
Woodworking machines — Safety —
Part 13:
Multi-blade rip sawing machines with
manual loading and/or unloading

Machines à bois — Sécurité —

*Partie 13: Déligneuses multi-lames à chargement et/ou
déchargement manuel*

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

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Contents

	Page
Foreword	v
Introduction	vi
1 Scope	1
2 Normative references	1
3 Terms and definitions	2
4 List of significant hazards	4
5 Safety requirements and measures for controls	6
5.1 Safety and reliability of control systems.....	6
5.2 Control devices.....	6
5.3 Start.....	8
5.4 Safe stops.....	8
5.4.1 General.....	8
5.4.2 Normal stop.....	8
5.4.3 Operational stop.....	8
5.4.4 Emergency stop.....	8
5.5 Braking function of tool spindles.....	8
5.6 Mode selection.....	8
5.6.1 General.....	8
5.6.2 Pressure shoe/board cutting mode.....	8
5.6.3 Cleaning mode.....	9
5.6.4 Powered axial adjustment mode.....	9
5.7 Spindle speed changing.....	10
5.7.1 Spindle speed changing by changing belts on the pulleys.....	10
5.7.2 Spindle speed changing by incremental speed change motor.....	10
5.7.3 Infinitely variable speed by frequency inverter.....	10
5.8 Failure of any power supply.....	10
5.9 Manual reset control.....	10
5.10 Enabling control.....	10
5.11 Machine moving parts limited speed monitoring.....	10
5.12 Time delay.....	10
5.13 Powered adjustments when guards are closed.....	10
6 Safety requirements and measures for protection against mechanical hazards	11
6.1 Stability.....	11
6.1.1 Stationary machines.....	11
6.1.2 Displaceable machines.....	11
6.2 Risk of break-up during operation.....	11
6.3 Tool holder and tool design.....	11
6.3.1 General.....	11
6.3.2 Spindle locking.....	11
6.3.3 Circular saw blade fixing device.....	11
6.3.4 Flanges dimensions for circular saw blades.....	11
6.4 Braking.....	11
6.4.1 Braking of tool spindles.....	11
6.4.2 Maximum run-down time.....	12
6.4.3 Brake release.....	12
6.5 Safeguard design.....	12
6.5.1 Fixed guards.....	12
6.5.2 Interlocking moveable guards.....	12
6.5.3 Hold-to-run control.....	12
6.5.4 Two-hand control.....	12
6.5.5 Electro-sensitive protective equipment (ESPE).....	12
6.5.6 Pressure sensitive protective equipment (PSPE).....	12

6.6	Prevention of access to moving parts.....	12
6.6.1	General.....	12
6.6.2	Guarding of tools.....	13
6.6.3	Guarding of drives.....	13
6.6.4	Guarding of crushing and shearing zones.....	13
6.7	Impact hazard.....	14
6.8	Clamping devices.....	14
6.9	Measures against ejection.....	14
6.9.1	General.....	14
6.9.2	Guards materials and characteristics.....	14
6.9.3	Measures against ejection through the infeed opening.....	15
6.9.4	Measures against ejection through the outfeed opening.....	25
6.10	Work-piece support and guide.....	28
7	Safety requirements and measures for protection against other hazards.....	28
7.1	Fire.....	28
7.2	Noise.....	28
7.2.1	Noise reduction at the design stage.....	28
7.2.2	Noise emission measurement.....	28
7.3	Emission of chips and dust.....	28
7.4	Electricity.....	28
7.4.1	General.....	28
7.4.2	Displaceable machines.....	28
7.5	Ergonomics and handling.....	28
7.6	Lighting.....	28
7.7	Pneumatics.....	29
7.8	Hydraulics.....	29
7.9	Electromagnetic compatibility.....	29
7.10	Laser.....	29
7.11	Static electricity.....	29
7.12	Errors of fitting.....	29
7.13	Isolation.....	29
7.14	Maintenance.....	29
8	Information for use.....	29
8.1	Warning devices.....	29
8.2	Marking.....	29
8.2.1	General.....	29
8.2.2	Additional marking.....	29
8.3	Instruction handbook.....	30
8.3.1	General.....	30
8.3.2	Additional information.....	30
	Annex A (informative) Performance level required.....	31
	Annex B (normative) Test for braking function.....	32
	Annex C (normative) Stability test for displaceable machines.....	33
	Annex D (normative) Impact test method for guards.....	34
	Annex E (normative) Noise emission measurement for machines not in ISO 7960:1995.....	35
	Annex F (normative) Test for the anti-splinter system on machines with one chain conveyor.....	36
	Bibliography.....	40

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).

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.

This document is intended to be used in conjunction with ISO 19085-1:2017, which gives requirements common to different machine types.

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

Introduction

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

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

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

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

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

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

Thus, [Clauses 5, 6, 7 and 8](#) with their subclauses and the annexes of this part can either

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

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

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

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

Specific subclauses and annexes in this document without correspondent in ISO 19085-1:2017 are indicated by the introductory sentence: “Subclause/Annex specific to this document.”.

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

NOTE Requirements for tools are given in EN 847-1:2017.

Woodworking machines — Safety —

Part 13:

Multi-blade rip sawing machines with manual loading and/or unloading

1 Scope

This document gives the safety requirements and measures for stationary multi-blade rip sawing machines manually loaded and/or unloaded, hereinafter referred to as “machines”, designed to cut solid wood and material with similar physical characteristics to wood.

It deals with all significant hazards, hazardous situations and events as listed in [Clause 4](#) relevant to 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 are taken into account.

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

This document does not deal with specific hazards related to the combination of single machines with any other machine as part of a line.

It is not applicable to machines:

- with all saw blades spindles mounted below the workpiece support/level only;
- intended for use in potentially explosive atmosphere;
- manufactured prior to 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 13856-2:2013, *Safety of machinery — Pressure-sensitive protective devices — Part 2: General principles for design and testing of pressure-sensitive edges and pressure-sensitive bars*

ISO 13856-3:2013, *Safety of machinery — Pressure-sensitive protective devices — Part 3: General principles for design and testing of pressure-sensitive bumpers, plates, wires and similar devices*

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

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

EN 614-1:2006+A1:2009, *Safety of machinery — Ergonomic design principles — Part 1: Terminology and general principles*

EN 894-2:1997+A1:2008, *Safety of machinery — Ergonomics requirements for the design of displays and control actuators — Part 2: Displays*

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

IEC 61800-5-2:2016, *Adjustable speed electrical power drive systems — Part 5-2: Safety requirements - Functional*

IEC 61310-1:2007, *Safety of machinery — Indication, marking and actuation — Part 1: Requirements for visual, acoustic and tactile signals*

3 Terms and definitions

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

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

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

3.1

multi-blade rip sawing machine

machine designed to be used with circular saw blades at different positions on the spindles which are fixed in position during cutting, where the work-piece is fed to the tools by an integrated power feed, i.e. rollers or chain conveyor

Note 1 to entry: The saw blades can be mounted on one or more saw spindles which can be capable of vertical adjustment. The saw blades can be capable of axial adjustment either relative to the spindle or together with the spindle. The saw blade spindles can be arranged so that they are all mounted above the work-piece support or mounted both above and below the work-piece support.

Note 2 to entry: The cutting can be “against the feed” or “climb cutting” (see ISO 19085-1:2017, Figure 1) or a combination of both.

Note 3 to entry: Examples of machines configurations as of feed technology and spindles number and position are shown in [Figure 1](#):

- Saw blades spindles: single-spindle machines are shown in a), b), c); double-spindle machines in d), e), f), one above and one below the work-piece level.
- Work-piece support and integrated feed: by feed rollers shown in a), d); by chain conveyor in b), c), e); by a combination of the two in f).

3.2

anti-splinter finger

moveable element mounted in a row at the infeed of the machine to prevent the ejection of splinters

