 mm with the lowest light beam at maximum 200 mm and the highest light beam at minimum 1 600 mm, measured from the floor level.
- b) Triggering AOPD 1, e.g. when loading a panel stack upon the lifting platform, shall initiate a safe stop of any dangerous movement at the rear side of the machine, e.g. of the lifting platform, the powered conveyor and the panel stack, and of the panel pusher.
- c) Triggering AOPD 1, an already commenced cutting cycle is allowed to be completed (see 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 7, and Figure 9), shall be provided to impede the access to the area above the machine table.
 - 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 initiate a safe stop of

the machine according to 4.4 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.
- 5) The maximum gap between the machine and the lateral fences shall be 180 mm to prevent access to the area where the pressure beam is allowed to continue operating.



Key

- | | |
|------------------------------------|---|
| 1 AOPD 1 | 6 lateral fences |
| 2 reset control device for AOPD 1 | 7 AOPD 2 |
| 3 lifting platform | 8 mechanical cam |
| 4 panel pusher | 9 position switch |
| 5 workpiece support of the machine | 10 optional rear pre-loading roller conveyors |

Figure 8 — Example of safeguarding a device for panel stack loading directly on the lifting platform or on the rear pre-loading roller conveyors

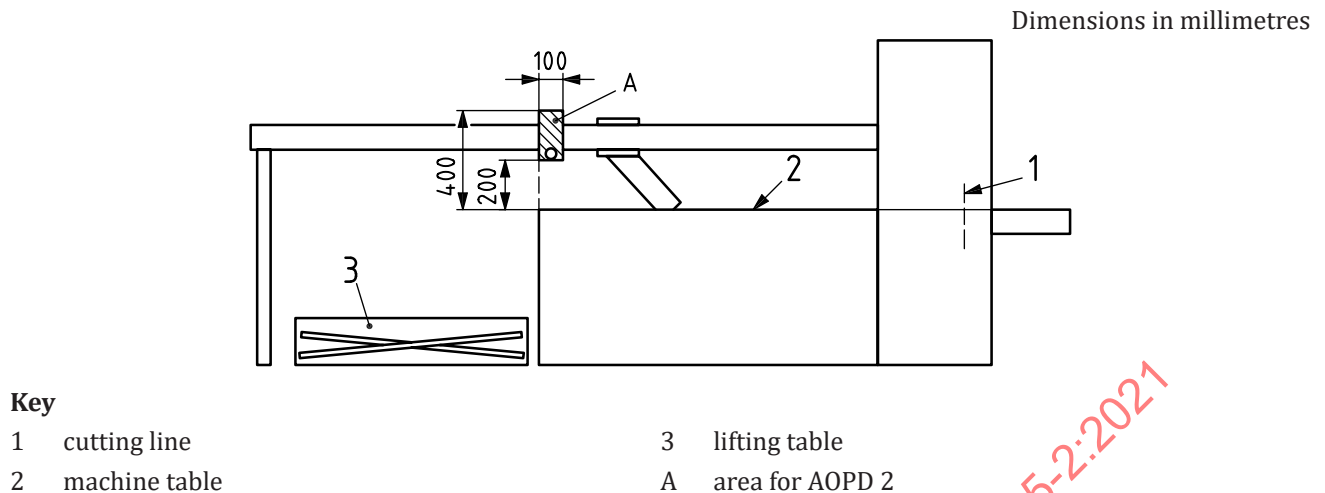


Figure 9 — Position of AOPD-2 (side view)

- d) A manually operated reset control device for reactivating the AOPD 1 according to 4.9 located as stated in 4.2 shall be provided. A reset of AOPD 2 shall only be possible together with or after reset of AOPD 1.
- e) Any hazardous movement in the area of the lifting platform shall only be possible to start after reset of AOPD 1.

The SRP/CS for initiating safe stop in b) and c) 2) and for stopping the panel pusher at not less than 250 mm from the edge of the machine table 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.

