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Food processing machinery — Automatic industrial slicing machines — Safety and hygiene requirements

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National foreword

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The UK participation in its preparation was entrusted to Technical Committee MCE/3/5, Food industry machines.

A list of organizations represented on this committee can be obtained on request to its secretary.

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Nahrungsmittelmaschinen - Automatische Schneidemaschinen für den industriellen Einsatz - Sicherheits- und Hygieneanforderungen

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European foreword

This document (EN 16743:2016) has been prepared by Technical Committee CEN/TC 153 “Machinery intended for use with foodstuffs and feed”, the secretariat of which is held by DIN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by July 2016, and conflicting national standards shall be withdrawn at the latest by July 2016.

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This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive 2006/42/EC.

For relationship with EU Directive 2006/42/EC, see informative Annex ZA, which is an integral part of this document.

According to the CEN-CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

Introduction

This European Standard is a type-C-standard as stated in EN ISO 12100.

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

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

1 Scope

1.1 General

This European Standard specifies requirements relating to the design and construction of automatic industrial slicing machines and auxiliary components.

The automatic industrial slicing machines covered by this standard are used for the cutting of meat and sausage products, cheese or other sliceable food products that can be cut using one or more blades. Automatic industrial slicing machines are designed to cut slices.

A sickle blade or an eccentrically moving blade is used for cutting. As a rule, the product only moves along one axis during the cutting process.

The auxiliary components covered by this standard are used for conveying slices from the cutting zone, for weighing or for sorting.

This European Standard covers all the significant hazards, hazardous situations and hazardous events identified by means of risk assessment associated with automatic industrial slicing machines and auxiliary components if they are used in accordance with regulations and under the conditions of reasonably foreseeable misuse defined by the manufacturer (see Clause 4).

This standard covers hazards which can arise during the commissioning, operation, cleaning, servicing and decommissioning of the machine.

This standard only applies to automatic industrial slicing machines and auxiliary components that were manufactured after the date of publication of this standard.

This standard applies to automatic industrial slicing machines and auxiliary components designed for industrial use. These are machines which are usually used in food processing facilities. The machines are normally permanently installed in one place.

This standard does not apply to cutting machines with moving infeed slides, slicing machines that are used in for example shops, restaurants, supermarkets, canteens etc. and are already covered in EN 1974.

This standard does not apply to portion cutting machines which are manufactured and put on the market in accordance with the requirements specified in EN 13870.

1.2 Machine description

This standard covers the following designs (see Figure 1 to Figure 7):

Design variations in the feed area:

— automatic industrial slicing machine with manual feed;

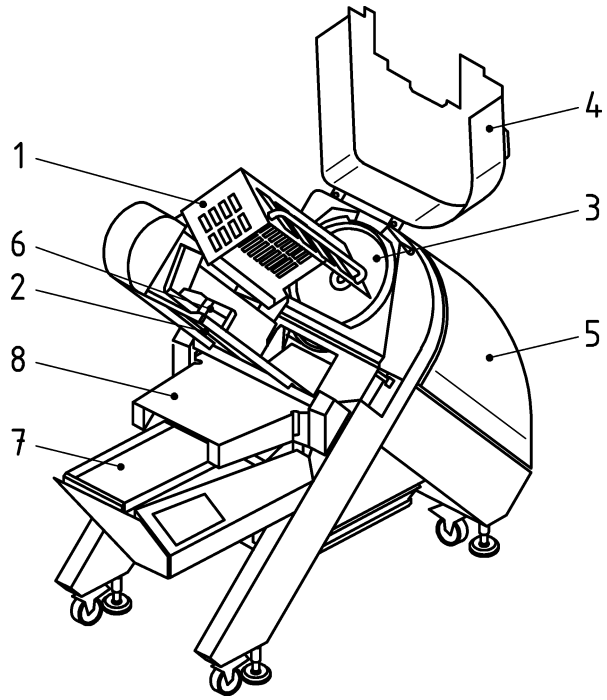
— automatic industrial slicing machine with automatic feed;

— automatic industrial slicing machine with continuous feed.

Design variations in the outfeed area:

— automatic industrial slicing machine with outfeed conveyor, without depositing unit and without subsequent auxiliary components;

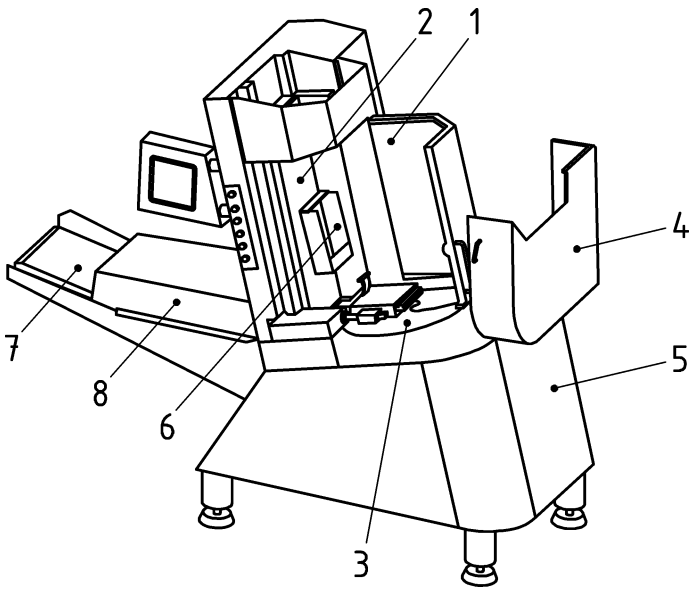
— automatic industrial slicing machine with depositing unit and if necessary with subsequent auxiliary components.



Key

1 feed guard
2 product support
3 blade
4 blade guard
5 machine housing
6 gripper
7 outfeed conveyor
8 protective outfeed guard

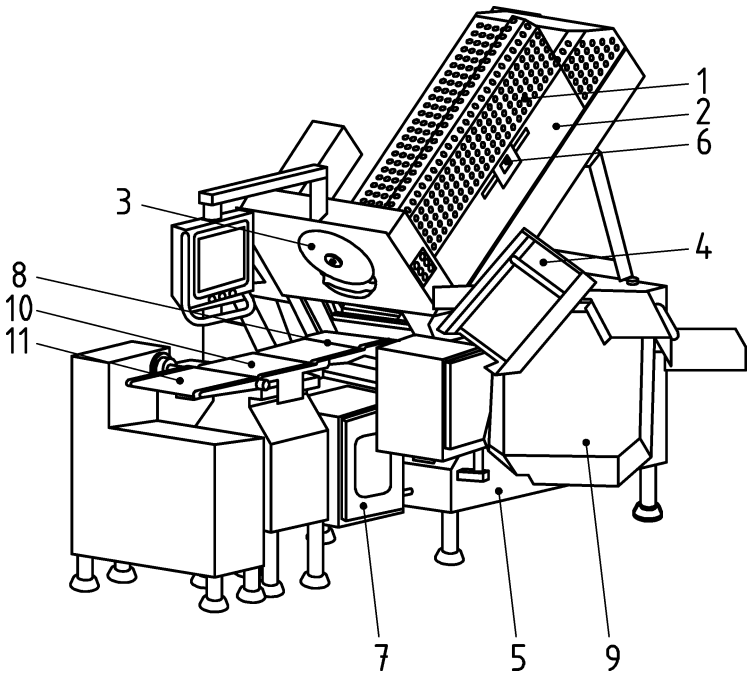
Figure 1 — Machine with manual feed and outfeed conveyor and without depositing unit



Key

1 feed guard
2 product support
3 blade
4 blade guard
5 machine housing
6 gripper
7 outfeed conveyor
8 protective outfeed guard

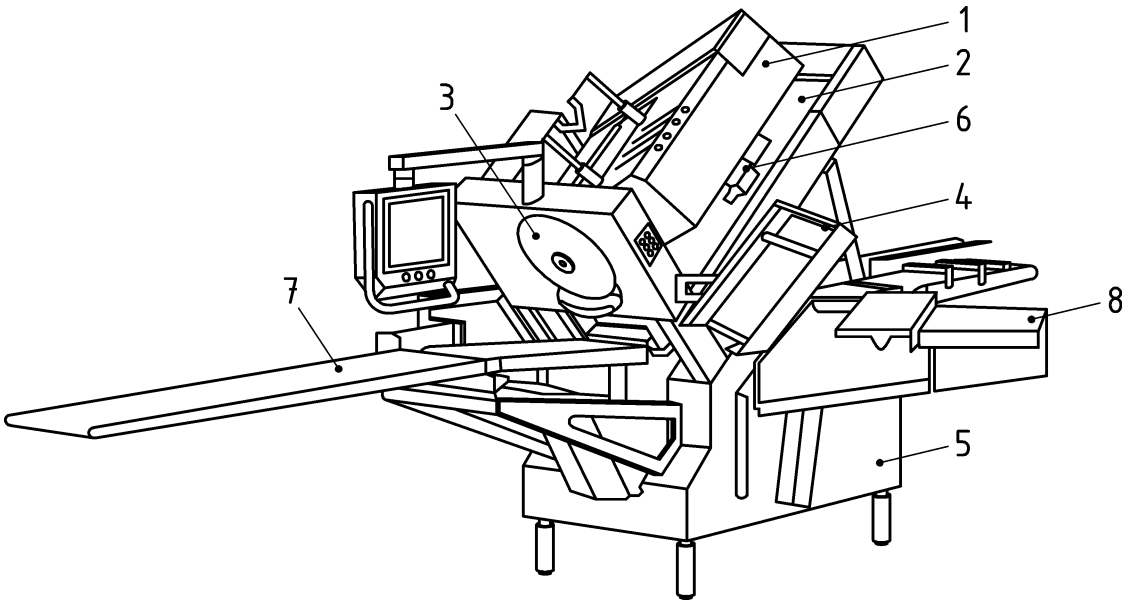
Figure 2 — Machine with manual feed and outfeed conveyor and without depositing unit



Key

1 feed guard
2 product support
3 blade
4 blade guard
5 machine housing
6 gripper
7 interleaver
8 depositing unit
9 outfeed guard
10 weigher
11 rocker

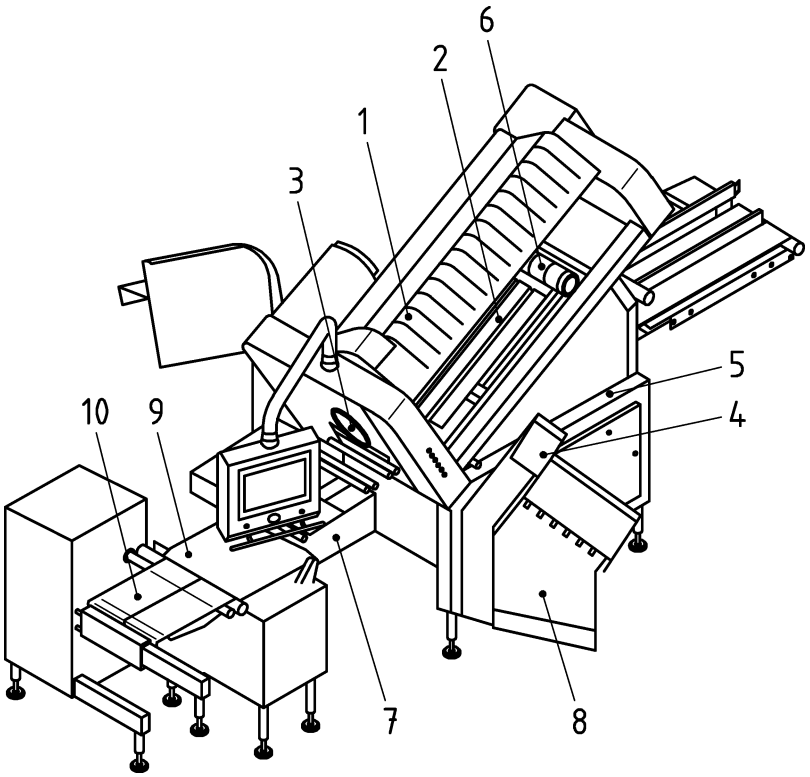
Figure 3 — Machine with manual feed, depositing unit and auxiliary components