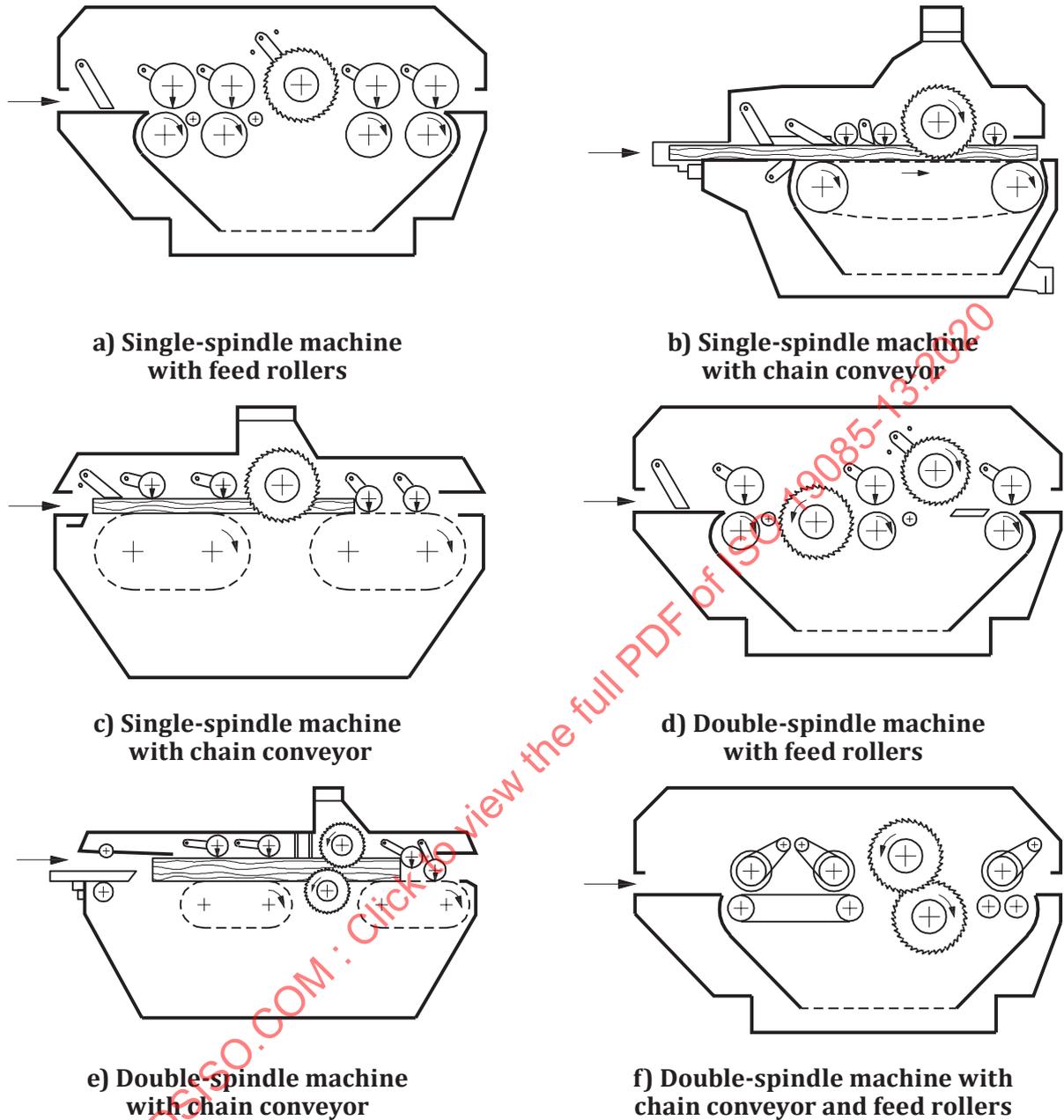
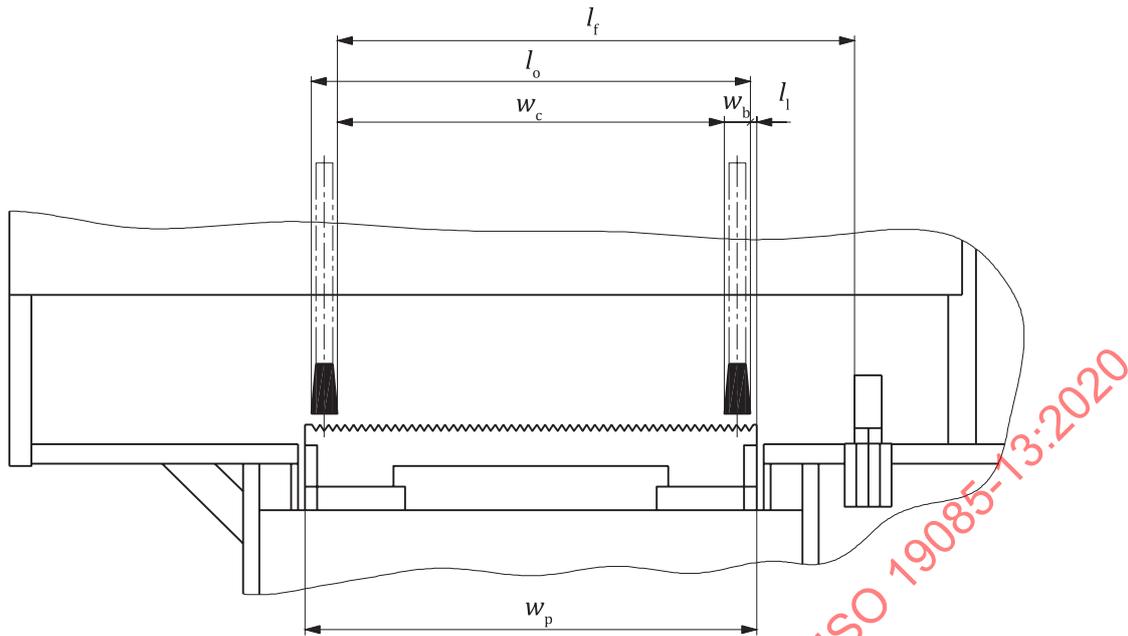


Figure 1 — Examples of machines configurations

3.3 cutting width capacity

maximum distance between inner cutting surfaces of the two outside saw blades mounted at extreme positions on the saw spindle

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



Key

- l_f maximum distance between saw blade and fence
- l_1 distance between the inner surface of the outside saw blade and the lateral limitation given by the feed system
- l_o maximum distance between the two outer cutting planes of the outside saw blades
- w_b cutting width of the saw blade
- w_c cutting width capacity
- w_p width of the work-piece conveyor

Figure 2 — Cutting width capacity

3.4 manual loading

placement of the work-piece by the operator directly onto the machine integrated feed, e.g. rotating feed rollers or chain conveyor, without any intermediate loading device to receive and transfer the work-piece from the operator to the integrated feed

3.5 manual unloading

removal of the work-piece by the operator directly from the machine outfeed, without any intermediate unloading device to receive and transfer the work-piece from the machine outfeed to the operator

4 List of significant hazards

This clause contains all the significant hazards, hazardous situations and events (see ISO 12100:2010), 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/or measures or by reference to relevant standards. These hazards are listed in [Table 1](#).

Table 1 — List of significant hazards

No.	Hazards, hazardous situations and events	ISO 12100:2010	Relevant subclause in this document
1	Mechanical hazards related to — machine parts or work-pieces due to		
	a) shape	6.2.2.1, 6.2.2.2, 6.3	6.2 , 6.3 , 6.9 , 6.6 , Annex F
	b) relative location		5.2 , 5.4.4 , 5.9 , 6.9 , 6.6 , 7.5
	c) mass and stability (potential energy of elements which can move under the effect of gravity)		5.15
	d) mass and velocity (kinetic energy of elements in controlled or uncontrolled motion)		5.13 , 5.9 , 6.9 , 6.10
	e) mechanical strength — accumulation of energy inside the machinery by		6.2 , 6.9
	f) liquids and gases under pressure	6.2.10, 6.3.5.4	6.9 , 7.8 , 7.9
1.1	Crushing hazard		6.10 , 6.6
1.2	Shearing hazard		6.10 , 6.7
1.3	Cutting or severing hazard		6.3 , 6.4 , 6.9 , 6.10 , 6.6
1.4	Entanglement hazard		6.10 , 6.6
1.5	Drawing-in or trapping hazard		6.10 , 6.6
1.6	Impact hazard		6.2 , 6.9
1.7	Stabbing and puncture hazard		6.2 , 6.10
1.9	High pressure fluid injection or ejection hazard	6.2.10	6.10 , 7.8 , 7.9
2	Electrical hazards due to		
2.1	Contact of persons with live parts (direct contact)	6.2.9, 6.3.5.4	7.4
2.2	Contact of persons with parts which have become live under faulty conditions (indirect contact)	6.2.9	7.4
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	Lasers		7.10
7	Hazards generated by materials and substances (and their constituent elements) processed or used by the machinery		
7.1	Hazards from contact with or inhalation of harmful fluids and dusts	6.2.3, 6.2.4	7.3 , 8.3
7.2	Fire hazard	6.2.4	7.1
8	Hazards generated by neglecting ergonomic principles in machinery design related to		
8.1	Unhealthy postures or excessive effort	6.2.7, 6.2.8, 6.2.11.12, 6.3.5.5, 6.3.5.6	5.2 , 7.5
8.2	Hand-arm or foot-leg anatomy	6.2.8	5.2 , 7.5
8.4	Local lighting	6.2.8	8.3
8.5	Mental overload and underload, stress	6.2.8	8.3

Table 1 (continued)

No.	Hazards, hazardous situations and events	ISO 12100:2010	Relevant subclause in this document
8.6	Human error, human behaviour	6.2.8, 6.2.11.8, 6.2.11.10, 6.3.5.2, 6.4	5.1 , 7.5 , 8.3
8.7	Design, location or identification of manual controls	6.2.8.f, 6.2.11.8	5.2 , 7.5
8.8	Design or location of visual display units	6.2.8, 6.4.2	5.2 , 7.5
10	Unexpected start up , unexpected overrun/overspeed (or any similar malfunction) from		
10.1	Failure/disorder of the control system	6.2.11, 6.3.5.4	5.1 , 7.13
10.2	Restoration of energy supply after an interruption	6.2.11.4	5.10 , 7.7 , 7.8
10.3	External influences on electrical equipment	6.2.11.11	5.1 , 7.9
10.5	Errors in the software	6.2.11.7	5.1
10.6	Errors made by the operator (due to mismatch of machinery with human characteristics and abilities, see 8.6)	6.2.8, 6.2.11.8, 6.2.11.10, 6.3.5.2, 6.4	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	5.2 , 5.4.2 , 5.4.4
12	Variations in the rotational speed of tools	6.2.2.2, 6.2.3	5.13
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	5.10
15	Errors of fitting	6.2.7, 6.4.5	7.12
16	Break-up during operation	6.2.3	6.2
17	Falling or ejected objects or fluids	6.2.3, 6.2.10	6.9 , Annex F
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

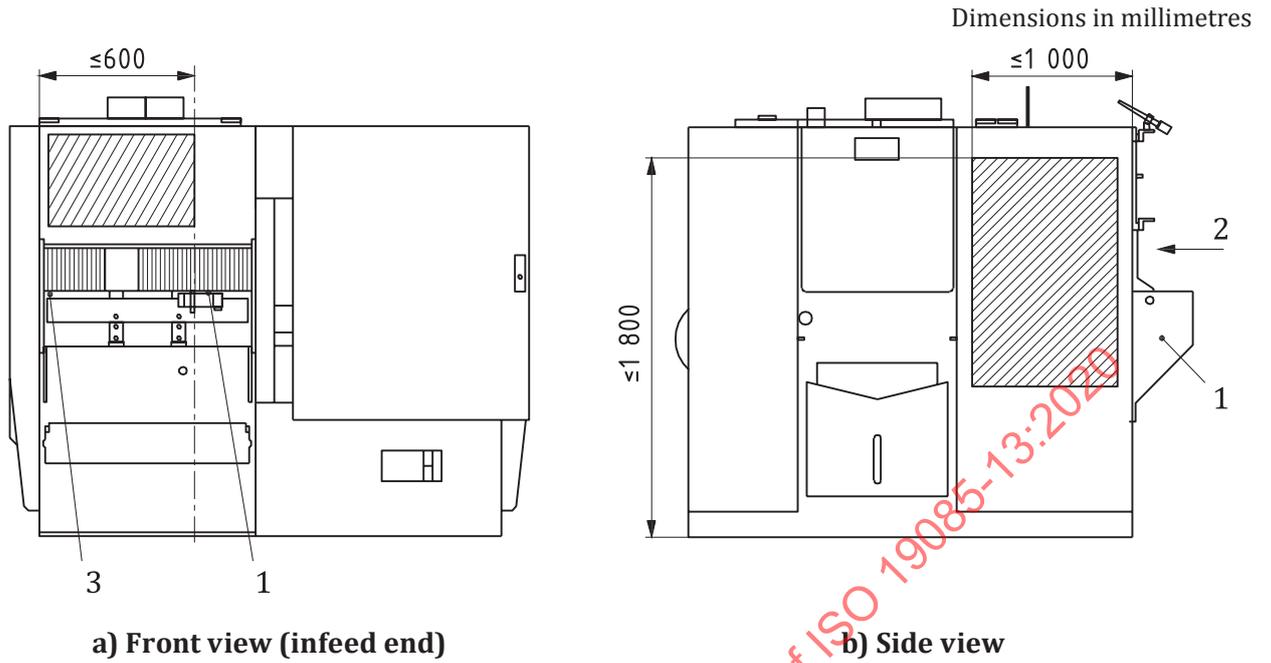
ISO 19085-1:2017, 5.1, applies.