5.6.9.2 Automatic loading of panel stacks by 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, at heights of 400 mm and 900 mm from the floor level for AOPD 1, from the roller conveyor upper level for AOPD 2.
- b) The AOPD 1 shall be positioned at least 850 mm from any dangerous point of the protected zone.
- c) The AOPD 2 shall be positioned at least 1 000 mm from any dangerous point of the protected zone.
- d) the distance between the guards in correspondence of AOPD 2 and the outer edge of the roller conveyor shall not be greater than 180 mm.
- e) If AOPD 1 and AOPD 2 are light curtains 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, with the lowest light beam at maximum 200 mm and the highest light beam at minimum 1 600 mm, measured from the floor level for AOPD 1 and from the roller conveyor upper level for AOPD 2.

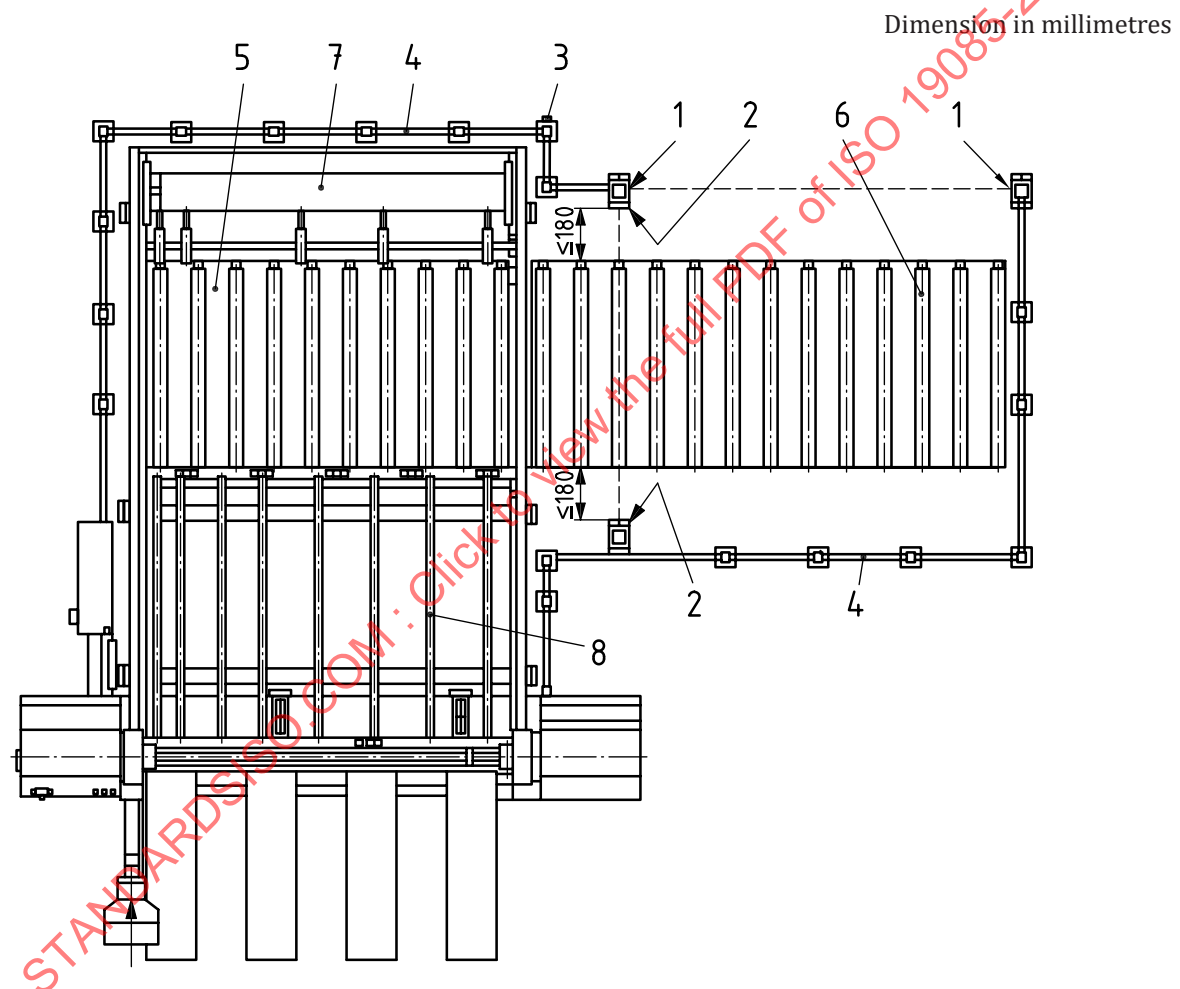
- f) as long as AOPD 1 is active, triggering AOPD 2 shall not cause any effect to the machine.
- g) Triggering AOPD 1, e.g. during loading a panel stack to the roller conveyor, shall initiate a safe stop of any dangerous movement in the corresponding protected zone (e.g. powered driven rollers or panel stack movement).