Key

1 feed guard
2 product support
3 blade
4 blade guard
5 machine housing
6 gripper
7 outfeed conveyor
8 protective outfeed guard

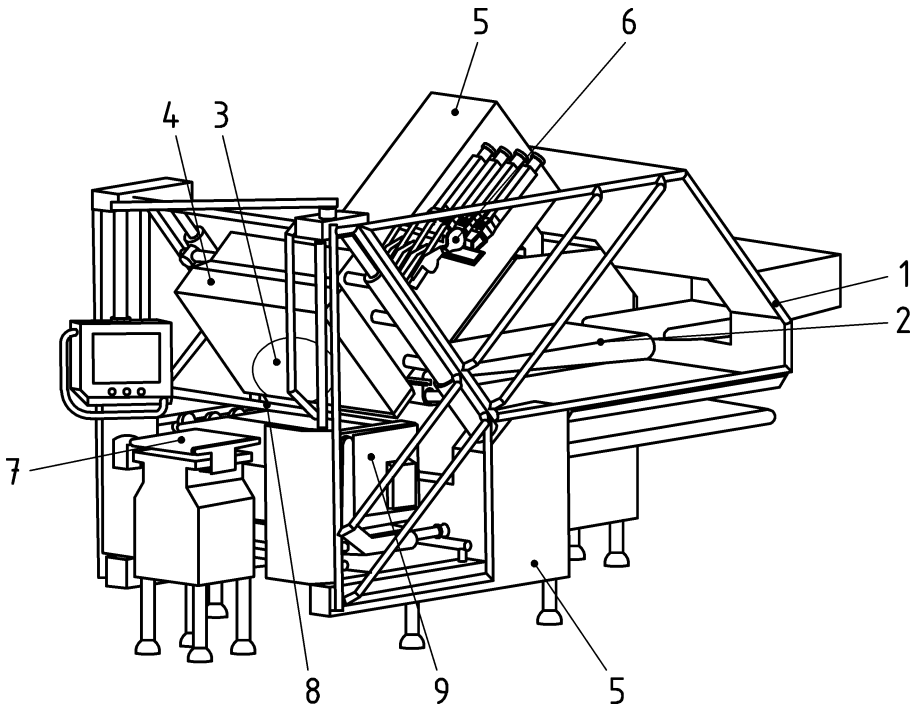
Figure 4 — Machine with automatic feed and outfeed conveyor and without depositing unit



Key

1 feed guard
2 product support
3 blade
4 blade guard
5 machine housing
6 gripper
7 depositing unit
8 protective outfeed guard
9 check weigher
10 rocker

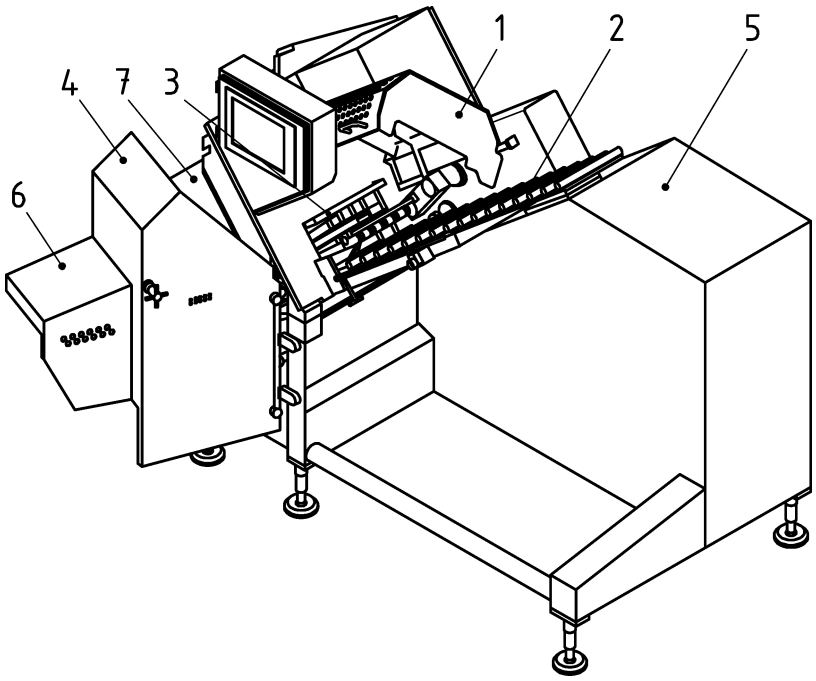
Figure 5 — Machine with automatic feed and depositing unit and auxiliary components



Key

1 feed guard
2 product support
3 blade
4 blade guard
5 machine housing
6 gripper
7 check weigher
8 protective outfeed guard
9 depositing unit

Figure 6 — Machine with automatic feed with depositing unit and auxiliary components



Key

1 feed guard
2 product support
3 blade (covered)
4 blade guard
5 machine housing
6 protective outfeed guard
7 depositing unit / outfeed conveyor

Figure 7 — Machine with continuous feed

1.3 Machine design

Automatic industrial slicing machines mainly consist of machine housing, product support with automatic or manually operated grippers, downholder, blade housing, blade, outfeed device, associated drives and electrical, hydraulic or pneumatic components. Furthermore optional features can be added.

Automatic industrial slicing machines in the scope of this standard may be equipped with the following auxiliary components:

— feeder;

— interleaver;

— outfeed conveyor;

— depositing unit;

— check weigher;

— sorting components (e.g. rocker);

— positioning devices (e.g. wheels).

1.4 Intended use

The intended use of automatic industrial slicing machines and auxiliary components, in accordance with this document, in accordance with regulations (as defined in EN ISO 12100:2010, 3.23) is described in 1.1.

The product is manually placed on the product base or automatically fed to the product base with a loading device. The product is supplied to the blade by automatic or manually operated grippers or conveyor slide or belt and the cutting process begins. The slices fall onto an outfeed conveyor or a depositing unit where they are arranged into formations, followed by the transport out of the cutting area.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

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

EN 953, *Safety of machinery — Guards — General requirements for the design and construction of fixed and movable guards*

EN 1005-1, *Safety of machinery — Human physical performance — Part 1: Terms and definitions*

EN 1005-2, *Safety of machinery — Human physical performance — Part 2: Manual handling of machinery and component parts of machinery*

EN 1005-3, *Safety of machinery — Human physical performance — Part 3: Recommended force limits for machinery operation*

EN 1672-2:2005+A1:2009, *Food processing machinery - Basic concepts - Part 2: Hygiene requirements*

EN 60204-1:2006, *Safety of machinery - Electrical equipment of machines - Part 1: General requirements (IEC 60204-1:2005, modified)*

EN 60529, *Degrees of protection provided by enclosures (IP Code) (IEC 60529)*

EN ISO 3744:2010, *Acoustics - Determination of sound power levels and sound energy levels of noise sources using sound pressure - Engineering methods for an essentially free field over a reflecting plane (ISO 3744:2010)*

EN ISO 4413, *Hydraulic fluid power - General rules and safety requirements for systems and their components (ISO 4413)*

EN ISO 4414, *Pneumatic fluid power - General rules and safety requirements for systems and their components (ISO 4414)*

EN ISO 4871, *Acoustics - Declaration and verification of noise emission values of machinery and equipment (ISO 4871)*

EN ISO 11201:2010, *Acoustics - Noise emitted by machinery and equipment - Determination of emission sound pressure levels at a work station and at other specified positions in an essentially free field over a reflecting plane with negligible environmental corrections (ISO 11201:2010)*

EN ISO 11688-1, *Acoustics - Recommended practice for the design of low-noise machinery and equipment - Part 1: Planning (ISO/TR 11688-1)*

EN ISO 12100:2010, *Safety of machinery - General principles for design - Risk assessment and risk reduction (ISO 12100:2010)*

EN ISO 13849-1:2008, *Safety of machinery - Safety-related parts of control systems - Part 1: General principles for design (ISO 13849-1:2006)*

EN ISO 13849-2, *Safety of machinery - Safety-related parts of control systems - Part 2: Validation (ISO 13849-2)*

EN ISO 13855:2010, *Safety of machinery - Positioning of safeguards with respect to the approach speeds of parts of the human body (ISO 13855:2010)*

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

EN ISO 14119:2013, *Safety of machinery - Interlocking devices associated with guards - Principles for design and selection (ISO 14119:2013)*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN ISO 12100:2010 and the following apply.

3.1
depositing unit
device which arranges the slices into formations

3.2
outfeed guard
fixed and/or moving guard at the outfeed opening

3.3
outfeed conveyor
device which transports the slices away from the cutting zone

3.4
outfeed area
area comprising the depositing unit or the outfeed conveyor depending on the machine design

3.5
automatic feed
device which feeds the product to the product support automatically

3.6
feeder
device which lifts the product up to the height of the product support

3.7
feed guard
interlocking guard around the feed area

3.8
inlet/outlet opening
opening through which the product enters or exits the machine

3.9
continuous feed
device which feeds the product to the product support continuously one after the other

3.10
gripper
device for holding and feeding the product to the cutting zone

3.11
interleaver
device for inserting separating sheets between slices formations

3.12
manual feed
device where the product is placed in position on the product support by hand

3.13
machine housing
base frame which supports all of the machine components

3.14
blade
component which cuts the product at the cutting frame

3.15
blade housing
housing in which the blade is operated by a drive

3.16
blade guard
interlocking guard at the blade housing

3.17
downholder
device which presses the product onto the product support in order to ensure safe transportation to the cutting zone and to hold the product securely in position during the cutting process

3.18
slices
cut product

3.19
product support
assembly which transports the product from the feed area to the cutting blade

Note 1 to entry: The product support can be fixed or moving, e.g. in the form of a feeding with conveyor belt.

3.20
cutting zone
area where the product is cut

3.21
product
food to be processed in the automatic industrial slicing machine

3.22
cutting frame
assembly which provides the opposite side to the blade for stabilising the product while it is being cut

3.23
cutting throat
part of the machine in which the product is fed to the cutting zone

3.24
cutting head housing
assembly which contains the cutting head and the blade drive

3.25
cut-resistant gloves
personal protective equipment made of cut-resistant material

Note 1 to entry: e.g. such as Kevlar®.