5.2 Control devices

ISO 19085-1:2017, 5.2, applies with the following additions.

Hand operated control devices for start and stop of the drives for the saw spindles, for the feed and for the height adjustment of the upper roller support shall be positioned in one or more of the shaded areas shown in [Figure 3](#) or on a moveable control panel at the loading position.

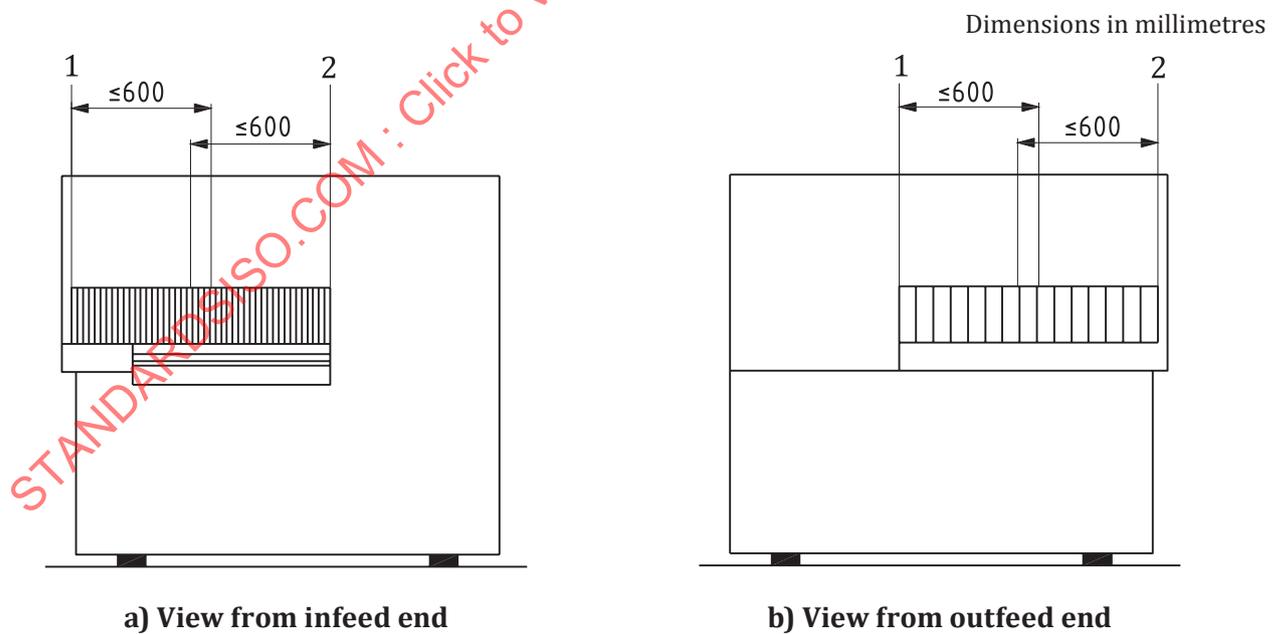
Emergency stop control devices shall be positioned at the infeed end and, on machines with manual unloading, at the outfeed end of the machine, not more than 600 mm from the opening edges (see [Figure 4](#)), and in addition on any moveable control panel.



Key

- 1 infeed table
- 2 feed direction
- 3 left side of the infeed opening

Figure 3 — Position of control devices except emergency stop



Key

- 1 left edge of infeed/outfeed opening
- 2 right edge of infeed/outfeed opening

Figure 4 — Position of emergency stop control devices

5.3 Start

ISO 19085-1:2017, 5.3, applies with the following additions.

On machines where at least one spindle is cutting against the feed and reverse feed is provided, the control for reverse feed shall be a hold-to-run control. Reverse feed shall only be possible when the saw blades are stopped and in standstill and the anti-kickback devices (see 6.9.3) are retracted.

The SRP/CS for saw blade drive standstill monitoring shall achieve $PL_r = c$.

The SRP/CS for the interlocking of reverse feed with the anti-kickback device retraction shall achieve $PL_r = c$.

5.4 Safe stops

5.4.1 General

ISO 19085-1:2017, 5.4.1, applies.

5.4.2 Normal stop

ISO 19085-1:2017, 5.4.2, applies.

5.4.3 Operational stop

ISO 19085-1:2017, 5.4.3, does not apply.

5.4.4 Emergency stop

ISO 19085-1:2017, 5.4.4, applies.

5.5 Braking function of tool spindles

ISO 19085-1:2017, 5.5, applies.

5.6 Mode selection

ISO 19085-1:2017, 5.6, applies with the following additions, subdivided into further specific subclauses.

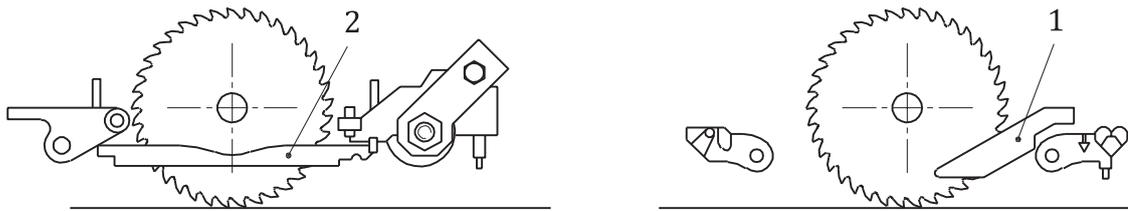
5.6.1 General

In ISO 19085-1:2017, 5.6 d), only normal stop applies, no operational stop is allowed on this machine.

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

5.6.2 Pressure shoe/board cutting mode

On machines without any work-piece detection device, and where the anti-kickback fingers are mounted on a shaft that rises and falls with the support for the upper feed rollers, and vertical adjustment in the direction of increasing the work-piece thickness is necessary for pressure devices cutting (see [Figure 5](#)), mode selection shall be provided for pressure shoe/board cutting.

**Key**

- 1 pressure shoe
- 2 pressure board

Figure 5 — Examples of pressure devices

The pressure shoe/board cutting mode shall, in addition to 5.6.1, be in accordance with the following requirements:

- a) after standstill of the saw blades, its control system shall override the interlocking of the rotation of the saw blade with the movement of the support for the upper feed rollers in direction of increasing the work-piece thickness (see 6.9.3.1.2);
- b) after standstill of the saw blades and with closed guards (see also 6.6.2), restart of the drives for the spindles and the vertical adjustments shall be possible.

The SRP/CS for override with standstill, defined in a), shall achieve $PL_r = c$.

The SRP/CS for interlocking of drives restart with standstill, defined in b), shall achieve $PL_r = c$.

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

5.6.3 Cleaning mode

Where it is necessary to clean the machine with guards open and powered movements allowed, the cleaning mode shall, in addition to 5.6.1, be in accordance with the following requirements:

- a) feed shall be capable of running only under hold-to-run control; feed speed indication shall be provided at the machine; the SRP/CS for the feed speed indication shall achieve $PL_r = b$;
- b) vertical movement of the saw blades and of the pressure shoe/board shall be either prevented or manually operated (e.g. by hand wheel) or, if power operated, under hold-to-run control with adjustment speed not exceeding 10 mm s^{-1} , monitored according to 5.11. The dangerous points shall be visible from the position of the operator when using the hold-to-run control device.

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

5.6.4 Powered axial adjustment mode

The mode for powered axial adjustment of the saw blades when the guards are open shall, in addition to 5.6.1, be in accordance with the following requirements:

- a) powered axial adjustment of the saw blades shall be under hold-to-run control;
- b) the adjustment speed shall not exceed 10 mm s^{-1} , monitored according to 5.11;
- c) the dangerous points shall be visible from the position of the operator when using the hold-to-run control device.

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

5.7 Spindle speed changing

5.7.1 Spindle speed changing by changing belts on the pulleys

ISO 19085-1:2017, 5.7.1, applies.

5.7.2 Spindle speed changing by incremental speed change motor

ISO 19085-1:2017, 5.7.2, applies.

5.7.3 Infinitely variable speed by frequency inverter

ISO 19085-1:2017, 5.7.3, applies.

5.8 Failure of any power supply

ISO 19085-1:2017, 5.8, applies.

5.9 Manual reset control

ISO 19085-1:2017, 5.9, applies with the following additions.

Manual reset may be achieved by control power-on circuit, where control-power on device fulfils position requirements stated in [5.2](#) for manual reset devices.

5.10 Enabling control

ISO 19085-1:2017, 5.10, does not apply.

5.11 Machine moving parts limited speed monitoring

ISO 19085-1:2017, 5.11, is replaced by the following text.

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

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

For limited speed monitoring of PDS(SR) (power drive system, safety-related), IEC 61800-5-2:2016, 4.2.3.4 (safely limited speed, SLS) applies.

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

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

5.12 Time delay

ISO 19085-1:2017, 5.12, applies.

5.13 Powered adjustments when guards are closed

Subclause specific to this document.

Where powered axial adjustment of the saw blades with guards are closed is provided, a means shall be provided for detecting that a work-piece, which has entered the infeed of the machine, has passed the saw blades, e.g. by position monitoring of the powered rollers (at least for the rollers in front of and behind the spindle).

The SRP/CS for work-piece detection shall achieve $PL_r = c$.

On machines with vertical powered adjustment of the saw spindles, contact between saw blades on different spindles and/or contact between saw blades and parts of the machine shall be prevented, e.g. by a manually adjustable mechanical restraint device.