Triggering AOPD 2 after AOPD 1 has been triggered and not reset shall initiate a safe stop of the whole machine.

The SRP/CS for initiating safe stops shall achieve $PL_r = c$.

- h) A manually operated reset control device for reactivating the AOPD 1 according to 4.9 shall be provided where stated in 4.2.

In addition, access beneath the roller conveyor shall be prevented by fixed guards.



Key

- | | |
|---|------------------------------------|
| 1 AOPD 1 for loading opening | 5 lifting platform |
| 2 AOPD 2 for opening between roller conveyor and lifting platform | 6 powered roller conveyor |
| 3 reset control device for AOPD 1 | 7 panel pusher |
| 4 fences | 8 workpiece support of the machine |

Figure 10 — Example of safeguarding a device for automatic loading of panel stack by powered roller conveyor

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

5.6.9.3 Manually controlled loading of panel stack by powered roller conveyor from a side

The side opening for loading of the panel stack on the lifting platform by a roller conveyor shall be safeguarded by an active opto-electronic protective device (light barrier – AOPD 1, see [Figure 11](#), key 1). The following requirements shall be fulfilled.

- a) Starting and stopping of rollers in roller conveyor and lifting platform shall only be possible under a hold to run control device positioned outside the danger zone, at least at 1 000 mm from the outer edge of the roller conveyor fence and in a position from which there is good visibility of roller conveyor and lifting platform.
- b) AOPD 1 shall have at least two beams, at heights of 400 mm and 900 mm above the roller conveyor upper level. It shall be positioned at least 1 000 mm from any dangerous point of the protected zone.