3.26
sorting component
equipment for sorting or sorting out the slices or formations in vertical or horizontal direction

Note 1 to entry: e.g. rocker.

3.27
safety shutter
assembly which closes off the cutting throat during the feed process and can serve as a guard and/or as a limit stop for the product

3.28
check weigher
device for weighing the slices or formations

3.29
feed area
area where product is fed into the automatic industrial slicing machine by hand or automatically before the cutting process

3.30
infeed conveyor
device for feeding product into the automatic industrial slicing machine

3.31
formation
arrangement of several slices in form and position

Note 1 to entry: e.g. staple, row, circle.

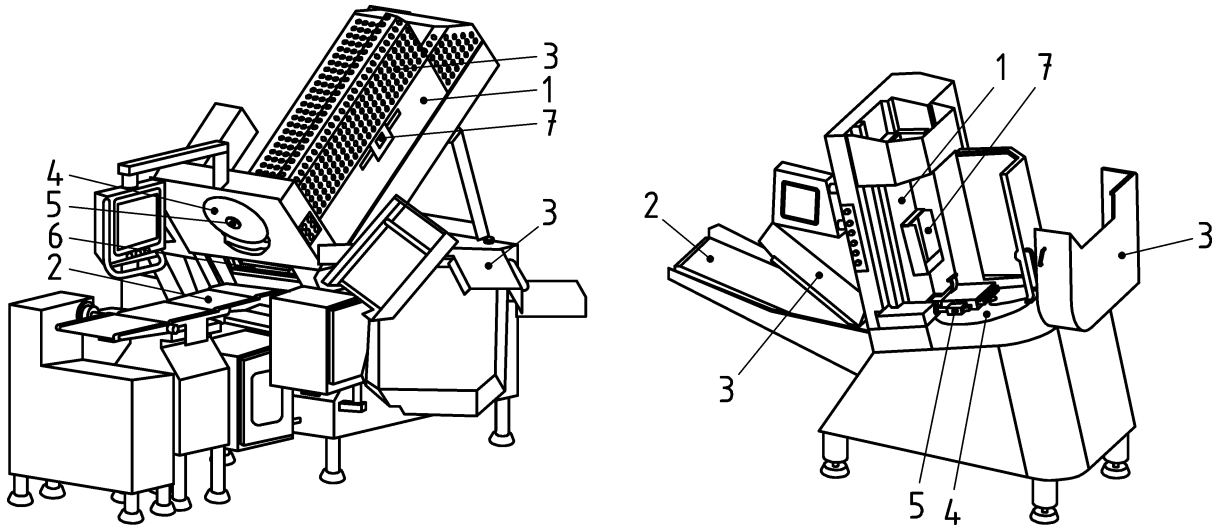
4 List of significant hazards

This clause contains all the significant hazards, hazardous situations and events identified by risk assessment as significant for this type of machine and which require measures to eliminate or reduce risk associated with the identified hazards (see Table 1).

Table 1 — List of significant hazards

Hazards, hazardous situations and hazardous events	Location or cause	Clause/sub-clause in this European Standard
Mechanical hazards	**General**	5.2.1
crushing; severing; shearing; trapping; cutting; drawing in	Zone 1: driven components in feed area	5.2.2
	Zone 2: driven components in outfeed area	5.2.3
	Zone 3: movable guards	5.2.4
	Zone 4: blade	5.2.5
	Zone 5: blade fixation	5.2.6
	Zone 6: safety shutter	5.2.7
	Zone 7: grippers	5.2.8
	Conveyor belts	5.2.9
	Oscillating conveyor belts (see Figure 10)	5.2.10
	Drive components in the machine housing	5.2.11
	Protective devices for moving blades	5.2.12
Electrical hazards	Electric shock from direct or indirect contact with live components external influences on electrical equipment (e.g. cleaning with water)	5.3
Hazards generated by hydraulic or pneumatic	Risk of: - the operator being sprayed with hydraulic fluid; - high pressure air of hydraulic fluid entering the skin; - the product being contaminated with hydraulic fluid; - mechanical damage and physical injury caused by malfunctions	5.4
Hazards generated by loss of stability	The complete machine and where used the loading device or auxiliary machine	5.5
Hazards generated by noise	Automatic industrial slicing machines and their auxiliary components generate noise	5.6
Hazard generated by neglecting ergonomic principles	Unhealthy body posture or excessive physical effort; inadequate consideration of human hand/arm or foot/leg anatomy by design of machines; no respect of the working area.	5.7
Hazard generated by neglecting hygienic design principles	e.g. contamination by microbial growth or foreign materials	5.8

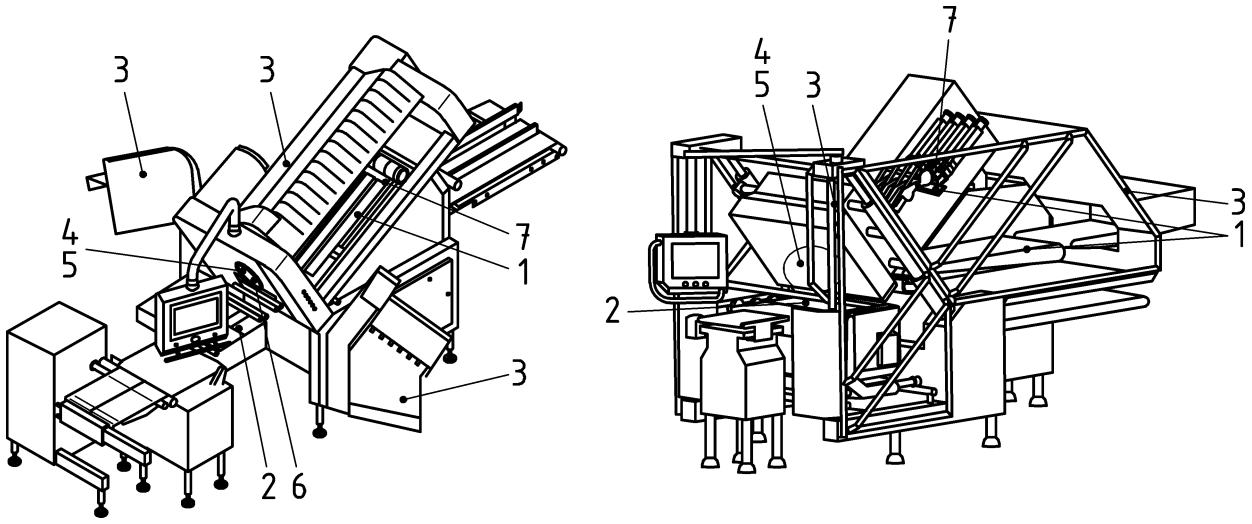
Figure 8 to Figure 10 show the danger zones of automatic industrial slicing machines.



Key

1 zone 1
2 zone 2
3 zone 3
4 zone 4
5 zone 5
6 zone 6
7 zone 7

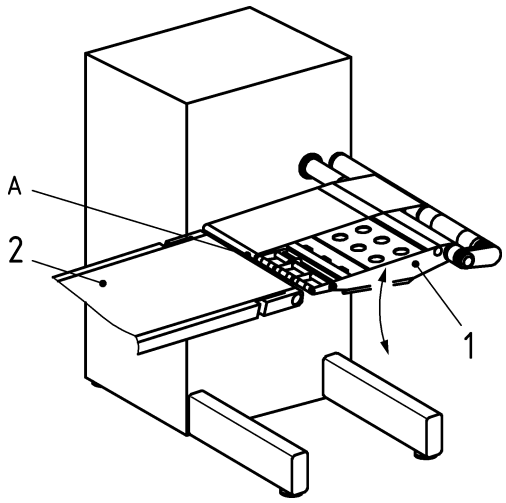
Figure 8 — Danger zones on an automatic industrial slicing machine with manual feed



Key

1 zone 1
2 zone 2
3 zone 3
4 zone 4
5 zone 5
6 zone 6
7 zone 7

Figure 9 — Danger zones on an automatic industrial slicing machine with automatic feed



Key

1 rocker

2 subsequent part of the machine, e.g. conveyor belt

A danger zone

Figure 10 — Danger zone generated by pivoting the rocker

5 Safety and hygiene requirements and/or protective measures

5.1 General

Automatic industrial slicing machines and their auxiliary components shall comply with the safety and hygiene requirements and/or the protective measures listed in this clause.

Additionally, for hazards which are relevant but not significant and so have not been addressed in this standard, the machine shall be designed according to the guidelines of EN ISO 12100:2010 (e.g. sharp edges).

Where the assembly or installation of the machine is the method of risk reduction, the manufacturer shall describe how this can be achieved in the instruction manual.

Where the type of risk reduction should be achieved through safe use, the manufacturer shall specify the exact details and the required training for the operations in the instruction manual.

5.2 Mechanical hazards

5.2.1 General

Automatic industrial slicing machines shall be designed and built in accordance with the requirements listed below.

The guards have to comply with EN 953.

Fasteners for fixed guards shall remain attached to the guard or on the machine, if the guard is removed.

Unless specified in other sub-paragraphs, the locking devices fitted to moveable guards shall meet the requirements of EN ISO 14119:2013, 4.2, and the safety related parts of the control shall meet at least performance level “c” of EN ISO 13849-1:2008.

In addition, locking devices shall be installed inside the machine housing and meet EN ISO 14119:2013, Clause 7.

This is necessary:

— to meet the hygiene requirements,

— for protection against mechanical damage,

— to protect against the influence of detergents and disinfectants,

— to protect against the influence of cleaning fluids (water),

— to prevent them from being easily bypassed.

5.2.2 Zone 1 – Driven components in the feed area

5.2.2.1 Automatic feeding

Access to driven components in the feed area (e.g. product support, gripper, and downholder) shall be prevented. This is achieved e.g. by one of the following measures:

— a guard closed on all sides with fixed and/or interlocking movable guard (e.g. feeding cover);

— upwards open guard consisting of a fixed guard (e.g. security fence) and/or an interlocking movable guard (e.g. protective feeding door).

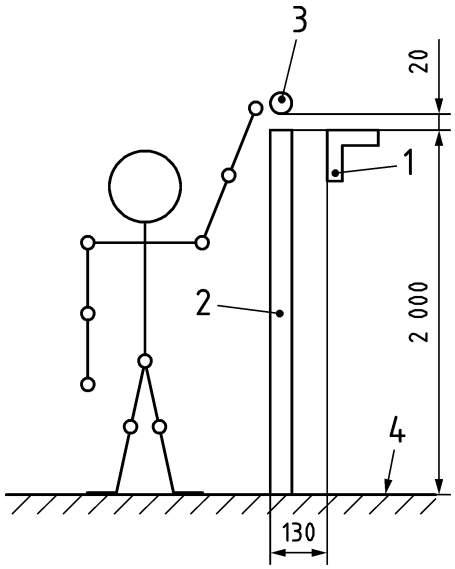
Moveable guards shall be interlocked. Guard locking shall meet EN ISO 14119:2013, 4.3.