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

6 Safety requirements and measures for protection against mechanical hazards

6.1 Stability

6.1.1 Stationary machines

ISO 19085-1:2017, 6.1.1, applies.

6.1.2 Displaceable machines

ISO 19085-1:2017, 6.1.2, does not apply.

6.2 Risk of break-up during operation

ISO 19085-1:2017, 6.2, does not apply.

6.3 Tool holder and tool design

6.3.1 General

ISO 19085-1:2017, 6.3.1, applies.

6.3.2 Spindle locking

ISO 19085-1:2017, 6.3.2, applies.

6.3.3 Circular saw blade fixing device

ISO 19085-1:2017, 6.3.3, does not apply.

6.3.4 Flanges dimensions for circular saw blades

ISO 19085-1:2017, 6.3.4, does not apply.

6.4 Braking

6.4.1 Braking of tool spindles

ISO 19085-1:2017, 6.4.1, applies.

6.4.2 Maximum run-down time

ISO 19085-1:2017, 6.4.2, is replaced by the following text.

Maximum run-down time shall be:

- 90 s for machines fitted with drives which all have a rated input of 200 kW or less;
- 120 s for machines with at least one drive with a rated input of more than 200 kW.

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

6.4.3 Brake release

ISO 19085-1:2017, 6.4.3, applies.

6.5 Safeguard design

6.5.1 Fixed guards

ISO 19085-1:2017, 6.5.1, applies.

6.5.2 Interlocking moveable guards

6.5.2.1 General

ISO 19085-1:2017, 6.5.2.1, applies.

6.5.2.2 Moveable guards with interlocking without guard locking

ISO 19085-1:2017, 6.5.2.2, applies.

6.5.2.3 Moveable guards with interlocking and guard locking

ISO 19085-1:2017, 6.5.2.3, applies.

6.5.3 Hold-to-run control

ISO 19085-1:2017, 6.5.3, applies.

6.5.4 Two-hand control

ISO 19085-1:2017, 6.5.4, does not apply.

6.5.5 Electro-sensitive protective equipment (ESPE)

ISO 19085-1:2017, 6.5.5, does not apply.

6.5.6 Pressure sensitive protective equipment (PSPE)

ISO 19085-1:2017, 6.5.6, applies.

6.6 Prevention of access to moving parts

6.6.1 General

ISO 19085-1:2017, 6.6.1, does not apply.

6.6.2 Guarding of tools

ISO 19085-1:2017, 6.6.2, is replaced by the following text.

Access to the saw blades shall be prevented by fixed guards, except for the infeed and outfeed openings. Where access to the saw blades is required, e.g. for saw blade changing, it shall be via interlocking moveable guards with guard locking, interlocked with the standstill of each saw spindle drive.

The SRP/CS for the standstill monitoring system shall achieve $PL_r = c$.

Access to the saw blades through the chip and dust outlets shall be prevented in accordance with the requirements of ISO 13857:2008, Table 4.

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

6.6.3 Guarding of drives

ISO 19085-1:2017, 6.6.3, applies.

6.6.4 Guarding of crushing and shearing zones

ISO 19085-1:2017, 6.6.4, applies with the following additions.

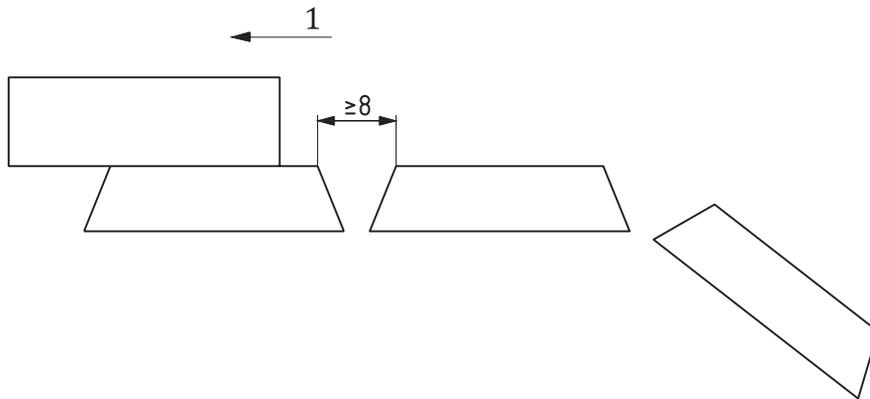
Access to the crushing and shearing points of the feed mechanism shall be prevented by either a fixed guard or, where frequent access is required (i.e. more than once per week), by a moveable guard with interlocking and:

- with guard locking where the run-down time is equal to or exceeds 2 s;
- without guard locking where the run-down time is less than 2 s.

Access to the feed rollers external to the anti-kickback/anti-splinter systems shall be deterred by a trip device, i.e. PSPE according to ISO 13856-2:2013 or ISO 13856-3:2013, which shall meet the following requirements:

- a) the width of the trip device sensor shall be at least equal to the width of the infeed opening;
- b) the tripping force shall be lower than or equal to 50 N;
- c) with regard to the gap between the trip sensor and the work-piece, the horizontal distance from the trip sensor to the hazard point, the response time of the trip device and the stopping time of the feed, the trip sensor shall be designed and positioned so that the front end of a test wedge, resting on the work-piece moving at the maximum feed speed against the trip, shall not reach the hazard point and shall still be able to be retracted (not clamped). The test wedge shall be made of solid wood, be 200 mm long, 100 mm wide, 12 mm high at the front end and 40 mm at the rear end;
- d) it shall not in itself create a trapping hazard.

For machines fitted with chain conveyor feed, crushing hazards caused by the closing links of the conveyor chain at the infeed-end, where accessible, shall be eliminated. An example of how this can be achieved is shown in [Figure 6](#).



Key

1 feed direction

Figure 6 — Example of prevention of crushing risk by closing links on conveyor chain

At the outfeed end of the machine, where the chain conveyor returns into the machine frame, crushing and drawing-in hazards shall be prevented by one of the following solutions:

- e) design of the machine frame and chain conveyor;
- f) fixed guards mounted at a distance of at least 80 mm from the chain conveyor;
- g) fixed guards mounted at a distance not greater than 8 mm from the chain conveyor;
- h) a PSPE interlocked with the feed; restart of the feed shall only be possible after manual reset.

6.7 Impact hazard

ISO 19085-1:2017, 6.7, is replaced by the following text.

On machines where the operator can stand at the outfeed within the cutting width capacity, a feed speed limit of 50 m/min applies.

See also 8.3.2 g).

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

6.8 Clamping devices

ISO 19085-1:2017, 6.8, does not apply.

6.9 Measures against ejection

6.9.1 General

ISO 19085-1:2017, 6.9.1, applies.

6.9.2 Guards materials and characteristics

6.9.2.1 Choice of class of guards

ISO 19085-1:2017, 6.9.2.1, applies with the following additions.

Guards used to prevent ejection shall be of class A.

6.9.2.2 Guards of class A

ISO 19085-1:2017, 6.9.2.2, applies.

6.9.2.3 Guards of class B

ISO 19085-1:2017, 6.9.2.3, does not apply.

6.9.3 Measures against ejection through the infeed opening

Subclause specific to this document.

6.9.3.1 Machines designed for cutting against the feed

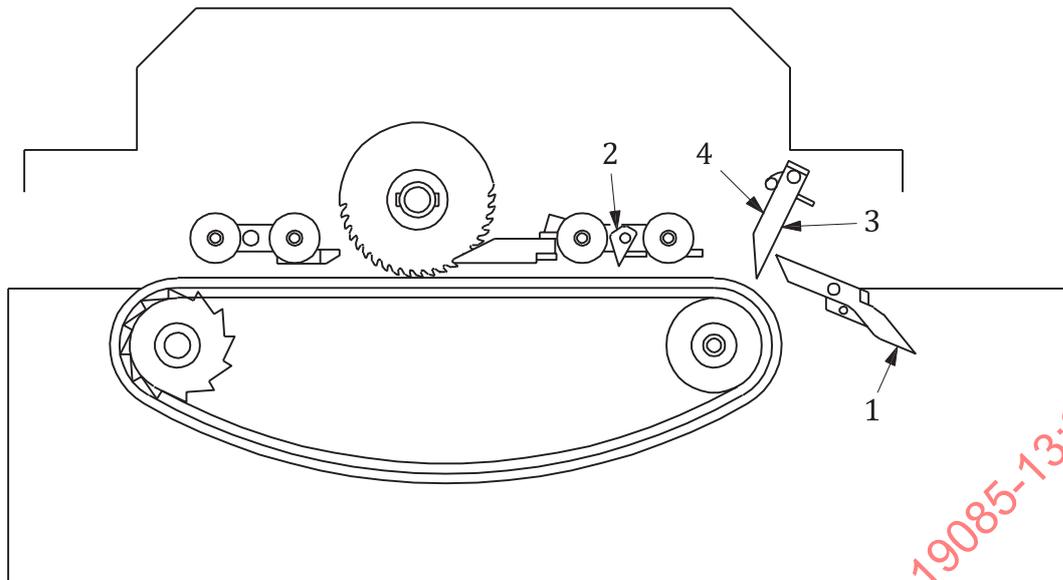
6.9.3.1.1 General

On machines designed for cutting against the feed with at least one spindle, anti-kickback fingers and anti-splinter fingers shall be fitted before the saw blades in the feed direction.

The anti-kickback and anti-splinter system shall at least include the following components:

- a) one row of anti-kickback fingers according to [6.9.3.1.2](#);
- b) one of the following combinations above the table:
 - 1) one type 1 row of anti-splinter fingers according to [6.9.3.1.3](#) and one type 2 row of anti-splinter fingers according to [6.9.3.1.4](#) or two type 1 rows, where all anti-splinter fingers extend below the support level of the work-piece conveyor more than 6 mm and at least to the table surface level (e.g. see [Figure 7](#)); where two type 1 rows are provided, an offset according [Figure 12](#) shall be fulfilled, i.e. the fingers shall not coincide; or
 - 2) one type 1 row of anti-splinter fingers according to [6.9.3.1.3](#) and one type 3 anti-splinter curtain according to [6.9.3.1.5](#), where the anti-splinter fingers of type 1 extend down to 1 mm or less above the support level of the work-piece conveyor and down to the table surface level on the left and on the right side of the conveyor (e.g. see [Figure 8](#)); where the conveyor chain is fitted with spikes, the distance is measured between the lower face of the anti-splinter finger and the top of the spikes.
- c) one row of anti-splinter fingers below the table according to [6.9.3.1.6](#).