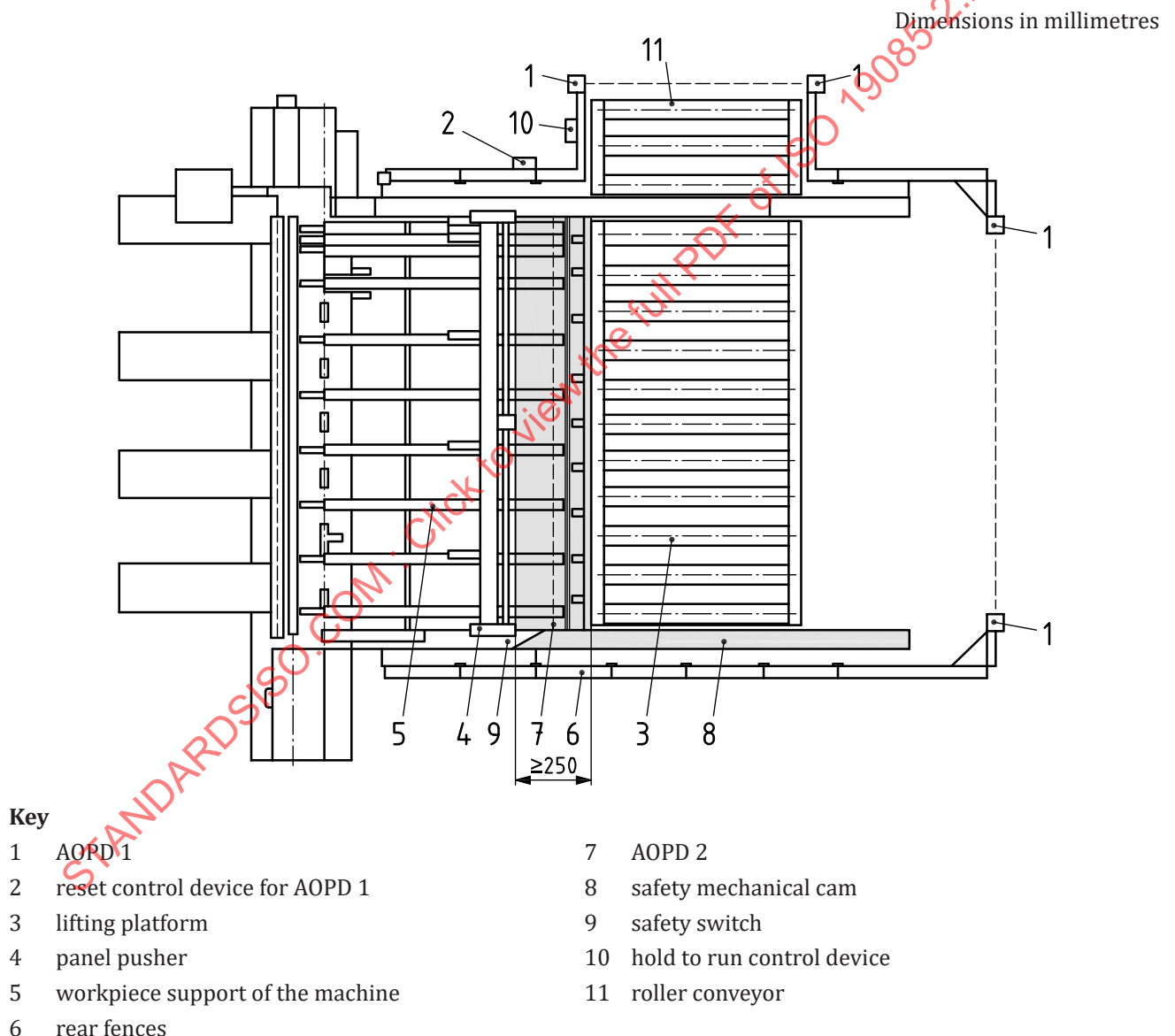


Figure 11 — Example of safeguarding a loading device for manual panel stack loading by powered roller conveyor from a side

- c) Triggering AOPD 1 shall initiate a safe stop of any dangerous movement at the rear side of the machine except the rollers and the movements occurring between the grey area in [Figure 11](#) and the cutting line.

- d) Requirements of 5.6.9.1 c) and the related PL_r shall apply.
- e) A manually operated reset control device for reactivating the AOPD 1 according to 4.9 shall be provided where stated in 4.2. A reset of AOPD 2 shall only be possible together with or after reset of AOPD 1.
- f) The dangerous movements at the rear side of the machine stopped by triggering AOPD 1 according to c) shall only be possible to start after reset of AOPD 1.

The SRP/CS for initiating safe stop in c) shall achieve $PL_r = c$.