Reaching over a distance guard shall be prevented. This is achieved by the following measures:

— as a deviation from EN ISO 13857:2008, when the height of the protective device ranges from ≥ 1600 mm to < 2000 mm, the safe distance to the first danger spot shall be ≥ 850 mm;

— if a sensitive protective equipment is mounted at a height of 2000 mm on the guard (e.g. light guard, pressure sensitive edge), the safety distance of the protection device (in actuated position) shall be 130 mm to the first danger zone (see Figure 11).

Dimensions in millimetres



Key

1 danger zone (shortest distance)

2 guard

3 sensitive protective equipment

4 reference plane

Figure 11 — Safety measures to prevent reaching danger zones over the guard

If active opto-electronic protective devices are used to prevent access to the danger zone, they shall comply with EN ISO 13855:2010.

Openings in the guards shall meet the requirements of EN ISO 13857:2008, Table 4. This does not apply to the infeed opening if it meets one of the following requirements:

— unclosed infeed opening shall be set up in such a way that the dimensions listed in Table 2 are adhered to (see Figure 12);

— sensitive protective equipment shall be set up in such a way that the dimensions listed in Table 2 are adhered to (see Figure 13);

— interlocking movable guard.

The requirements of 5.2.4 (Zone 3) shall be adhered to for the locked guard.

Table 2 — Dimensions of an infeed opening without a interlocking guard

Dimensions in millimetres

A	≥	1000	1000	1000	850	850	850	550	230
B	≤	280	250	230	200	180	150	120	30
C	≤	300	280	250	230	200	180	150	50
D	≤	330	300	280	250	230	200	180	50
E	≤	300	500	—	300	500	—	—	—

A = Safety distance to danger zone
B = Aperture height of infeed opening
C = Aperture height of infeed opening in combination with a switchgear assembly (e.g. safety strip)
D = Aperture height of infeed opening in combination with one or more light barriers
E = Aperture width of infeed opening

Dimensions in millimetres

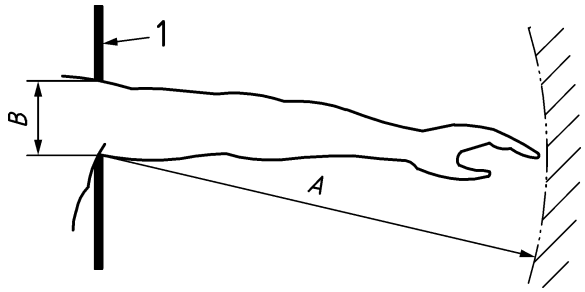


Figure 12 — Feed – Infeed opening safety distances

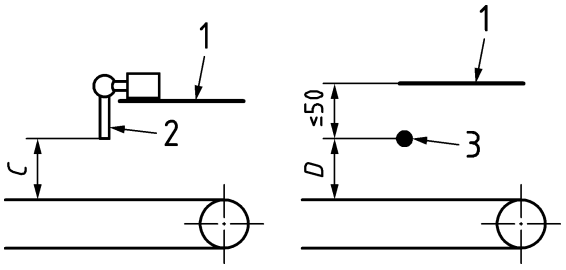


Figure 13 — Feed – Infeed opening safety distances

Key
1 = guard
2 = sensitive protective equipment
3 = active opto-electronic protective device

5.2.2.2 Manual loading

If the guard to protect the feed area is open during manual loading (incl. product search of the grippers), access to the moving components in the feed area (e.g. product support, grippers, downholders) shall be prevented. This is achieved e.g. by the following measures:

— the movement of the components shall take place only while the operator is pressing the hold-to-run control is actuated by the operator (jog mode);

or

— if the movement speed of the driven components is less than 0,5 m/s and no danger is caused due to insufficient space, the movement can be automated after the start by the operator. The feed area shall be designed so that a getting onto the product support is not readily available, e.g. by a height difference between the reference plane and product support of at least 700 mm.

— in the instruction manual, the manufacturer shall describe the procedure to manual loading, the residual risk and the training of the operator. The instruction manual shall state that during manual loading the operator when handling the product shall not reach with his hand within the effective range of the gripper. The effective range of the gripper shall be indicated in the manual.

5.2.3 Zone 2 – Driven components in the outfeed area

During operation, access to the danger zones in the outfeed area shall be prevented. This is achieved by one of the following measures:

— the guard shall be designed to meet the safety requirements as laid out in 5.2.2.1, Zone 1. This does not apply to the transfer points of conveyor if they comply with 5.2.9;

— the guard shall have no openings in the flying range of the blade or fragments of the blade. Openings in the guards, e.g. observation holes, shall be dimensioned and positioned according to EN ISO 13857:2008, Table 4;

— the discharge area guard shall be designed to meet the dimensions in Table 3 (see Figure 14).

Table 3 — Dependence of aperture height *B* on the distance to danger zone *A*

Dimensions in millimetres

A	≥	1000	850	550	230
B	≤	150	125	85	30
A = Safety distance to danger zone *B* = Aperture height at the front edge of the guard					

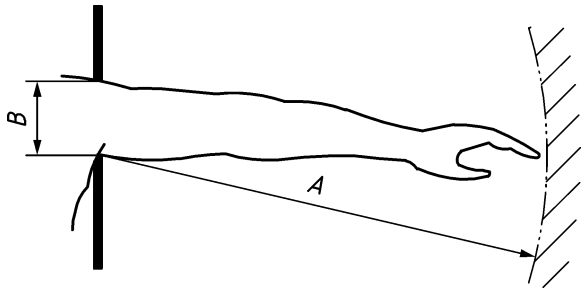


Figure 14 — Discharge area – safety measures

If the arm is supported by a restrictive obstacle of at least 300 mm when entering the protective hood laterally, the following safety distances are required (see Figure 15):

— Aperture width (*D*) at the front of the guard ≤ 150 mm and

— Safety distance (*A*) to the danger zone ≥ 550 mm

Dimensions in millimetres

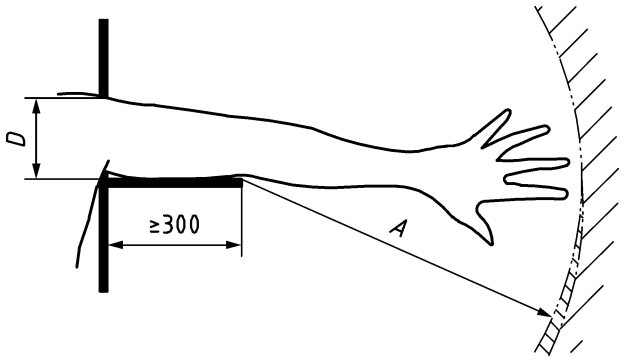


Figure 15 — Discharge section — safety measures with restricted movement

If the access opening at the delivery end on the bottom cannot be secured by a guard (e.g. protective sheet) the discharge conveyor, the depositing unit or the following auxiliary component shall be designed so that the access opening is prevented. The openings and safety distance shall meet the requirements set by EN ISO 13857:2008, Table 4.

If the access is prevented by the following auxiliary component, it shall be ensured that the protective function of the auxiliary component is not changed. This can be achieved by lateral guide plates, stops or locking devices.

5.2.4 Zone 3 – Movable guards

5.2.4.1 Manually operated guards

Manually operated guards shall either be designed in such a way that they can be moved and adjusted safely or be fitted with handles.

The force needed to lift or lower a guard shall not exceed 250 N.

Movable guards shall be designed to prevent unexpected closing. This can be achieved by the following measures:

— in the open position the movable guard shall be sufficiently far behind its dead point;

— if the movable guard is on the open position and not sufficiently far behind its dead point, some measure, e.g. a counter weight, a spring or a mechanical locking device shall prevent unexpected closing.

Moveable guards shall be at minimum interlocked or interlocked with guard locking. Usually fixed guards, even those which are movable for ergonomic reasons and need only be opened for maintenance or repairs, are excluded from this.

5.2.4.2 Power-operated guards

If power operated guards are not safe entirely by design (e.g. pre-leading deflector), the risk of crushing by the guard shall be reduced by the following measures:

— when closing the guard the maximum crushing force of the guard shall be 135 N and the maximum impact force shall be 180 N;

— when closing the guard the maximum closing speed shall be 200 mm/s if the distance from the guard to the closing edge is > 200 mm;

— when closing the guard the maximum closing speed shall be 50 mm/s if the distance from the guard to the closing edge is ≤ 200 mm;

— guards whose distance from the guard to the closing edge in its final position is > 20 mm and ≤ 30 mm, the distance to the first danger zone shall be at least 450 mm;

— guards whose distance from the guard to the closing edge in its final position is > 6 mm, the locking force shall be at least 300 N;

— guards whose distance from the guard to the closing edge in its final position is ≤ 6 mm, the locking force shall be at least 200 N.

Power-operated guards that are held closed by a holding force shall not be fitted with handles.

In the event of a power failure (e.g. electrical power failure, pipe or hose break), the movement of the power-operated guard shall be automatically stopped if the crushing force of the guard is greater than 135 N. Safety-related parts of control shall meet the requirements set by EN ISO 13849-1:2008.

The power operated guard shall be fitted with electro-sensitive protective equipment which stops the movement of the guard when an obstruction is sensed.

Where the operator has to walk underneath a guard that pivots up, the minimum height under the opened guard shall be 1800 mm. The edges of the guard shall not be sharp.

The manufacturer shall describe the safe working practices for the machine in the instruction manual. These working procedures shall be part of the training and shall be followed by the operator. The manufacturer shall describe the guards, the residual risks and the training of the operator in the instruction handbook.

5.2.5 Zone 4 – Blades

5.2.5.1 General

Injury by cutting or piercing when dealing with the blade or on a stationary blade shall be prevented. This can be achieved e.g. by the following measures:

— The manufacturer shall supply a protection device which allows the blade to be installed, removed and transported safely.

— The manufacturer shall describe the residual risks when handling the blade and working in the cutting zone, especially during cleaning and maintenance operations in the instruction manual. The use and handling of the blade guard shall be described in the instruction manual.

— The instruction manual shall state that cut-resistant gloves shall be worn when handling the blade and working in the cutting zone. The instruction manual shall also include information about storage, transportation, maintenance, cleaning and use of the blade.

The control system of the machine shall ensure that the stationary blade cannot move unintentionally both when the guard is open or closed. This requirement can be achieved by using a braking device.

5.2.5.2 Cutting and automatic loading

Access to the cutting zone shall be prevented during cutting and automatic loading. This can be achieved by the following measures.

Access through the infeed opening is prevented by one of the following measures:

— guards (e.g. fixed tunnel guard, interlocked moveable guard). Safety requirements see 5.2.2.1 Zone 1. The movable guards shall be interlocked with the machine drive. The locking devices shall meet the requirements of 5.2.12;

— a sensitive protective equipment (e.g. active opto-electronic protective devices). These shall meet EN ISO 13855:2010.

The blade shall be installed in a blade housing, with a locked separating blade guard. The locking devices shall meet the requirements of 5.2.12.

Access through the outfeed opening shall be prevented by a guard.

— This guard shall comply with 5.2.3, Zone 2.

— The movable guards shall be locked with the machine-drive. The locking devices shall meet the requirements of 5.2.12.