Machines with one chain conveyor as work-piece support [see [Figure 1](#) b)] shall pass the test for the anti-splinter system in [Annex F](#).

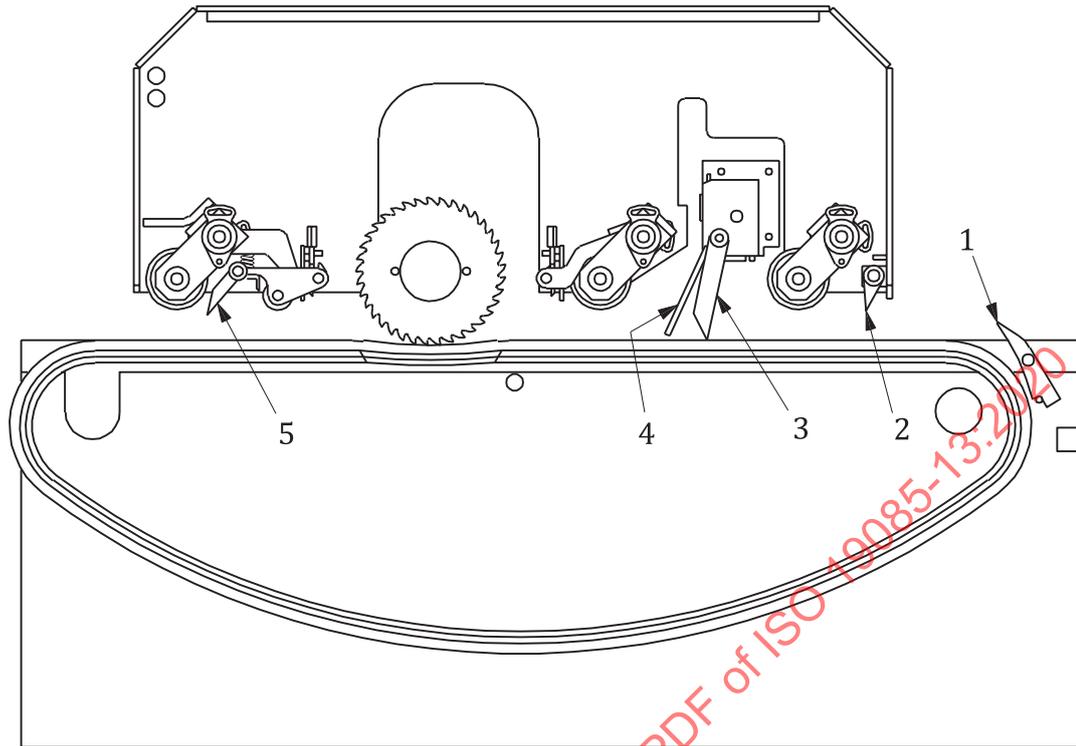


Key

- 1 row of anti-splinter fingers below the table
- 2 row of anti- kickback fingers
- 3 type 1 row of anti-splinter fingers
- 4 type 2 row of anti-splinter fingers

Figure 7 — Example 1 of an anti-kickback and anti-splinter system

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Key

- 1 row of anti-splinter fingers below the table
- 2 row of anti-kickback fingers
- 3 type 1 row of anti-splinter fingers
- 4 type 3 anti-splinter curtain
- 5 additional row of anti-kickback fingers at the out-feed side

Figure 8 — Example 2 of an anti-kickback and anti-splinter system

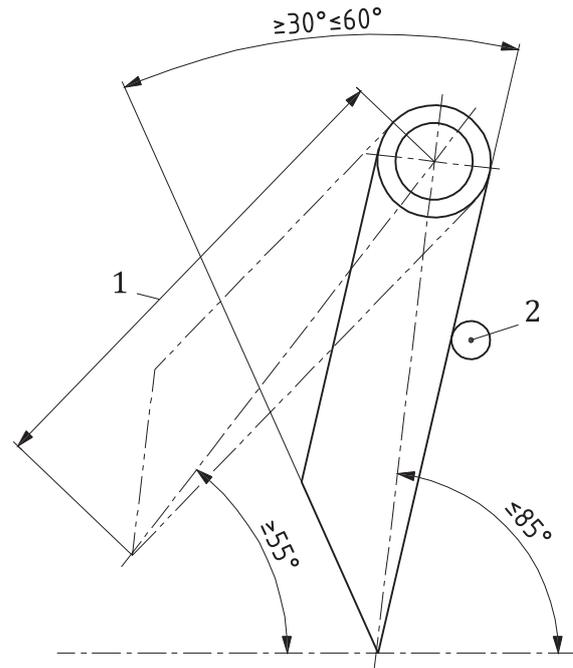
Verification: By checking the relevant drawings, inspection of the machine, measurement and, for machines with one chain conveyor as work-piece support, performing test in [Annex E](#).

6.9.3.1.2 Row of anti-kickback fingers

Row of anti-kickback fingers shall be fitted and shall extend across the full cutting width capacity of the machine (see [3.3](#)). At least one anti-kickback finger shall be added to each end of this row.

The anti-kickback fingers and their mounting shall be in accordance with the following requirements:

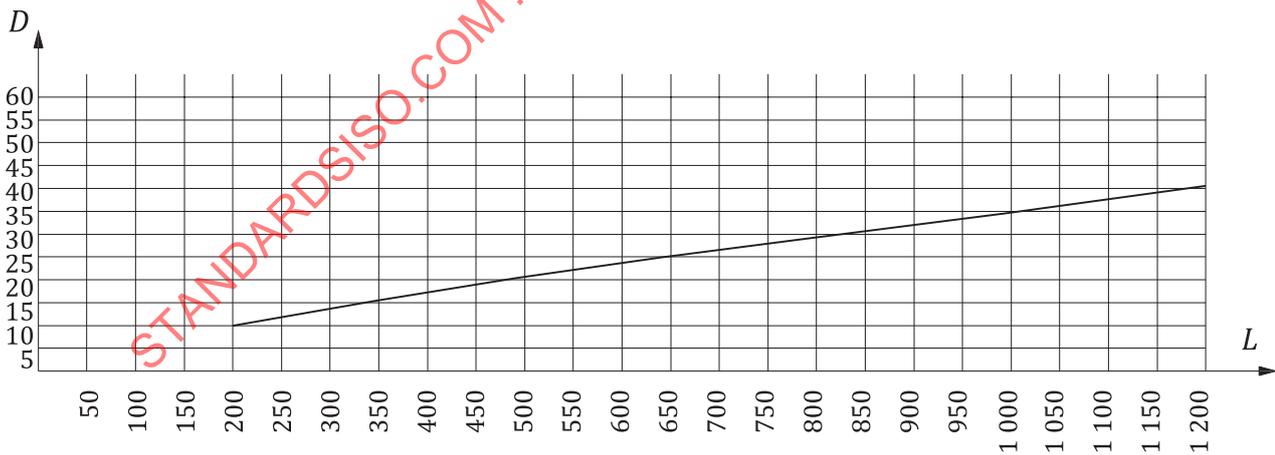
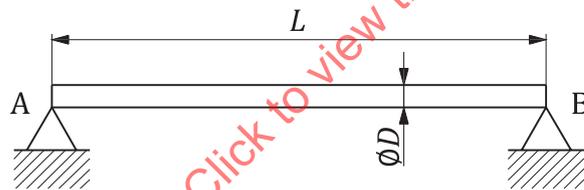
- a) they shall be effective over the full cutting height capacity of the machine. Effective operation is given between 85° and 55° , whereby this angle is measured between a line from the tip to the axis of pivot of the fingers and the horizontal (see [Figure 9](#)). To achieve this, it can be necessary to have more than one row or a particular profile or both;
- b) a mechanical stop shall be provided to prevent the anti-kickback fingers moving beyond the 85° position (see [Figure 9](#));
- c) the mounting shafts for the anti-kickback fingers shall be in accordance with [Figure 10](#), and the shaft shall be manufactured from solid steel having an ultimate tensile strength of at least 570 N mm^{-2} . The clearance between the mounting shaft and the bore diameter of the fingers shall not exceed 0,5 mm;



Key
 1 length of the finger

2 mechanical stop

Figure 9 — Example of anti-kickback finger



Key
 L length of the shaft

D diameter of the shaft

Figure 10 — Dimensions of the shaft of the anti-kickback system

- d) the fingers shall have lower tips with a maximum radius of 0,5 mm and a hardness of (45 ± 5) HRC;
- e) where the fingers are mounted on a fixed shaft or shafts, one row shall extend down to 1 mm or less above the table or the support level of the work-piece feeding system;

- f) where the fingers are mounted on a shaft which rises and falls with the support for the upper feed rollers and vertical adjustment, either powered or manually operated, is provided, when moving in the direction of increasing the work-piece thickness, this movement shall only be possible when the saw blades have stopped rotating and the feed has been stopped, or a device for detecting that the work-piece that has entered the infeed of the machine has passed the saw blades shall be provided, e.g. monitoring of powered roller position. The SRP/CS for the interlocking of vertical adjustment in the direction of increasing the work-piece thickness with sawblade standstill, feed stop and work-piece detection shall achieve $PL_r = c$;
- g) the lower tips shall, in the rest position (i.e. at 85° from the horizontal), be at least 5 mm below the lowest point of the upper feed roller (see [Figure 11](#)).