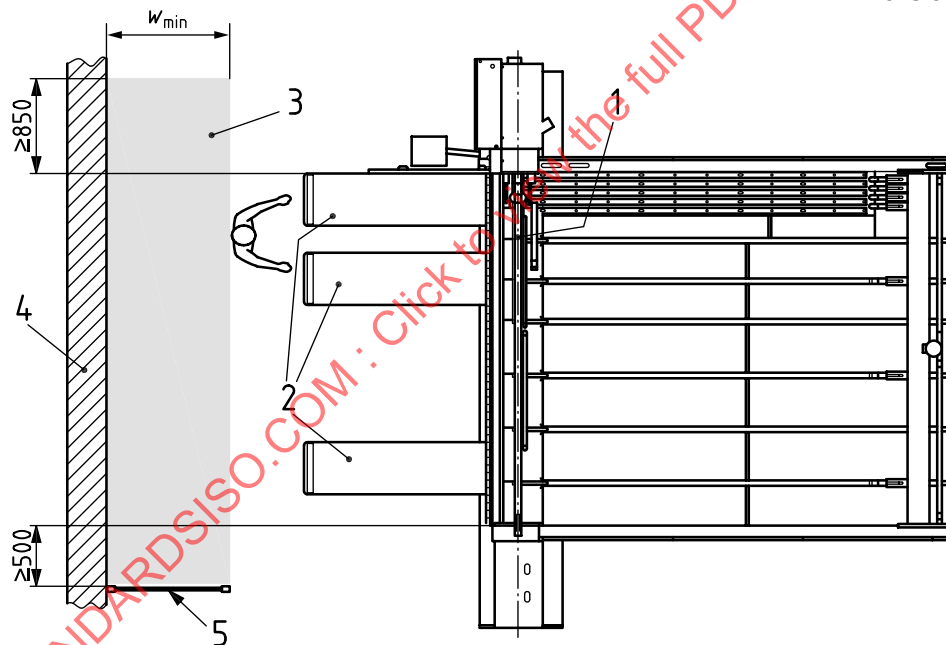
Verification: By checking the relevant drawings and/or circuit diagrams, inspection of the machine, measurement and relevant functional testing of the machine.

5.6.10 Minimum clearance at the unloading area

To prevent body crushing at the unloading area (Figure 2, key 4) one of the following requirements shall be fulfilled:

- a) a pressure sensitive mat or an ESPE extending from any fixed point (e.g. wall) towards the machine at least 500 mm plus the maximum distance travelled by the panel pusher moving at the maximum speed, after its stop initiation. (see Figure 12, key w_{min}).

Dimensions in millimetres



Key

- | | | | |
|---|---------------------------------|-----------|----------------------------|
| 1 | front cutting line | 4 | wall |
| 2 | extension tables | 5 | fence |
| 3 | ESPE or pressure sensitive mats | w_{min} | minimum width of clearance |

Figure 12 — Minimum clearance at the unloading area

The protected zone shall protrude laterally (in direction perpendicular to the workpiece unloading direction):

- 1) at least 850 mm; or
- 2) at least 500 mm where a fence with a minimum height of 1 400 mm is provided at the outer side of the ESPE/pressure sensitive mat (see Fig.12, key 5)

Triggering the pressure sensitive mat or ESPE shall initiate a safe stop of the panel pusher. The SRP/CS for initiating a safe stop when triggering the pressure sensitive mat or ESPE shall achieve $PL_r = c$.

- b) a clearance (see [Figure 13](#)) of not less than the maximum length of the panel plus 500 mm shall be ensured between the cutting line at the front side of the machine and any fixed point (e.g. wall); if the panel pusher can move beyond the cutting line, its extreme position shall be taken as reference in place of the cutting line; in addition a free space shall be ensured at the sides of the cutting line of at least 500 mm extending from the outer edge of the shortest workpiece extension table up to the length defined above.

NOTE lateral clearance is needed to avoid shearing and crushing hazards between the workpiece and any fixed obstacle, e.g. columns

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

5.6.11 Predisposition for top loading/unloading by an external system

Access to the area of the machine (i.e. the machine table and/or on the machine preloading roller conveyor and/or on the machine lifting table) where the external system provides automatic workpiece loading/unloading from the top, shall be prevented by fixed guards in combination with:

- a) interlocking movable guards with guard locking. Guard unlocking shall be possible only when it is detected that the external system is out of the area where access is required (e.g. detection by mechanical cam and position switch) and that there are no hanging workpieces. The SRP/CS for interlocking of unlocking with position of the external system for top loading/unloading and the detection that there are no hanging workpieces shall achieve $PL_r = c$.
- b) ESPE or pressure sensitive mats extending at least 1000 mm from any dangerous point, including any hanging workpiece. In addition, a warning light shall clarify when access is allowed and when no workpiece is hanging.