5.2.5.3 Manual loading while the blade is running

On machines with manual loading, access to the running blade shall be prevented by one of the following measures:

— While loading, an automatic guard (e.g. a safety shutter) shall separate the blade from the feed area. The safety shutter shall only be opened when the guard of the feed area is closed. The guard of the feed area shall only be opened if the safety shutter is closed.

— The closed position of the automatic guard shall be interlocked with the blade drive. The locking device shall meet the requirements set by EN ISO 14119:2013, 4.3 (interlocking device with guard locking).

— Any openings in or around the automatic guard (e.g. downholder) shall meet the requirements set by EN ISO 13857:2008, Table 4.

5.2.5.4 Manual loading while the blade is stationary

On machines with manual loading, access to the area of the stationary blade shall be prevented e.g. by the following measures.

— Before carrying out manual loading, the blade shall be arrested by means of the normal stopping device and the blade shall come to rest in such a position that access to the blade is prevented.

— The requirements specified in EN ISO 13857:2008 apply to this situation. The feed area guard shall be locked with the blade drive. The locking device shall meet the requirements set by EN ISO 14119:2013, 4.3.

5.2.6 Zone 5 – Blade fixation

The blade housing and blade guard shall be designed to prevent penetration of flung parts (e.g. blades or parts of blades). Excepted are the outlet, inlet opening and in certain circumstances the opening on the floor as an outlet for remnants. A deformation of the blade housing and blade guard by parts is allowed.

The reliability of design measures is to be identified and documented by appropriate practical tests, such as collision or breaking tests.

The manufacturer shall run at least three tests (or have them run) and document them. The tests shall be performed on each type of machine, where the hazards are identified to be significantly different.

For the tests the manufacturer shall use the blades that can cause the most severe damage to the protective device (worst-case blade), including requirements that have become known by observation of e.g. the following points:

— type of blade: e.g. through-hardened/not through-hardened, smooth/serrated blade;

— breaking of the fastener device;

— foreign objects in the cutting throat;

— maximum motor or blade speed, additional energy input by other moving parts;

— self-rotation;

— maximum cutting speed.

If there is more than one major error, only errors with the same cause shall be considered. This means that some errors that do not have the same case have to be excluded from the test evaluation.

In the instruction manual, the manufacturer shall describe the fastening of the blade, fixing materials, residual risk and training of the operator.

5.2.7 Zone 6 – Safety shutter

When opening or closing the safety shutter, access shall be prevented. This can be achieved e.g. by the following measures:

— The inlet-side access to the opening or closing safety shutter shall be prevented by the protective hood for loading/protective door for loading. For safety requirements, see 5.2.5.3.

— The outlet-side access to the opening or closing safety shutter shall be prevented by moving guards. For safety requirements, see 5.2.3, Zone 2.

5.2.8 Zone 7 – Gripper

Grippers can be closed automatically or by activating a command. The safest possible access to the area of the closing gripper during manual loading and disassembly/assembly of the gripper shall be ensured. This can be achieved e.g. by the following measures:

— The safety requirements of 5.2.2.2 shall be met.

— In the instruction manual, the manufacturer shall describe the procedure to manual loading, the residual risk and the training of the operator. The instruction manual shall state that during

manual loading the operator when handling the product shall not reach with his hand within the effective range of the gripper. The effective range of the gripper shall be indicated in the manual.

— In the instruction manual, the manufacturer shall describe the procedure for disassembling/assembling of the gripper, the residual risk and the training of the operator. The instruction manual shall state that the gripper shall not be taken by hand in the area of the gripper needles.

5.2.9 Conveyor belts

Access to the drawing in points of the conveyor belts/transport belts and also the drive and guide rolls shall be prevented if the crushing force there exceeds 135 N. This requirement is satisfied e.g. by the following measures:

— a fixed guard shall be installed (e.g. lateral cover plate, nip guard),

— the gap between the fixed guard and the conveyor belt or the rollers shall not be greater than 6 mm (see Figure 16).

Dimensions in millimetres

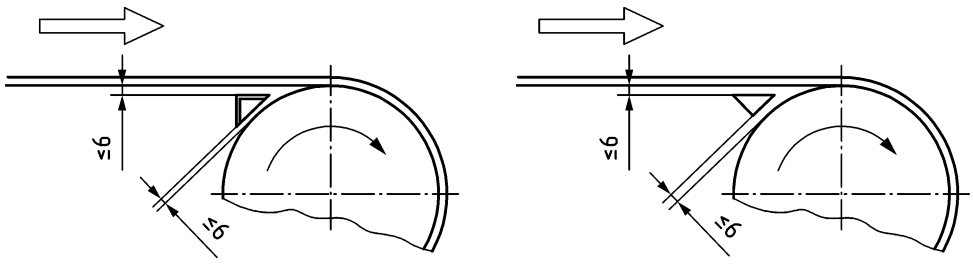


Figure 16 — Nip guards at drawing in points of e.g. belts

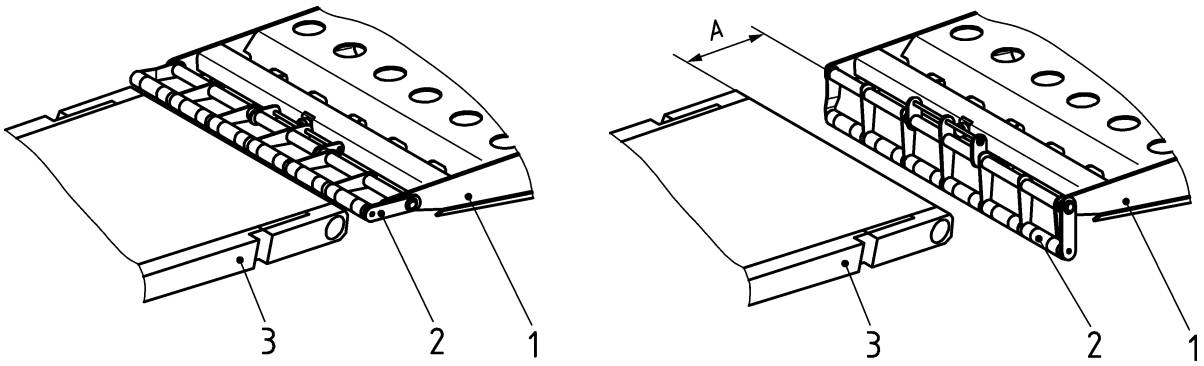
5.2.10 Exposed oscillating conveyor belts

If in the case of automatic oscillating conveyor belts, e.g. rockers or lifting cranks, access to crushing or impacting edges is not rendered safe by guards, the danger zone shall be protected by, for example, the following measures:

— The crushing force should not exceed 135 N.

— The impact force should not exceed 180 N.

If the crushing force exceeds 135 N the transition point between the rocker and the subsequent component shall be designed in such a way that the end part of the rocker folds down or up when force is applied to it, thus creating a gap of at least A = 60 mm (see Figure 17).



Key

1 rocker

2 end part of the rocker

3 subsequent component

A gap between rocker and subsequent component

Figure 17 — Transition point between rocker and subsequent component

5.2.11 Drive components in the machine housing

Access to danger zones in the drive mechanism shall be prevented. This is to be achieved by e.g. one of the following measures:

— a fixed guard;

— an interlocking movable guard.

Where possible, guards shall be incapable of remaining in place without their fixings.

If it is necessary that fixed guards can be removed, e.g. to adjust the working procedure, these shall be interlocked.

Requirements for interlocking guards see 5.2.1.

Openings in the guards shall be in accordance with the requirements of EN ISO 13857:2008, Table 4.

5.2.12 Guards for moving blades

5.2.12.1 General

Movable guards which prevent access to the blade shall be either interlocking guards, or interlocking guards with guard locking.

Requirements for interlocking guards see 5.2.1.

If the machine is arrested by means of the normal stopping device the blade shall come to rest in such a position that the sheath of the blade is located outside the cutting throat. If, for example, in the case of a large blade, a part of the sheath protrudes into the shaft, access from the feed area shall be protected if the point of danger cannot be clearly identified. This can be achieved by, for example, a cover plate and/or a description of the residual risk in the Operating Instructions.

5.2.12.2 Interlocking guard without guard locking

Interlocking guards without guard locking can be used only if they comply with the requirements of EN ISO 13855:2010, Clause 9.

The braking device shall take effect if

— the interlocking guard is opened;

— the emergency stop device (if fitted) is activated.

5.2.12.3 Interlocking guard with guard locking

Interlocking guard with guard locking shall be closed, locked off and secured by the time the blade comes to rest. The duration of the guard locking is dependent upon the actual coming to rest of the blade drive (monitoring of the state of rest). Control of the guard locking by a time-clock is not permissible. In the event of a failure of drive energy, the guard locking should be releasable in order to reduce the risk of contamination of the product (e.g. bacterial growth) after the drives have been stopped. This can be achieved by the following measures:

— After the drives have been stopped, the interlock can be released manually using a tool,

or

— the drives can be observed at rest so that the interlock is automatically released when movements no longer pose a threat to the operator.

Alternatively, delay devices in accordance with the requirements of EN ISO 14119:2013, F.5, may be used. These delay devices shall be fitted with a head which cannot be removed by a standard tool (e.g. a power-operated screwdriver). The necessary time between opening the switch and release of the separation-type protective device shall be longer than the rundown period before the blade motion stops (it is assumed that 1 revolution = 1 s).

Interlocking guards with guard locking which are provided with handles allowing them to be opened by hand require a retaining force of at least 500 N.

5.2.12.4 Safety-related mechanical components

The drive motor, gears, brake unit etc. shall consist of proven components in accordance with the requirements of EN ISO 13849-1:2008 and EN ISO 13849-2.

5.3 Electrical hazards

5.3.1 General

The electrical equipment shall comply with EN 60204-1:2006.

5.3.2 Emergency stop-device

Automatic industrial slicing machines shall be equipped with one or more emergency stop-devices except when the risk assessment by the manufacturer shows that the use of such a unit cannot reduce the level of risk because an emergency stop unit would not reduce the time taken before the machine stopped completely.

If no emergency stop unit is installed, the standard off-switch shall be located in a position which is easily accessible to the operator.

5.3.3 Protection against water ingress

5.3.3.1 IP degrees of protection

The electrical equipment shall comply with the following degrees of protection in accordance with EN 60529:

— IP X5 External electrical equipment:

  — on the machine,

  — on the control cabinet of the machine,

  — on the control cabinet in the work room,

— IP X3 Internal electrical equipment:

  — in a machine with enclosed housings with an open underside and of Type IPX5,

  — protection against direct and indirect penetration by streams of water shall be ensured,

— IP X2 Internally-located electrical equipment:

  — in a machine with a completely enclosed housing having protection type IP X5,

  — protection against condensation of water shall be ensured,

  — in the control cabinet,

— IP X0 Internally-located electrical equipment:

  — in a machine with a completely enclosed housing of protection type X5,

  — protection against condensation water shall be ensured in addition to protection of fingers and the back of the hand.

5.3.3.2 Protective hoods

When it becomes obvious that the automatic industrial slicing machine and its auxiliary components would be cleaned with a stream of water under pressure, it is necessary to ensure that no water penetrates into the exposed electrical equipment. This can be achieved e.g. by the following measures:

The electrical equipment shall be shielded by hood covers. Reference to such hood covers shall be included in the operating instructions. The use of hood covers with exposed electrical equipment may be applied to the use of on- and off command switches. Cover hoods in a closed position shall not prevent the operation of the off-switch.