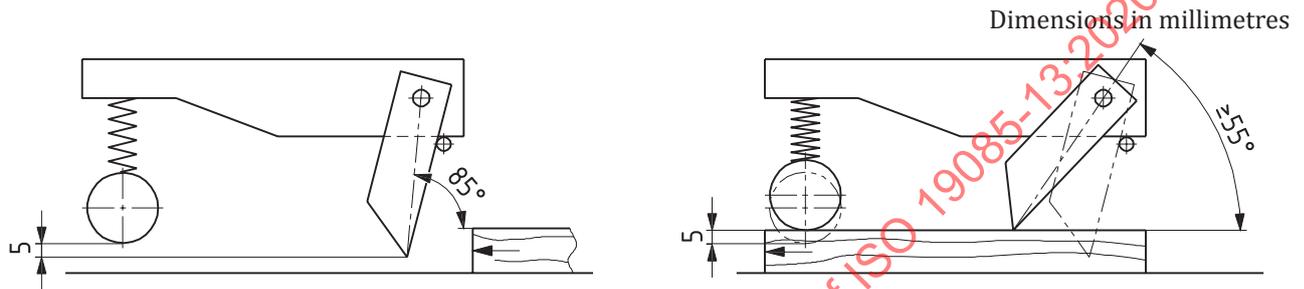


Figure 11 — Distance between roller and anti-kickback fingers

- h) the thickness of each spacer between the anti-kickback fingers shall be at least 0,5 mm and not more than 1 mm;
- i) where the length (see [Figure 9](#), key 1) of the anti-kickback fingers is less than or equal to 200 mm the minimum thickness of each finger shall be 6 mm and the maximum thickness 10 mm. Where the length of the anti-kickback fingers is more than 200 mm, the minimum thickness of each finger shall be 8 mm and the maximum thickness 15 mm. The thickness of the fingers may be reduced in the areas of the shaft support or lifting element;
- j) the fingers shall return automatically to their rest position when they are not in contact with the work-piece;
- k) the lateral surfaces of each finger shall be flat and parallel to each other within $\pm 0,5$ mm;
- l) the angle of the tips shall be between 30° and 60° (see [Figure 9](#));
- m) the anti-kickback fingers shall be manufactured from steel with an ultimate tensile strength of at least 570 N mm^{-2} .
- n) where the fingers are mounted on a fixed shaft or shafts, one of the following requirements apply:
 - 1) a device for lifting the anti-kickback fingers shall be provided, which shall not be capable of being operated until the saw blades spindles have stopped rotating and it shall not be possible to start the saw blades spindles as long as the fingers are in the raised position. The SRP/CS for interlocking of lifting the anti-kickback fingers with sawblades standstill and interlocking saw blades rotation with anti-kickback fingers raised position shall achieve $PL_r = c$; or
 - 2) the saw unit equipped with the largest saw-blades for which the machine is designed shall be capable of being lifted upwards so as to retract the unit entirely from the cutting area;
- o) there shall be a work-piece support at the place where anti-kickback fingers operate.

The SRP/CS for saw blades standstill detection shall achieve $PL_r = c$.

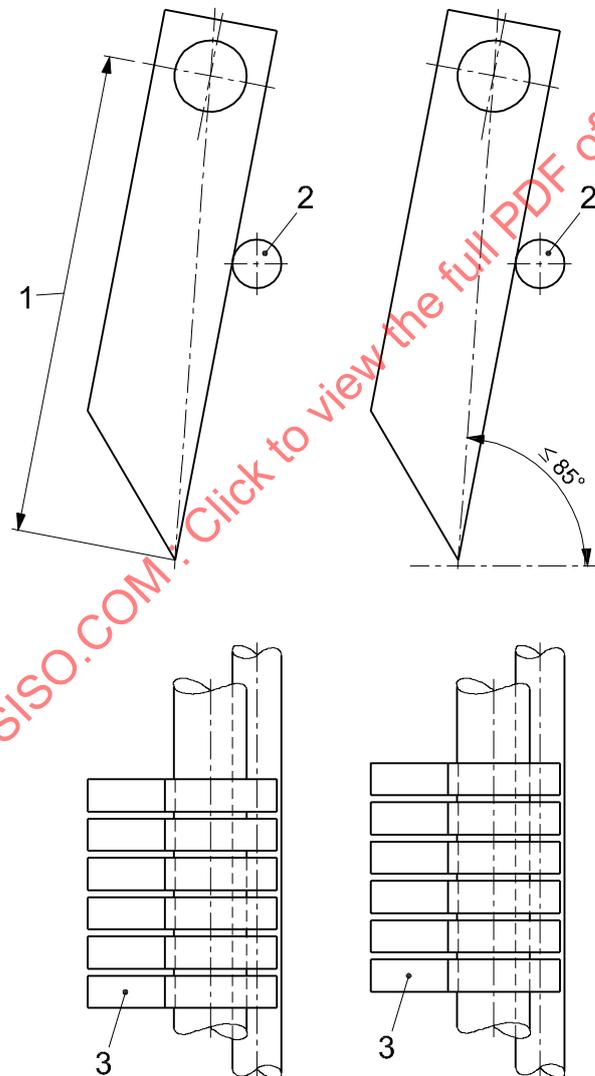
Verification: By checking the relevant drawings and/or circuit diagrams, inspection of the machine, measurement and relevant functional testing on the machine.

NOTE For the ultimate tensile strength a confirmation from the manufacturer of the material can be useful.

6.9.3.1.3 Type 1 row of anti-splinter fingers

Row of anti-splinter fingers type 1 shall fulfil the following requirements in addition to general requirements in 6.9.3.1.1:

- a) it shall extend over the full infeed opening width of the machine;
- b) the anti-splinter fingers shall be manufactured from steel having an ultimate tensile strength of at least 570 N mm⁻²;
- c) a mechanical stop shall be provided to prevent the anti-splinter fingers from moving beyond the 85° point (see Figure 12);



Key

- 1 length of the anti-splinter
- 2 mechanical stop
- 3 two off-set type 1 rows of anti-splinter fingers

Figure 12 — Type 1 row of anti-splinter fingers

- d) the mounting shaft for the anti-splinter fingers shall be in accordance with [Figure 10](#), and the shaft shall be manufactured from solid steel having an ultimate tensile strength of at least 570 N mm^{-2} ;
- e) the thickness of each spacer between the fingers shall be at least 0,5 mm and not more than 1 mm;
- f) the fingers shall return automatically to their rest position when they are not in contact with the work-piece;
- g) the lateral surfaces of each finger shall be flat and parallel to each other within $\pm 0,5 \text{ mm}$;
- h) where the length, l , of the anti-splinter fingers is less than or equal to 200 mm the minimum thickness of each finger shall be 6 mm and the maximum thickness shall be 15 mm. Where the length of the anti-splinter finger is more than 200 mm, the minimum thickness of each finger shall be 8 mm and the maximum thickness shall be 20 mm. The thickness of the fingers may be reduced in the direct vicinity of the shaft support or lifting element to 3 mm.

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

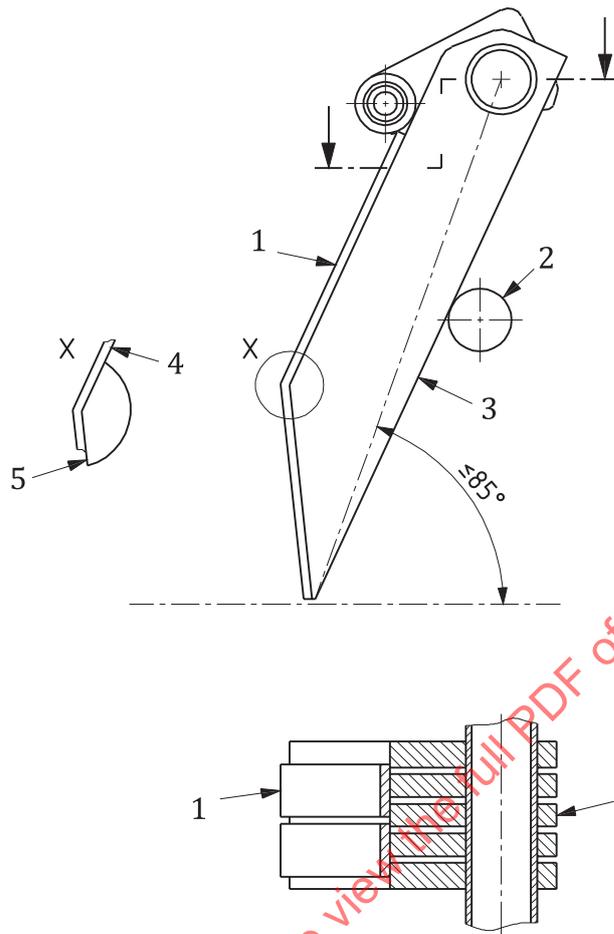
6.9.3.1.4 Type 2 row of anti-splinter fingers

Row of anti-splinter fingers type 2 shall fulfil the following requirements in addition to general requirements in [6.9.3.1.1](#):

- a) it shall extend over the full infeed opening width of the machine;
- b) the rear faces shall, during operation and in the rest position, remain in adherence with the front edges of a type 1 row of anti-splinter fingers (see [Figure 13](#));
- c) the width of each finger type 2 shall be from one to three times the width of the type 1 fingers on which it is resting (see [Figure 13](#));
- d) the thickness of each spacer between the fingers shall be at least 0,5 mm and not more than 1 mm;
- e) the fingers shall return automatically to their rest position when not in contact with the work-piece;
- f) the anti-splinter fingers shall be manufactured from steel having an ultimate tensile strength of at least 570 N mm^{-2} .

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

Dimensions in millimetres



Key

- | | | | |
|---|-----------------------------|---|----------------------|
| 1 | anti-splinter finger type 2 | 4 | back face of part 1 |
| 2 | mechanical stop | 5 | front face of part 3 |
| 3 | anti-splinter finger type 1 | | |

Figure 13 — Combination of type 1 and type 2 rows of anti-splinter fingers

6.9.3.1.5 Type 3 anti-splinter curtain

Anti-splinter curtain type 3 shall be in accordance with the following requirements:

- a) it shall extend over the full infeed opening width of the machine;
- b) it shall be located behind (in the direction of the feed) a row of an anti-kickback/anti-splinter fingers type 1 and shall extend at least down to the table and to the work-piece feeding system (see [Figure 14](#));

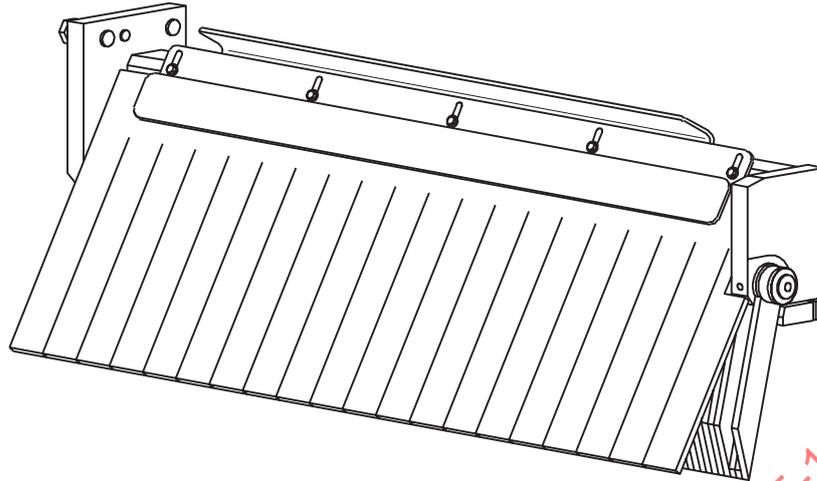


Figure 14 — Anti-splinter curtain (type 3)

- c) the curtain shall have 3 layers overlapping for one third of their width, or more layers overlapping for a half of their width;
- d) the width of each stripe shall be two to four times the width of the type 1 fingers on which it is resting;
- e) the material from which it is made shall be synthetic polyaramid/polyamide fabric coated both sides with polyurethane and shall pass the test in STANAG 2920 with a value $V_{50} > 350$ m/s;
- f) the stripes shall return automatically to lay on the type 1 row when they are not in contact with the work-piece.