In both cases, any intrusion of the external system in the protected area when the interlocking movable guard is opened or the ESPE/ pressure sensitive mats have been triggered, shall provide a signal to the external system causing a safe stop of the external system itself. The SRP/CS for interlocking of any intrusion of the external system in the protected area with the signal causing a safe stop of the external system shall achieve $PL_r = c$.

5.6.12 Integrated trimming unit for offcuts management

If the machine is fitted with an integrated trimming unit for offcuts management, access to crushing and shearing points of the trimming unit shall be prevented e.g. by a combination of the following:

- a) fixed guards with opening for off cuts feeding providing a distance of at least 850 mm from any hazardous point where the accessible part of the opening around the vibrating conveyor does not exceed 180 mm in one of the two dimensions;
- b) fixed guards with a minimum height of 1 800 mm and a maximum distance from the floor of 180 mm, providing a distance of at least 850 mm from any hazardous point;
- c) moveable guards with interlocking. The moveable guards shall be provided with guard locking if the stopping time of the moving parts is higher than 2 s.

5.7 Impact hazard

ISO 19085-1:2021, 5.7, 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 onto the main panel pusher carriage:

- their relative stroke shall be limited to 1 200 mm; and
- the total speed shall not exceed 40 m min^{-1} .

5.8 Clamping devices

ISO 19085-1:2021, 5.8, 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 $PL_r = b$.

5.9 Measures against ejection

5.9.1 General

ISO 19085-1:2021, 5.9.1, applies with the following additions.

From the examples given, only guards are relevant.

5.9.2 Guards materials and characteristics

5.9.2.1 Choice of class of guards

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

Guards used to prevent ejection shall be of class B.

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 in line with the cutting line, it shall be either enclosed by the above guard or made of class A materials and characteristics according to [5.9.2.2](#).

5.9.2.2 Guards of class A

ISO 19085-1:2021, 5.9.2.2, applies.

5.9.2.3 Guards of class B

ISO 19085-1:2021, 5.9.2.3, applies.

5.10 Workpiece supports and guides

ISO 19085-1:2021, 5.10, applies with the following additions.

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

At the front of the machine and at the rear side of machine without panel pusher, a workpiece 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, one or more extension tables shall be fitted to provide support for manual loading, manual unloading and workpiece handling. 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.

Each extension table shall extend at least 1,35 m measured perpendicularly from the front cutting line and have a width of at least 0,5 m. As an exception, a width of 0,4 m for moveable extension table is acceptable if the total width of the fixed and moveable 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 workpieces 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.

6 Safety requirements and measures for protection against other hazards

6.1 Fire

ISO 19085-1:2021, 6.1, 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 [5.2](#).

6.2 Noise

6.2.1 Noise reduction at the design stage

ISO 19085-1:2021, 6.2.1, applies.

6.2.2 Noise emission measurement

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

Annex F replaces ISO 19085-1:2021, Annex F.

6.3 Emission of chips and dust

ISO 19085-1:2021, 6.3, 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.

6.4 Electricity

ISO 19085-1:2021, 6.4, applies.

6.5 Ergonomics and handling

ISO 19085-1:2021, 6.5, applies.

6.6 Lighting

ISO 19085-1:2021, 6.6, applies.

6.7 Pneumatics

ISO 19085-1:2021, 6.7, applies.

6.8 Hydraulics

ISO 19085-1:2021, 6.8, applies.

6.9 Electromagnetic compatibility

ISO 19085-1:2021, 6.9, applies.

6.10 Laser

ISO 19085-1:2021, 6.10, applies.

6.11 Static electricity

ISO 19085-1:2021, 6.11, applies.