When film-covered keyboards, membrane switches or similar switches are used and provide suitable protection when cleaning with water under pressure there is no need to use cover hoods.

NOTE It is not intended that automatic industrial slicing machines and their auxiliary components should be cleaned with water under pressure. However, it is difficult to guarantee that this method will not be used in practice when there would be less need for the requirements specified in this clause designed to reduce the level of electrical hazards.

5.3.4 ON- and OFF-command switches

At least one ON- and one OFF-command switch shall be installed on every automatic industrial slicing machine. These command switches shall be located on the operator side of the machine. The ON-command switch shall be protected against unintentional operation (e.g. by protective collars, the installation position, activation duration, etc.) In addition on the OFF-command switch, the main switch can be regarded as an OFF-command switch, although the main switch shall not be located on the operator side.

5.4 Hydraulic and pneumatic hazards

Hydraulic and pneumatic installations shall conform to the following standards:

— EN ISO 12100:2010, 6.2.10;

— EN ISO 4413;

— EN ISO 4414.

The burst pressure of the hydraulic hoses shall be four times as great as the highest pressure under operating conditions. Information shall be provided in the instruction manual as to the greatest operating pressure.

5.5 Hazards due to instability

Automatic industrial slicing machines (fixed and movable) shall be installed stably for regular operating conditions.

Automatic industrial slicing machines and auxiliary components that are not fixed to the floor shall be stabilized with sufficient safety against overturning.

Movable automatic industrial slicing machines shall not be able to roll, slide or tip under regular operating conditions. This is achieved, for example, by the construction of the machines and the position of the centre of gravity (swivel castors and foot positioning).

Movable automatic industrial slicing machines shall not tip over. There shall be at least 2 trestle rollers (or feet) and 2 swivel castors with locking devices that prevent rolling and/or turning away.

Manufacturer shall provide details of the foundation load and type of anchoring in the instruction manual. The use of the locking device for the swivel castors and the condition of the floor shall be described.

In the tests described in Clause 6, Table 4, the machines at the installation site shall not tilt, roll or slide away.

5.6 Noise reduction

Noise reduction shall be a component of the development process; in particular, measures shall be taken where noise arises according to the requirements of EN ISO 11688-1. The success of the noise reduction measurements carried out is estimated on the basis of current noise-emission values (see Annex A) in comparison to other machines of the same construction.

5.7 Ergonomic requirements

The ergonomic principles and requirements regarding EN ISO 12100:2010, 6.2.8, and EN 614-1 and EN 1005-1, EN 1005-2 and EN 1005-3 shall be taken into account. All information required for achieving the ergonomic objectives to be followed by the user shall be described in the instruction handbook.

Removable components, such as blades and protective hoods, shall be designed so that a retention or operating force of < 250 N is required.

The handle on hand-operated protection installations shall be designed and fixed so that an effect of < 250 N is required.

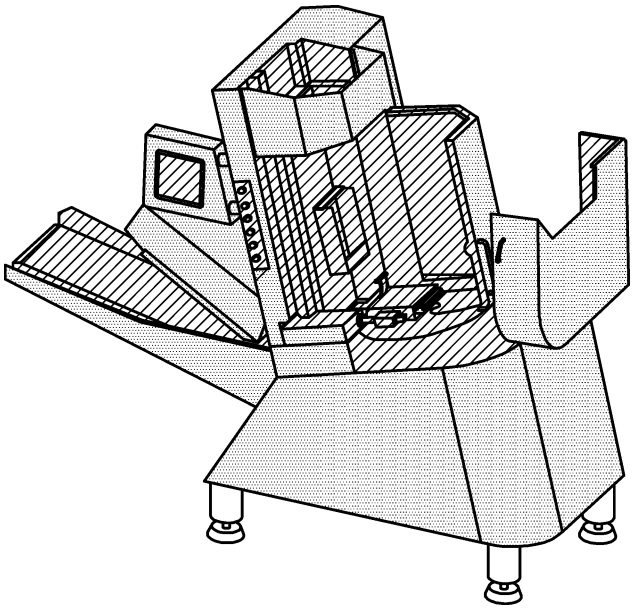
Lifting machines and level transport vehicles for assembly and disassembly and for transporting these parts without lifting them by hand shall be present on automatic industrial slicing machines with removable parts weighing more than 25 kg. Otherwise, there shall be a statement in the instruction manual to the effect that parts weighing more than 25 kg have to be installed and removed with the help of a second person.

5.8 Hygiene and cleaning

5.8.1 General

Machines shall be constructed in accordance with EN 1672-2:2005+A1:2009, the requirements stated below and according to Annex B.

Hygiene areas – see Figure 18 to Figure 20.



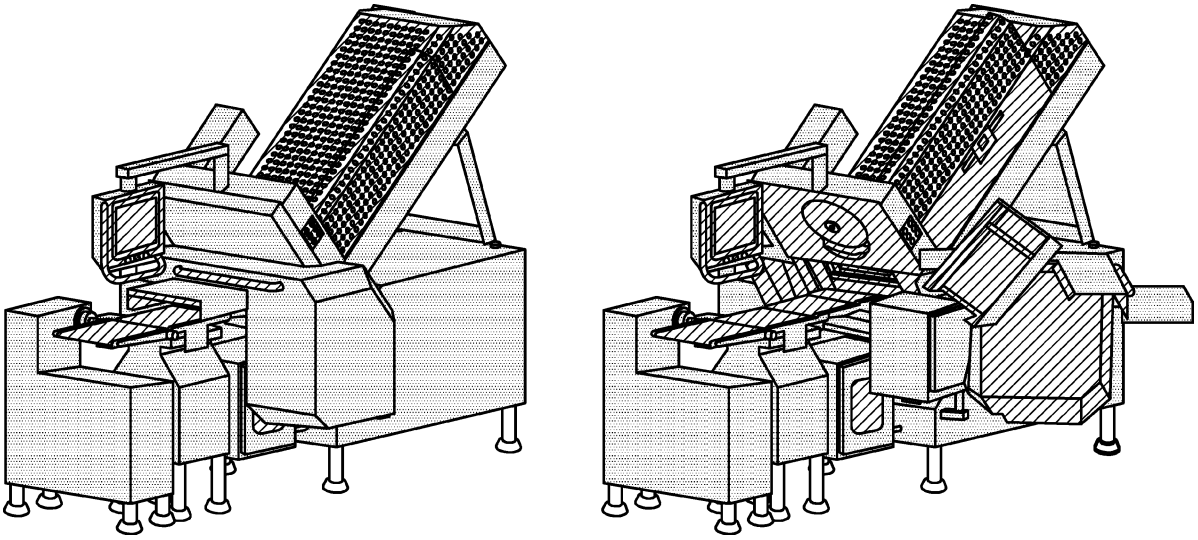
Key

food area

splash area

non-food area

Figure 18 — Example of hygiene areas on automatic industrial slicing machines with manual loading and output belt



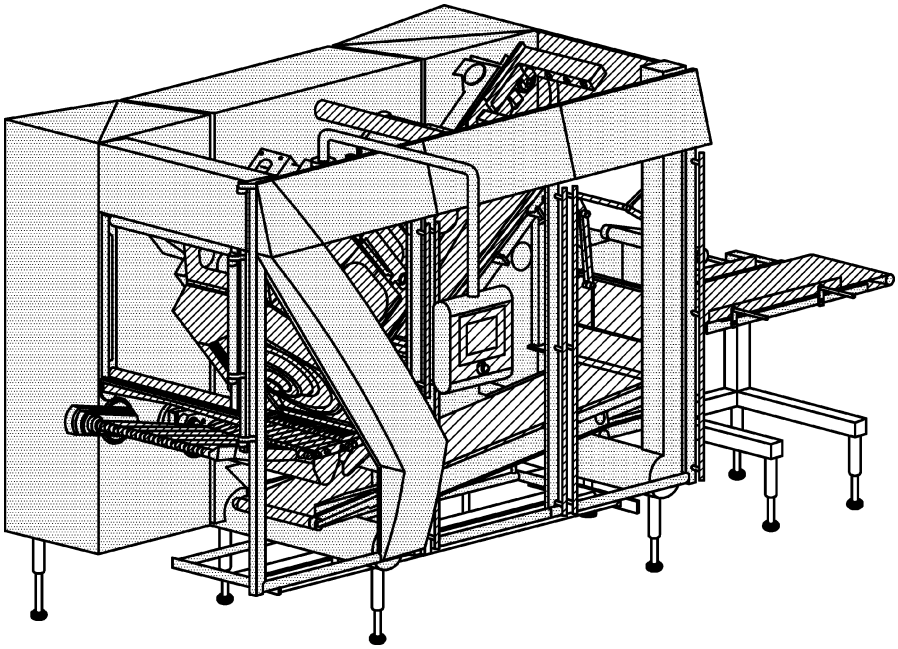
Key

food area

splash area

non-food area

Figure 19 — Example of hygiene areas on automatic industrial slicing machines with manual loading and output belt



Key

food area

splash area

non-food area

Figure 20 — Example of hygiene areas on automatic industrial slicing machines with automatic load and depositing unit

5.8.2 Food area

The food area includes surfaces that come into contact with the food and from where under normal conditions of use, the food or other substances can be returned to the product by running off, dripping, pouring or flowing out (see Figure 18 to Figure 20).

The following parts are, as defined in EN 1672-2:2005+A1:2009, allocated to the food area:

— product support;

— gripper;

— downholder;

— safety shutter;

— blade;

— inner side of the blade guard;

— outside of the cutting head housing, which is directed to the blade;

— cutting throat;

— cutting frame;

— conveyor belt surfaces;

— operating elements (e.g. panels, buttons).

5.8.3 Splash area

The splash area includes surfaces that can be splashed with part of the food or along which it can run under normal conditions of use and does not return to the product (see Figure 18 to Figure 20).

The following parts are, as defined in EN 1672-2:2005+A1:2009, allocated to the splash area:

— guards, outer side;

— vertical housing surfaces, outer side;

— machine housing, outer side;

— inner sides of the cutting-head housings.

5.8.4 Non-food area

The non-food area includes any area other than those stated above (see Figure 18 to Figure 20).

The following parts are, as defined in EN 1672-2:2005+A1:2009, allocated to the non-food area:

All other surfaces, such as:

— machine feet;

— inside of the machine housing.

5.8.5 Surface condition

The design of the surface shall comply with the requirements of EN 1672-2:2005+A1:2009.

The maximum roughness value shall comply with those in Annex B.

5.8.6 Cleaning

All surfaces in the food area shall be easy to clean and shall be able to be disinfected. They shall be constructed so that cleaning fluid can run independently.

Additional installations in the cutting zone, such as grinders or optical equipment, shall comply with the requirements of EN 1672-2:2005+A1:2009.

Some parts in the food area, such as cutting frames, are not easy to clean. The manufacturer shall make special notes in the instruction manual (see 7.2) for cleaning, the sufficient removal of cleaners and disinfectants and the exclusive use of suitable cleaners and disinfectants.