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

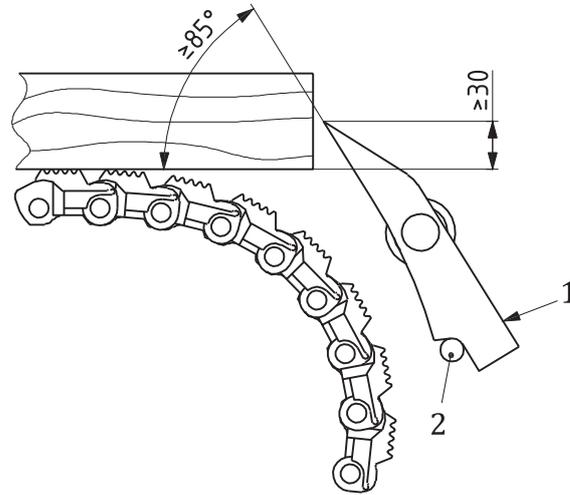
6.9.3.1.6 Row of anti-splinter fingers below the table

The row of anti-splinter fingers below the table shall be in accordance with the following requirements:

- a) it shall extend over the full infeed opening width of the machine. As an exception for the machines where the anti-splinter rows above the table extend below the work piece conveyor, i.e. combination of type 1 and type 2 or two times type 1, the anti-splinter row below the table may extend only over the full cutting width capacity of the machine.
- b) a mechanical stop shall be provided so that the angle between the lower exposed surface of each finger and the horizontal does not exceed 85° (see [Figure 15](#));
- c) the thickness of each spacer between the fingers shall be at least 0,5 mm and not more than 1 mm;
- d) the lateral surfaces of each finger shall be flat and parallel to each other within $\pm 0,5$ mm;
- e) the mounting shaft for the anti-splinter fingers shall be in accordance with [Figure 10](#), and the shaft shall be manufactured from steel having an ultimate tensile strength of at least 570 N mm^{-2} ;
- f) the anti-splinter fingers shall return automatically to their rest position when they are not in contact with the work-piece;
- g) the highest point of each finger in the rest position shall be at least 30 mm above the support level of the work-piece feeding system;
- h) the thickness of each finger shall be at least 6 mm and not more than 15 mm;

- i) the anti-splinter fingers should be designed so that the anti-splinter system cannot be made ineffective by parts of the work-piece/splinters, e.g. by diving splinters through a table opening before anti-splinter fingers.

Dimensions in millimetres



Key

- 1 anti-splinter fingers below the table
- 2 mechanical stop

Figure 15 — Anti-splinter finger below the table

Verification: By checking the relevant drawings, inspection of the machine, measurement and relevant functional testing on the machine. During the test in [Annex F](#), the anti-splinter row shall not be made ineffective e.g. by splinters stuck under fingers.

NOTE For the ultimate tensile strength, a confirmation from the manufacturer of the material can be useful.

6.9.3.2 Machines designed for climb cutting

Ejection of splinters through the infeed opening shall be minimised by one of the following measures:

- a) a safety curtain that fulfils the following requirements:
 - 1) it shall be manufactured from polyamide (PA), polypropylene (PP), polyurethane (PU), polyvinylchloride (PVC), or a material with similar strength characteristics;
 - 2) it shall be manufactured from stripes of material, in layers, with a total thickness of at least 10 mm and a width between 60 mm and 80 mm;
 - 3) it shall have at least two overlapping layers of the same thickness. The stripes of each layer shall be half-overlapping;
 - 4) it shall be fitted above the table across the full infeed opening of the machine and extend down to the table or to within 1 mm of the work-piece feeding system;
- b) at least one type 1 row of anti-splinter fingers mounted above the table as described in a) to g) of [6.9.3.1.3](#).

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

6.9.4 Measures against ejection through the outfeed opening

Subclause specific this document.

6.9.4.1 Machines designed for climb cutting

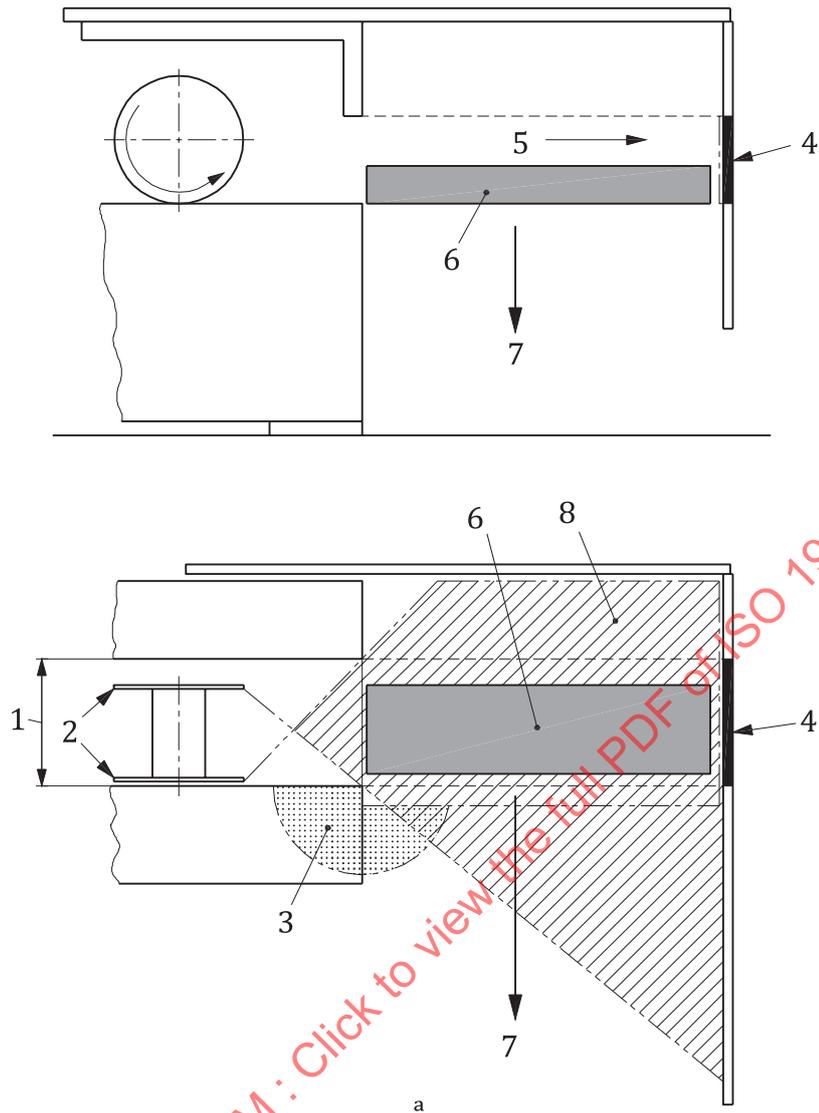
At the outfeed, where the saw blades or the most rearward saw blades are climb cutting, there shall be a tunnel guard having a totally enclosed end and allowing side or bottom off-loading. The end wall and the side walls of the tunnel guard shall be designed and constructed to retain any work-piece ejected in the area defined by the vertical planes of the two outermost saw blades (see [Figure 16](#), area Y). The end wall in area Z (see [Figure 16](#)) shall be at least 20 mm thick and made of steel, with ultimate tensile strength of at least 350 N mm⁻².

Other parts of the outfeed tunnel guard shall be manufactured from materials which are in accordance with the requirements of [6.9.2](#).

Access to the outfeed opening, defined by the width of the outfeed opening in [Figure 16](#), shall be prevented in accordance with reach distances set out in ISO 13857:2008, Tables 2 and 4.

In addition, it shall not be possible for splinters ejected in a straight line at any angle (i.e. any direction) from any point of the outfeed opening to escape from the tunnel before deflection. Mesh shall not be used to fulfil this requirement.

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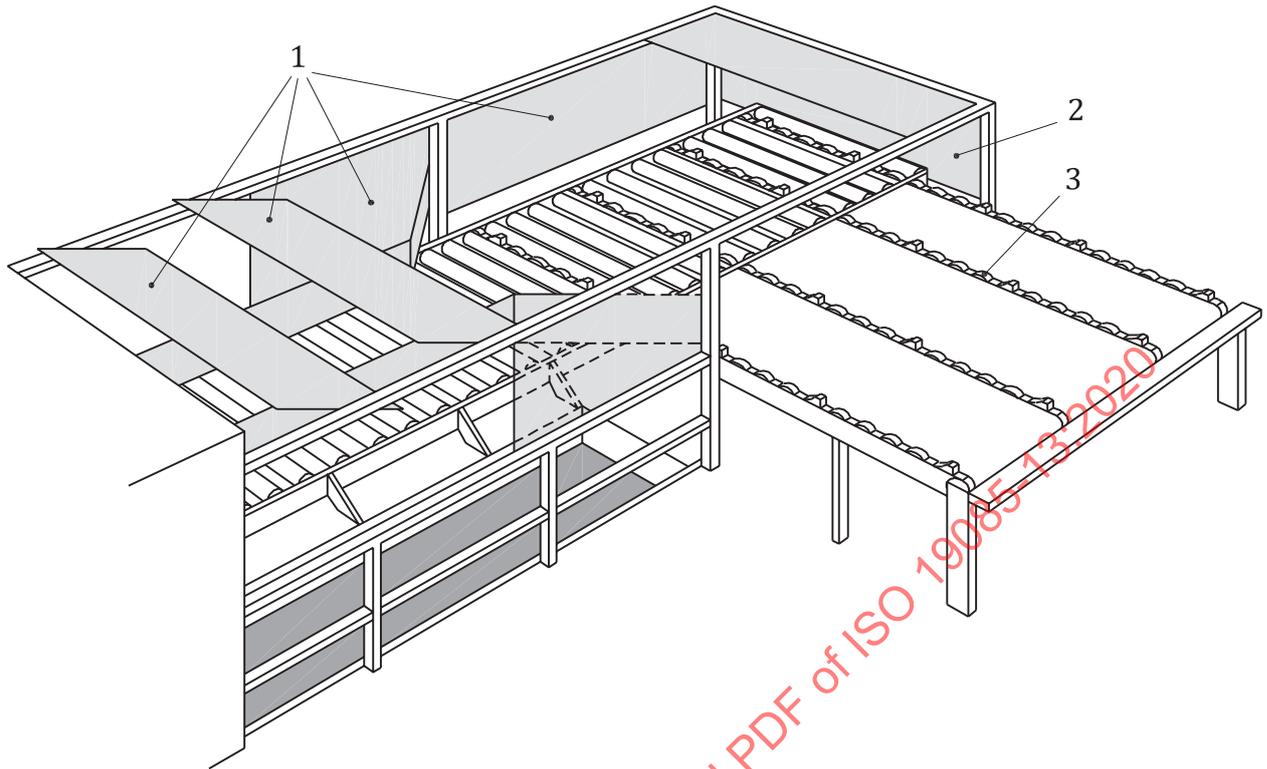