6.12 Errors of fitting

ISO 19085-1:2021, 6.12, applies.

6.13 Isolation

ISO 19085-1:2021, 6.13, applies with the following additions.

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

6.14 Maintenance

ISO 19085-1:2021, 6.14, applies.

6.15 Relevant but not significant hazards

ISO 19085-1:2021, 6.15, applies.

7 Information for use

7.1 Warning devices

ISO 19085-1:2021, 7.1, applies.

7.2 Marking

7.2.1 General

ISO 19085-1:2021, 7.2.1, applies.

7.2.2 Additional markings

ISO 19085-1:2021, 7.2.2, is replaced by the following text.

The following additional information shall be marked legibly and indelibly throughout the expected life of the machine either directly on the machine, e.g. by engraving, etching or by using labels or plates permanently fixed to the machine, e.g. by riveting or stickers:

- a) maximum and minimum diameter of the saw blades for which the machine is designed;
- b) bore diameter of the saw blades;
- c) if the machine is fitted with saw blades, the requirements for marking of the tools in EN 847-1:2017, Clause 7, shall apply;
- d) an arrow indicating the direction of rotation of the saw blade.

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

7.3 Instruction handbook

7.3.1 General

ISO 19085-1:2021, 7.3.1, applies.

7.3.2 Additional information

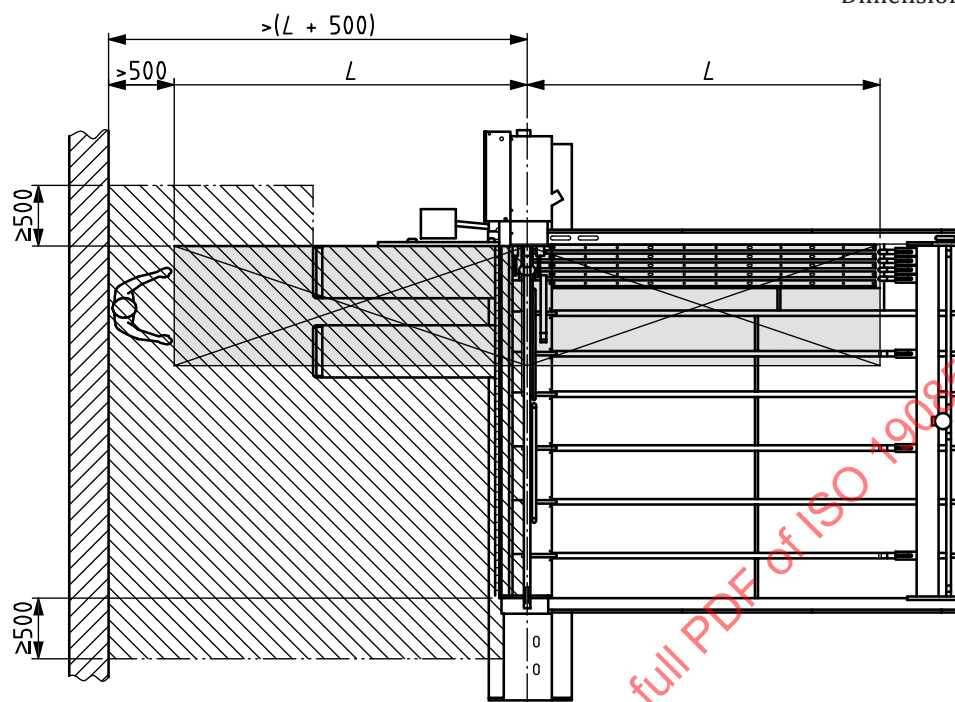
ISO 19085-1:2021, 7.3.2, is replaced by the following text.