6 Verification of safety and hygiene requirements and/or protective measures

Verification of the requirements defined in Clauses 5 and 7 shall be made by means of inspection, calculation, or testing. These shall be applied to a machine in a fully commissioned condition, but partial dismantling may be necessary for the purpose of some checks. Such partial dismantling shall not invalidate the result of the verification. The criteria for acceptance should follow the detailed requirements set out in Clauses 5 and 7 or in this clause.

Table 4 — Verification list

Clause	Testing method
5.2.2.1	Measuring dimensions Verification of the circuit diagram Function test Examination of the locking device
5.2.2.2	Measuring the movement speed Function test Examination of the locking device Verification of the circuit diagram Verification of the instruction manual
5.2.3	Measuring dimensions Verification of the electric circuit diagram Examination of the locking device
5.2.4.1	Measuring dimensions and forces Function test
5.2.4.2	Measuring dimensions and forces Measuring the movement speed Function test Verification of the circuit diagram Verification of the instruction manual
5.2.5	Measuring dimensions Function test Examination of the locking device Examination manual

Clause	Testing method
	Verification of the electrical and pneumatic circuit diagram
5.2.6	Experiments for foreign bodies in the cutting throat: foreign body = stainless steel round bar Ø 30 mm, 300 mm long in direction of the feed, loose fixture Tests for fixture breach: number of tests required is at least 3 with a comparable result that is the most negative possible in safety terms Examination of the blade fixture and the condition of the blade housing with the blade protection hood Verification of the instruction manual
5.2.7	Examination of the locking device Function test, Examination
5.2.8	Function test Measuring the movement speed Verification of the instruction manual
5.2.9	Measuring dimensions Examination
5.2.10	Measuring of forces Function test Examination
5.2.11	Verification of the locking device Examination
5.2.12	Function test of the emergency-stop device (if present) Function test with power failure Measuring run-down time Measuring the forces Function test of the separating protection device Examination, especially of standstill monitoring
5.3	Tests in accordance with EN 60204–1:2006, Clause 18, shall be carried out on every machine (individual machine) Verification of the degrees of protection (series)
5.4	Verification of the hydraulic/pneumatic circuit diagram (series) Inspecting the instruction manual (series) Examination (individual machine)
5.5	Calculation or verification of condition on a surface with a 10°-inclination With movable automatic industrial slicing machines, wheels shall be blocked by wheel stops if wheels are positioned awkwardly (series) Function test (individual machine) Examination (individual machine)
5.6	Measuring the noise emission values according to Annex A (series)
5.7	Measuring the forces Function test Examination manual
5.8	Measuring the surface roughness Measuring the radiuses and grooves Examination manual Examination, especially of the weld seams
7.2	Verification that the required information is contained in the instruction manual

7 Information for use

7.1 General

The user information shall fulfil the requirements of EN ISO 12100:2010, 6.4.

7.2 Instruction handbook

The instruction handbook shall at least contain the following information:

a) Information regarding transport and storage:

— of the machine;

— of the auxiliary components;

— of the blade;

— information on the dimensions and weight.

b) Information on the installation of the machine:

— information regarding the space necessary for operation;

— information regarding permitted environmental conditions;

— information about how the machine is connected to the electrical, hydraulic, pneumatic or gas energy supply and necessary safety installations;

— information regarding the foundation load, the condition of the floor and type of anchorage;

— description of the use of the locking devices on the swivel castors.

c) Information on the machine:

— detailed description of the machine and its components;

— description of the use of the machine in accordance with the conditions;

— description of predictable forms of misuse;

— description of the machine and its auxiliary components, the guards and other safety installations;

— description of the residual risks that cannot be entirely eliminated by the safety installations, e.g. grippers during manual loading;

— information on the electrical installation (see EN 60204-1:2006, Clause 17) and the circuit diagram or information in a deposit container (e.g. bags) in the machine.

— information on airborne sound emissions, determined and explained in accordance with Annex A of this European Standard:

— the A-weighted emission sound pressure at the workplace in so far as it exceeds 70 dB(A); if this level is lower than or equal to 70 dB(A), this shall be indicated;

— the highest value of the current C-weighted emission sound pressure level at the workplace in so far as it exceeds 63 Pa (130 dB with reference to 20 µPa);

— the A-weighted sound power level of the machine if the A-weighted emission sound pressure level at the workplace exceeds 80 dB(A).

If sound emission values are stated, the measuring uncertainties K pertaining to these values shall be stated. The operating conditions of the machine during the measurement and the measuring techniques used shall be described.

d) Information about the usual operating conditions of the machine:

— information about start-up;

— information about setting up and adjusting;

— information about stopping devices;

— information about residual risks and the required personal protective equipment, e.g. cut-resistant gloves;

— information about special risks that can occur in certain circumstances;

— information about ergonomics and cleaning;

— in case of manual loading, the description of these procedure, and that during manual loading the operator when handling the product shall not reach with his hand within the effective range of the gripper, the effective range of the gripper is to be indicated;

— information about forbidden uses;

— information about sharpening the blade;

— information about storage, transport, maintenance and cleaning of the blade;

— information about routine checking of the protection and locking devices before using the machine;

— description of how automatic industrial slicing machines can be handled without danger in case of disturbance.

e) Information about maintenance:

— description of the conduct and frequency of inspections and maintenance work taking behaviour procedures into consideration;

— information about the lubricants being used;

— specifications of the spare parts to be used if they have an effect on the operator's health and safety;

— the drawings required to conduct these tasks;

— circuit diagrams.

f) The instruction manual shall contain the information that the operator shall be trained and specifies the elements of training.

7.3 Marking

The following information at least shall be recognizable, clearly legible and permanently present on automatic industrial slicing machines:

— company name and complete address of the manufacturers and, if circumstances require it, their representatives,

— machine designation,

— product or type designation,

— serial number if applicable,

— mandatory marking[1)],

— construction year, i.e. the year in which the manufacturing process was completed,

— connected values, with supply voltage and frequency, nominal power,

— short-circuit current.

1) For machines and their related products intended to be put on the market in the EEA, CE-marking as defined in the European applicable directive(s), e.g. Machinery Directive.

Annex A
(normative)

Noise test code for automatic industrial slicing machines (grade 2)

A.1 Determination of the emission sound pressure level

EN ISO 11201:2010 shall be applied in order to determine the emission sound pressure level.

The measurements shall be taken at the normal operator position at a distance of:

— 0,5 m from the operating area at operators' usual workplaces;

— at a height of 1,55 m above the floor

with the microphone directed towards the machine.

If it is required to determine the sound power level of an automatic slicing machine EN ISO 3744:2010 should be applied.

A.2 Installation and mounting conditions

The test field shall be in accordance with EN ISO 11201:2010, Clause 6. It shall be laid out according to EN ISO 3744:2010, Annex A.

NOTE In the case of free-field tests, the environmental correction factor K_2 is assumed to be equal to or smaller than 0,5 dB and is therefore negligible.

A.3 Operating conditions

The test shall be carried out when the machine is running idle and at maximum speed.

A.4 Measurement

The A-weighted time-averaged emission sound pressure level shall be measured.

The measuring instruments shall be in accordance with EN ISO 11201:2010, Clause 5 and 10.2.1.

The measurement shall be carried out over a complete work cycle of more than 15 s whereby stopping shall be excluded.

A.5 Information to be recorded

The information shall be in accordance with EN ISO 11201:2010, Clause 12.

All deviations from this noise test code and EN ISO 11201:2010 shall be documented together with the technical justification for these deviations.

A.6 Information to be reported

The information to be included in the report is at least that which the manufacturer requires to prepare a noise declaration or which the user requires to verify the declared values.

As a minimum, the following information shall be included:

— reference to the basic noise emission standard EN ISO 11201:2010;

— description of the mounting and operating conditions used;

— location for the determination of the emission sound pressure level at the workplace;

— the noise emission values obtained.

It shall be confirmed that all the requirements of the noise test code have been fulfilled, or, if this is not the case, any unfulfilled requirements shall be identified. Deviations from the requirements shall be stated and technical justification for the deviations shall be given.

A.7 Declaration and verification of noise emission values

The declaration of the noise emission value shall be made in the form of a dual number emission declaration according to EN ISO 4871.

It shall declare the emission sound pressure level LpA at the workstation and the respective uncertainty KpA. The uncertainty KpA is assumed to be 2,5 dB.

The noise emission value shall be rounded up to the next higher decibel.

The noise data shall state that the emission values have been obtained according to this noise test code and to the basic standard EN ISO 11201:2010. If this statement is not true, the noise declaration shall indicate clearly what the deviations are.

If undertaken, verification shall be done according to EN ISO 4871 by using the same mounting, installation and operating conditions as those used for the initial determination of the noise emission value.

Annex B
(normative)

Design principles to ensure the cleanability of automatic industrial slicing machines and auxiliary components

B.1 Terms and definitions

For the purpose of this annex, the following terms and definitions apply.

B.1.1

food area

area comprising surfaces which will come into contact with foodstuff; the food area also comprises those surfaces with which the foodstuff may come into contact under normal operating conditions and returns into the product (see Figure 18 to Figure 20)

B.1.2

splash area

area comprising surfaces on which part of the foodstuff may splash or flow along under operating conditions and does not return into the product (see Figure 18 to Figure 20)

B.1.3

non-food area

all other areas not specified above (see Figure 18 to Figure 20)

B.1.4

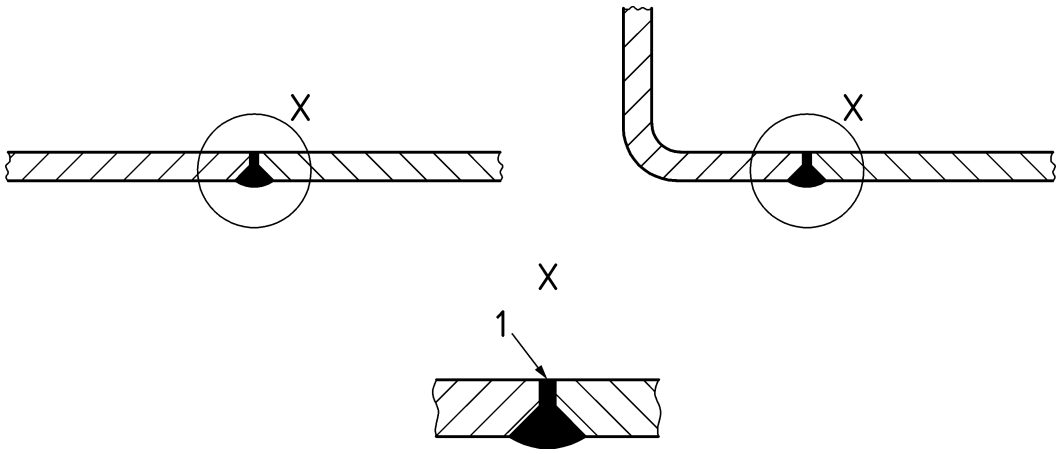
closely joined surfaces

surfaces are joined closely if product particles cannot be trapped in small crevices which would make them difficult to be removed and which would cause a contamination hazard (see Figure B.1)

B.1.5

easy to clean

machines are designed and constructed such that it is possible to remove dirt with a simple cleaning method, e.g. cleaning agent and water (see Figure B.1)



Key

1 closely joined surfaces

Figure B.1 — Closely joined surfaces – food area

B.2 Materials of construction

B.2.1 General

Materials of construction shall comply with EN 1672-2:2005+A1:2009, 5.2.