Key

- | | | | |
|---|-----------------------------------|---|----------------------|
| 1 | width of the outfeed opening | 6 | work-piece |
| 2 | the two outermost saw blades | 7 | work-piece unloading |
| 3 | area conforming to ISO 13857:2008 | 8 | area Y |
| 4 | area Z | a | View from above. |
| 5 | feed | | |

Figure 16 — Out feed tunnel guard with unloading of work-piece

Access to the inside of the tunnel shall be provided and shall be via a moveable interlocked guard with guard locking taking account of ergonomics principles in EN 614-1:2006+A1:2009. Access to the inside of the tunnel shall be prevented according to safety distances in accordance with ISO 13857:2008. Where there is need to see into the tunnel, polycarbonate or equivalent plastic shall be used or a louvers type tunnel. See for example [Figure 17](#).

**Key**

- 1 guiding sheet
- 2 end wall
- 3 work-piece unloading

Figure 17 — Outfeed louvers type tunnel guard

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

6.9.4.2 Machines with manual unloading designed for cutting against the feed

Ejection of splinters through the outfeed opening shall be minimised by one of the following measures:

- a) a safety curtain that fulfils the following requirements:
 - 1) it shall be manufactured from polyamide (PA), polypropylene (PP), polyurethane (PU), polyvinylchloride (PVC), or a material with similar strength characteristics;
 - 2) it shall be manufactured from stripes of material, in layers, with a total thickness of 10 mm and width between 60 mm and 80 mm;
 - 3) there shall be at least two overlapping layers of the same thickness; the stripes of each layer shall be half-overlapping;
 - 4) the curtain shall be fitted above the table across the full outfeed opening of the machine and extend down to the table or to within 1 mm of the work-piece feeding system;
- b) at least one row of anti-splinter fingers mounted above the table fulfilling the requirements given in 6.9.3.1.3, a) to g) with the minimum thickness of each finger of 6 mm and the maximum thickness of 15 mm.

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

6.10 Work-piece support and guide

ISO 19085-1:2017, 6.10, applies with the following additions.

Where machines are supplied with a pressure board or pressure shoe for holding down the work-piece between the saw blades, the pressure board or pressure shoe shall be replaceable.

7 Safety requirements and measures for protection against other hazards

7.1 Fire

ISO 19085-1:2017, 7.1, applies.

7.2 Noise

7.2.1 Noise reduction at the design stage

ISO 19085-1:2017, 7.2.1, applies.

7.2.2 Noise emission measurement

ISO 19085-1:2017, 7.2.2, applies with the following additions.

The operating conditions for noise measurement shall comply with ISO 7960:1995, Annexes Q or S.

7.3 Emission of chips and dust

ISO 19085-1:2017, 7.3, applies with the following additions.

An additional mechanical system for removal of chips, splinters, wooden parts and dust may be provided.

NOTE A proper chips and dust extraction can be obtained with the recommended air flow rate $q \geq 2\,500\text{ m}^3\text{h}^{-1}$.

7.4 Electricity

7.4.1 General

ISO 19085-1:2017, 7.4.1, applies.

7.4.2 Displaceable machines

ISO 19085-1:2017, 7.4.2, does not apply.

7.5 Ergonomics and handling

ISO 19085-1:2017, 7.5, applies with the following additions.

The height of the work-piece support level shall be between 750 mm and 1 100 mm above the floor.

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

7.6 Lighting

ISO 19085-1:2017, 7.6, does not apply.

7.7 Pneumatics

ISO 19085-1:2017, 7.7, applies.

7.8 Hydraulics

ISO 19085-1:2017, 7.8, applies.

7.9 Electromagnetic compatibility

ISO 19085-1:2017, 7.9, applies.

7.10 Laser

ISO 19085-1:2017, 7.10, applies.

7.11 Static electricity

ISO 19085-1:2017, 7.11, applies.

7.12 Errors of fitting

ISO 19085-1:2017, 7.12, applies.

7.13 Isolation

ISO 19085-1:2017, 7.13, applies.

7.14 Maintenance

ISO 19085-1:2017, 7.14, applies with the following additions.

Where lubrication points are provided, they shall be located as far as possible outside the saw blades guarding and easily accessible by the operator when standing on the floor.

8 Information for use

8.1 Warning devices

ISO 19085-1:2017, 8.1, applies.

8.2 Marking

8.2.1 General

ISO 19085-1:2017, 8.2.1, applies.

8.2.2 Additional marking

ISO 19085-1:2017, 8.2.2, is replaced by the following text.

The following additional information shall be marked in the same ways as in [8.2.1](#):

- a) maximum and minimum diameters of the saw blades for which the machine is designed;
- b) direction of rotation of the saw blades spindles;

- c) bore diameter of the saw blades;
- d) the following information, preferably by a pictogram: “feeding stacked work-pieces is very dangerous practice and is not allowed”.

If graphical symbols related to the operation of actuators are used, they shall be in accordance with IEC 61310-1:2007, Table A.1.

If the machine is equipped with scales, the requirements of EN 894-2:1997 shall apply.

The scale for indicating the cutting width shall be so designed and positioned that the adjusted cutting width is indicated and easily legible.

Verification: By inspection of the machine.

8.3 Instruction handbook

8.3.1 General

ISO 19085-1:2017, 8.3.1, applies.

8.3.2 Additional information

ISO 19085-1:2017, 8.3.2, is replaced by the following text.

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

- a) reasonably foreseeable misuse, which includes:
 - 1) simultaneous machining of multiple work-pieces, e.g. stacked or side by side,
 - 2) machining of tapered work-pieces with decreasing thickness from the front to the rear in the direction of feed;
- b) the wear of suitable personal protective equipment when necessary; this may also include a protective apron, e.g. of chain mail or leather;
- c) to stop the machine whilst unattended;
- d) to ensure that any spacer and spindle ring used is suitable for the purpose stated by the manufacturer;
- e) information that the maximum length of the work-pieces to be processed shall not exceed the space at the outfeed end of the machine minus 500 mm;
- f) maintenance requirements on the safety devices that shall be tested, how frequently the maintenance shall be carried out and by what method; this shall also include:
 - 1) anti-kickback fingers, status and distances to be respected – by inspection (see [6.9.3.1.2](#));
 - 2) anti-splinter fingers/curtains, status and distances to be respected – by inspection (see [6.9.3.1.3](#));
 - 3) curtains maintenance – by check of absence of damage (at least each month);
- g) that at the outfeed the operator who unloads the machine shall not stand within the cutting width capacity;
- h) instruction for safe use that circular saw-blades shall conform to EN 847-1:2017.

Verification: By checking the instruction handbook and relevant drawings.

Annex A (informative)

Performance level required

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

Table A.1 — Safety functions and PL_r

Area	Safety function/devices		PL _r	Subclause of ISO 19085-1:2017	Subclause of this document
Start	1	Interlocking of start with all safeguards	c	5.3	
	2	Interlocking of integrated feed with tool drive	c	5.3	
	3	Prevention of unexpected start/restart	c	5.3	
	4	Interlocking of reverse feed with anti-kickback device retraction	c		5.3
Stop	5	Normal stop (breaking function excluded)	c	5.4.2	
	6	Emergency stop (breaking function excluded)	c	5.4.4	
Braking	7	Braking function	b/c	5.5	
	8	Interlocking of brake release	c	6.4.3	
Mode selection	9	Mode selection	c	5.6	
	10	Override with standstill	c		5.6.2
	11	Interlocking of drives restart with standstill	c		5.6.2
	12	Feed speed indication	b		5.6.3
Controls	13	Time delay	c	5.12	
	14	Saw blade standstill monitoring	c		6.6.2
	15	Work-piece detection	c		5.13
	16	Interlocking of vertical adjustment in the direction of increasing the work-piece thickness with saw blade standstill, feed stop and work-piece detection	c		6.9.3.1.2
	17	Interlocking of lifting the anti-kickback fingers with saw blade standstill	c		6.9.3.1.2
	18	Interlocking saw blades rotation with the anti-kickback fingers raised position	c		6.9.3.1.2
	19	Machine moving parts speed monitoring	b		5.11
Safe-guards	20	Interlocking of movable guards	c	6.5.2.2	
	21	Interlocking of movable guards with guard locking	c	6.5.2.3	
	22	Hold-to-run	c	6.5.3	
	23	Interlocking with PSPE	c	6.5.6	

Annex B (normative)

Test for braking function

B.1 Conditions for all tests

ISO 19085-1:2017, B.1, applies with the following additions.

The tests shall be carried out using the maximum number of saw blades for which the machine is designed, or 8 saw blades, whichever is the least. The saw blades used in the tests shall be of maximum diameter for which the machine is designed.

B.2 Tests

B.2.1 Un-braked run-down time

ISO 19085-1:2017, B.2.1, applies.

B.2.2 Braked run-down time

ISO 19085-1:2017, B.2.2, applies.

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