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

- a) examples of foreseeable misuse are machining panels or panel stacks with different thickness at the same time or to store any object in the front area of the machine that shall remain free;
- b) additional example of residual risks is access to the saw blades when sectional safety curtains elements are broken or raised by hand;
- c) for machines with panel pusher, where requirements stated in [5.6.10](#) b) apply, the maximum dimensions L of the panels that can be machined together with an installation drawing ensuring a clearance of the maximum length of the panel plus at least 500 mm measured from the cutting line at the front side of the machine, to reduce risk of body crushing with any fixed points (see [Figure 13](#)); if the panel pusher can move beyond the cutting line, its extreme position shall be taken as reference in place of the cutting line. In addition, a free space at the side of the cutting line of at least 500 mm extending from the outer edge of the shortest workpiece extension table up to length defined above shall be ensured;
- d) the range of saw blade diameters and thickness for which the machine is designed;
- e) it is recommended that only sharpened saw blades manufactured in accordance with the requirements of EN 847-1:2017 are used;
- f) list of safety devices which shall be maintained and inspected periodically defining how frequently the tests shall be carried out and the test method shall include also the sectional safety curtain: check absence of damage;

- g) the operator shall frequently (weekly) check the slot for the saw blades. If the slot width in the table or in the fence exceeds at any point 10 mm, the corresponding part or insert shall be replaced.

Dimensions in millimetres



Key

L maximum length of the panels that can be machined

Figure 13 — Example of installation drawing

Verification: By checking the information given in the instruction handbook and relevant drawings.

Annex A (informative)

List of significant hazards

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

[Table A.1](#) lists all significant hazards, hazardous situations and events (see ISO 12100:2010), identified by risk assessment as significant for horizontal beam panel circular sawing machines, and which require action to eliminate or reduce the risk.

Table A.1 — List of significant hazards

No.	Hazards, hazardous situations and hazardous events	ISO 12100:2010	Relevant subclause in this document
1	Mechanical hazards related to		
	— machine parts or workpieces due to		
	a) shape	6.2.2.1, 6.2.2.2, 6.3	4.2 , 5.3 , 5.6 , 5.10 , 6.15 7.2 , 7.3
	b) relative location		4.2 , 4.3 , 4.8 , 5.6 , 7.2
	c) mass and stability (potential energy of elements which can move under the effect of gravity)		4.8 , 4.9
	d) mass and velocity (kinetic energy of elements in controlled or uncontrolled motion)		4.3 , 4.8 , 5.6 , 5.10
	e) mechanical strength		5.2
	— accumulation of energy inside the machinery by		
	f) gases under pressure	6.2.10, 6.3.5.4	4.8 , 6.7 , 6.13 , 7.3
1.1	Crushing hazard		4.3 , 4.4 , 4.8 , 5.4 , 5.10 , 5.6 , 6.12 , 6.13
1.2	Shearing hazard		4.3 , 4.4 , 5.4 , 5.10 , 5.6 , 6.12 , 6.13
1.3	Cutting or severing hazard		4.3 , 4.4 , 4.5 , 4.8 , 5.4 , 5.6 , 6.12 , 6.13
1.4	Entanglement hazard		4.4 , 4.5 , 5.6 , 6.12 , 6.13
1.5	Drawing-in or trapping hazard		4.3 , 4.4 , 4.5 , 5.4 , 5.6 , 6.12 , 6.13
1.6	Impact hazard		4.3 , 5.7 , 5.10 , 6.12
1.9	High pressure fluid injection or ejection hazard	6.2.10	4.4 , 6.7 , 6.8 , 6.13
2	Electrical hazards due to		
2.1	Contact of persons with live parts (direct contact)	6.2.9, 6.3.5.4	6.4 , 6.13
2.2	Contact of persons with parts which have become live under faulty conditions (indirect contact)	6.2.9	6.4 , 6.13
2.4	Electrostatic phenomena	6.2.9	6.11
4	Hazards generated by noise , resulting in		
4.1	Hearing loss (deafness), other physiological disorders (loss of balance, loss of awareness)	6.2.2.2, 6.3	6.2 , 7.1 , 7.3
4.2	Interference with speech communication, acoustic signals		
6	Hazards generated by radiation		