B.2.2 Type of materials

B.2.2.1 Materials of food area

European Directives contain a list of materials which come into contact with foodstuff and with foodstuff for human consumption. Some materials (e.g. plastic) shall be tested by means of migration tests. Materials not mentioned in the European Directives are admissible if compatibility with foodstuff is documented. The blade need not be corrosion-resistant. Measures to reduce corrosion shall be described in the instruction manual.

B.2.2.2 Materials of splash area

See EN 1672-2:2005+A1:2009, 5.3.2.

B.2.2.3 Non-food area

See EN 1672-2:2005+A1:2009, 5.3.3.

B.3 Design

B.3.1 General

Surfaces and components in the various areas shall meet the following requirements:

B.3.2 Food area

B.3.2.1 Surfaces

The surfaces in the food area shall be smooth and free of depressions and scratches (see Figure B.1).

B.3.2.2 Inside corners

The angle formed by the intersection of two surfaces shall be ≥ 90° and have a radius *R* of ≥ 3 mm (see Figure B.2).

Smaller radii are admissible if no other solutions can be found for reasons of process engineering, manufacturing technology (e.g. weld seam) or economic feasibility (see Figure B.2).

Dimensions in millimetres

Key

R radius

a) machining operations, bent plate **b) welding seam**

Figure B.2 — Corners and radii in food area

Parts of machines such as blades and cutting frames can have recesses, grooves and corners with smaller radii due to product manufacturing necessities. The components shall be easy to clean.

A corner with an angle ≥ 135° without radiuses is permitted. The distance between two edges shall then be ≥ 8,0 mm (see Figure B.3).

Dimensions in millimetres

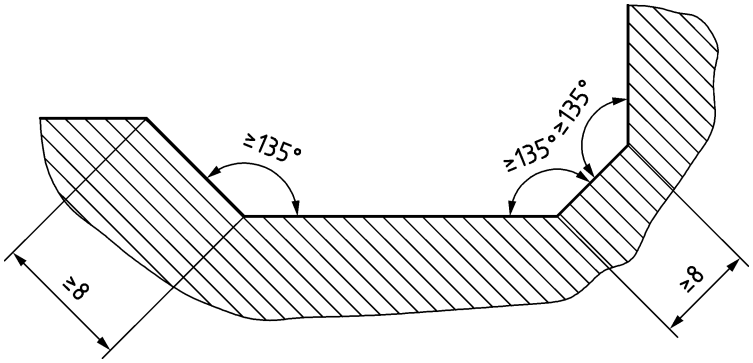
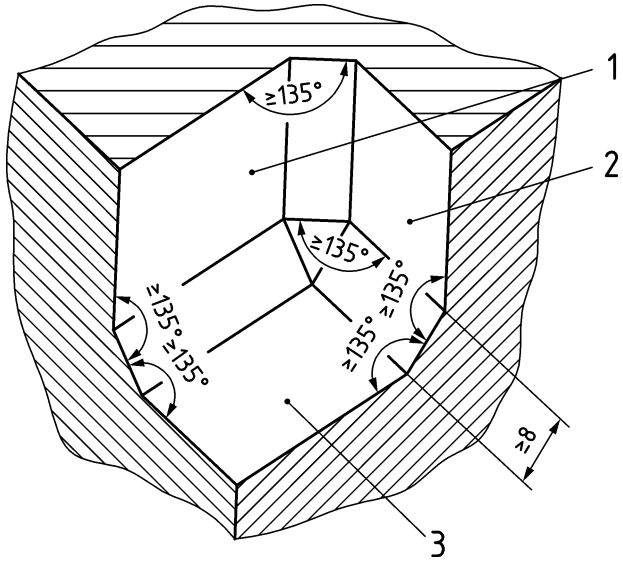


Figure B.3 — Corners in the food area

Should a corner be formed by the intersection of three surfaces, then the corners formed shall have angles of ≥ 90° and radii of ≥ 6 mm, also corners with an angle of ≥ 135° are permitted without a radius (see Figure B.4).

Dimensions in millimetres



Key

1 surface 1

2 surface 2

3 surface 3

Figure B.4 — Intersecting surfaces in food area

B.3.2.3 Grooves

Grooves may be used if the inner radius is ≥ 3 mm and the depth < 0,7 times the radius.

B.3.2.4 Joints and seams

Joints and seams shall be welded or sealed and as smooth as the connected surfaces (see Figure B.1).

B.3.2.5 Surface roughness

Surface roughness R_z shall be ≤ 25 µm; in those areas where it is technically possible R_z < 16 µm should be selected.

B.3.3 Splash Area

B.3.3.1 General

Surfaces shall be smooth (see Figure B.1)

B.3.3.2 Inside corners

The angle formed by the intersection of two surfaces shall be ≥ 80° and have a radius ≥ 3 mm.

If a corner is formed by the intersection of three surfaces, the corner formed by the intersection of two surfaces shall have a radius ≥ 6 mm. No requirements apply to the radius for the joining points of the third surface.

Angles ≥ 110° without radii are admissible (see Figure B.3).

B.3.3.3 Grooves

Grooves may be used if the inner radius is ≥ 3 mm and the depth < 1,0 times the radius.

B.3.3.4 Openings

Openings are permissible if they go right through and have a diameter ≥ 16 mm. Gaps are permissible provided the gap is at least 16 mm in width, the depth is not more than 16 mm and the gap is open.

B.3.3.5 Joints and seams

Joints and seams shall be welded or continuously sealed. This requirement does not apply if these joints are formed by overlapping sheet metal surfaces from the top to the bottom in a vertical plane such that there are no horizontal corners in which dirt may be trapped. The overlap shall be ≥ 12 mm. Joints which do not overlap shall be easily separated for cleaning purposes. For information see EN 1672-2:2005+A1:2009, Annex B.

B.3.3.6 Fastening methods

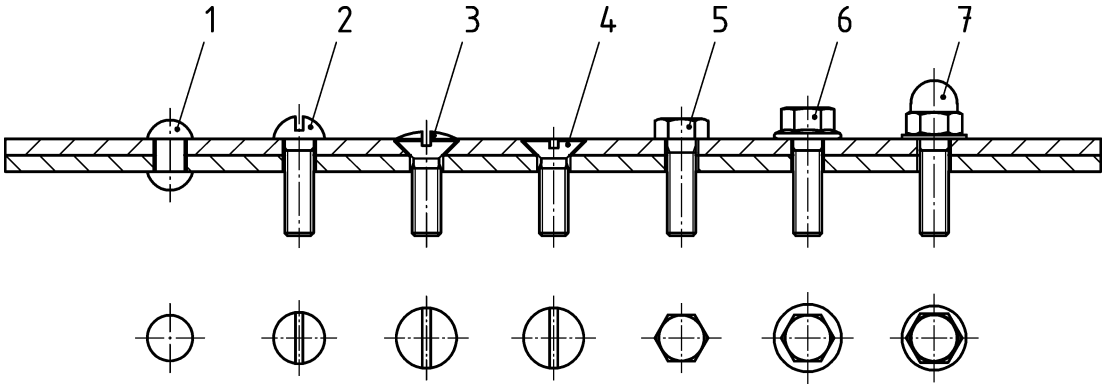
Screws, bolts and rivets with a low profile heads and of the types shown in Figure B.5 may be used only when other fastening methods are impracticable and they are easy to clean (see Figure B.5).

The following types of screw shall not be used:

— cross-thread screws;

— socket head screws;

— screws with a diameter of less than 3 mm.



Key

1 truss head

2 half-round head with slit

3 pan head with slit

4 countersunk with slit

5 hexagonal head, flat

6 hexagonal head with flange

7 hathead

Figure B.5 — Admissible fasteners – head profiles

B.3.3.7 Surface roughness

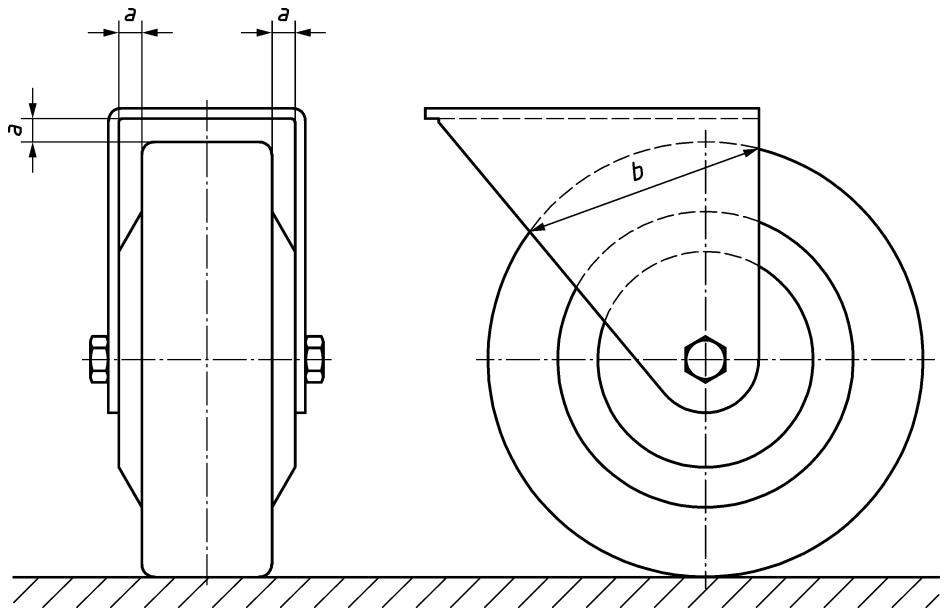
Surface roughness shall comply with the requirements of B.3.2.5.

B.3.4 Non-food area

Surfaces shall be as smooth as possible. Grooves, corners, holes, gaps and joints shall be avoided as much as possible. Closed cavities shall be wide enough to allow thorough cleaning and, where necessary, disinfection.

B.3.5 Machines standing on a floor – mobile machines

Castors shall be cleanable (example see Figure B.6).



Key

B < 25 mm, $a \geq 3.5$ mm

B > 25 mm, $a \geq 6$ mm

B is the largest size of the cover on the circumference of the wheel.

Figure B.6 — Castors — Dimensions examples

Annex ZA
(informative)

Relationship between this European Standard and the Essential Requirements of EU Directive 2006/42/EC

This European Standard has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association to provide one means of conforming to Essential Requirements of the New Approach Directive 2006/42/EC on machinery.

Once this standard is cited in the Official Journal of the European Union under that Directive and has been implemented as a national standard in at least one Member State, compliance with the normative clauses of this standard confers, within the limits of the scope of this standard, a presumption of conformity with the relevant Essential Requirements of that Directive and associated EFTA regulations.

WARNING — Other requirements and other EU Directives may be applicable to the product(s) falling within the scope of this standard.

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