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## Introduction

This draft standard is based on national and international discussions. Your comments on this draft are invited and will assist in the preparation of the consequent standard.

For international standards, comments will be reviewed by the relevant UK national committee before sending the consensus UK vote and comments to the international committee, which will then decide appropriate action. If the international standard is approved, it is usual for the text to be published as a British Standard.

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|                  |                        |
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| 1  | 2                                          | (3)                          | 4               | 5                                                                                                                                  | (6)                                                                      | 7                                                  |
|----|--------------------------------------------|------------------------------|-----------------|------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------|----------------------------------------------------|
| MB | Clause No./ Subclause No./Annex (e.g. 3.1) | Paragraph/ Figure/Table/Note | Type of comment | Comment (justification for change) by the MB                                                                                       | Proposed change by the MB                                                | Secretariat observations on each comment submitted |
|    | 3.1                                        | Definition 1                 | ed              | Definition is ambiguous and needs clarifying.                                                                                      | Amend to read '...so that the mains connector to which no connection...' |                                                    |
|    | 6.4                                        | Paragraph 2                  | te              | The use of the UV photometer as an alternative cannot be supported as serious problems have been encountered in its use in the UK. | Delete reference to UV photometer.                                       |                                                    |

English Version

Food processing machinery - Bread slicers - Part 2: Safety  
and hygiene requirements for self-service bread slicers

Machines pour les produits alimentaires - Trancheuses  
à pain - Partie 2: Prescriptions relatives à la sécurité et  
à l'hygiène des trancheurs de pain en libre service

Nahrungsmittelmaschinen - Brotschneidemaschinen -  
Teil 2: Sicherheits- und Hygieneanforderungen für  
Selbstbedienungs-Brotschneidemaschinen

This draft European Standard is submitted to CEN members for enquiry. It has been drawn up by the Technical Committee CEN/TC 153.

If this draft becomes a European Standard, CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

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## European foreword

This document (prEN 13954-2:2022) 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 document is currently submitted to CEN enquiry.

This document has been prepared under a Standardization Request given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive(s) / Regulation(s).

For relationship with EU Directive(s) / Regulation(s), see informative Annex ZA, which is an integral part of this document.

## Introduction

There are various types of bread slicing machines for self-service. They are divided mainly into the following types:

- Type 1: Frame cutter machines with multiple blades moving simultaneously and manual loading;
- Type 2: Machines with rotary crescent (sickle) or circular blade fixed to a shaft with oscillating or rotating movement and manual loading;

This European Standard is a type-C-standard as stated in EN ISO 12100:2010.

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

When provisions of this type-C-standard are different from those that 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** This document covers requirements for the safe and hygienic operation of self-service bread slicing machines of Type 1 and Type 2 including: loading, cutting, unloading, cleaning, crumb removal and maintenance.

The intended use of these machines is to cut baked bakery products (e.g. bread) and dry pastry products into slices. This document covers the intended use of the machines by trained personnel as well as by untrained and uninstructed persons (e.g. customers in the self-service area). The intended use for untrained and uninstructed person is only the slicing. All other operations (e.g. maintenance, cleaning) are only intended for trained and instructed personnel.

This document deals with all significant hazards, hazardous situations and events relevant to bread slicers machines, when they are used as intended and under conditions of misuse which are reasonably foreseeable by the manufacturer (see Clause 4).

**1.2** The following machines are excluded from the scope of this document:

- experimental and testing machines under development by the manufacturer;
- domestic appliances falling under Low Voltage Directive 2014/35/EU;
- rectangular cutting machines for cutting or sawing of panel size products into small pieces;
- baguette slicers according to EN 14655;
- bread slicers according to EN 13954.

**1.3** This document is not applicable to bread slicing machines which are manufactured before the date of publication of this document.

**1.4** The following hazards are not covered by this document:

- hazards due to packaging, handling or transport;
- hazards arising from electromagnetic compatibility issues;
- hazards due to dismantling and disassembling.

The significant hazards covered by this document are described in Annex A.

## 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.

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

EN 1672-2:2020, *Food processing machinery - Basic concepts - Part 2: Hygiene and cleanability requirements*

EN 60204-1:2018, *Safety of machinery - Electrical equipment of machines - Part 1: General requirements (IEC 60204-1:2016, modified)*

EN 60529:1991, *Degrees of protection provided by enclosures (IP Code) IEC 60529:1989*<sup>1</sup>

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 4871:2009, *Acoustics - Declaration and verification of noise emission values of machinery and equipment (ISO 4871:1996)*

EN ISO 7010:2020, *Graphical symbols - Safety colours and safety signs - Registered safety signs (ISO 7010:2019, Corrected version 2020-06)*

EN ISO 11688-1:2009, *Acoustics - Recommended practice for the design of low-noise machinery and equipment - Part 1: Planning (ISO/TR 11688-1:1995)*

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 12001:2009, *Acoustics - Noise emitted by machinery and equipment - Rules for the drafting and presentation of a noise test code (ISO 12001:1996)*

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

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

EN ISO 13854:2019, *Safety of machinery - Minimum gaps to avoid crushing of parts of the human body (ISO 13854:2017)*

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

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

EN ISO 14120:2015, *Safety of machinery - Guards - General requirements for the design and construction of fixed and movable guards (ISO 14120:2015)*

EN ISO 21469:2006, *Safety of machinery - Lubricants with incidental product contact - Hygiene requirements (ISO 21469:2006)*

EN ISO 21920-2:2022, *Geometrical product specifications (GPS) - Surface texture: Profile - Part 2: Terms, definitions and surface texture parameters (ISO 21920-2:2021, Corrected version 2022-06)*

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<sup>1</sup> As impacted by EN 60529:1991/A1:2000, EN 60529:1991/A2:2013, EN 60529:1991/AC:2016 and EN 60529:1991/AC:2019.

### 3 Terms, definitions and description

#### 3.1 Terms and definitions

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

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

— ISO Online browsing platform: available at <https://www.iso.org/obp>

— IEC Electropedia: available at <https://www.electropedia.org>

##### 3.1.1

##### **bread**

baked bakery and dry pastry products

##### 3.1.2

##### **self-service bread slicers**

bread slicers that are made available for untrained persons in points of sale (e.g. supermarkets) to slice baked bakery (e.g. bread) and dry pastry products. Operating of the machine is done by customers without surveillance by the personnel of the store

##### 3.1.3

##### **type 1 self-service bread slicers**

frame cutter machines with reciprocating multiple blades moving simultaneously and manual loading

##### 3.1.4

##### **type 2 self-service bread slicers**

machines with rotary crescent (sickle) or circular blade fixed to a shaft with oscillating or rotating movement and usually manual loading

##### 3.1.5

##### **frame**

support that carries the set(s) of blades in Type 1 bread slicers. During cutting the whole frame oscillates

##### 3.1.6

##### **crumb tray**

container that collects the crumb of the bread produced by slicing

##### 3.1.7

##### **pusher**

device used to move the bread or to move the blade to generate the adjusted slice thickness

##### 3.1.8

##### **holder/gripper**

device used to hold the bread in position

Note 1 to entry: May be combined with the pusher.

##### 3.1.9

##### **bagging tray**

support for bread used to hold the bread in position while the bread is put in a bag

**3.1.10**

**stopping time**

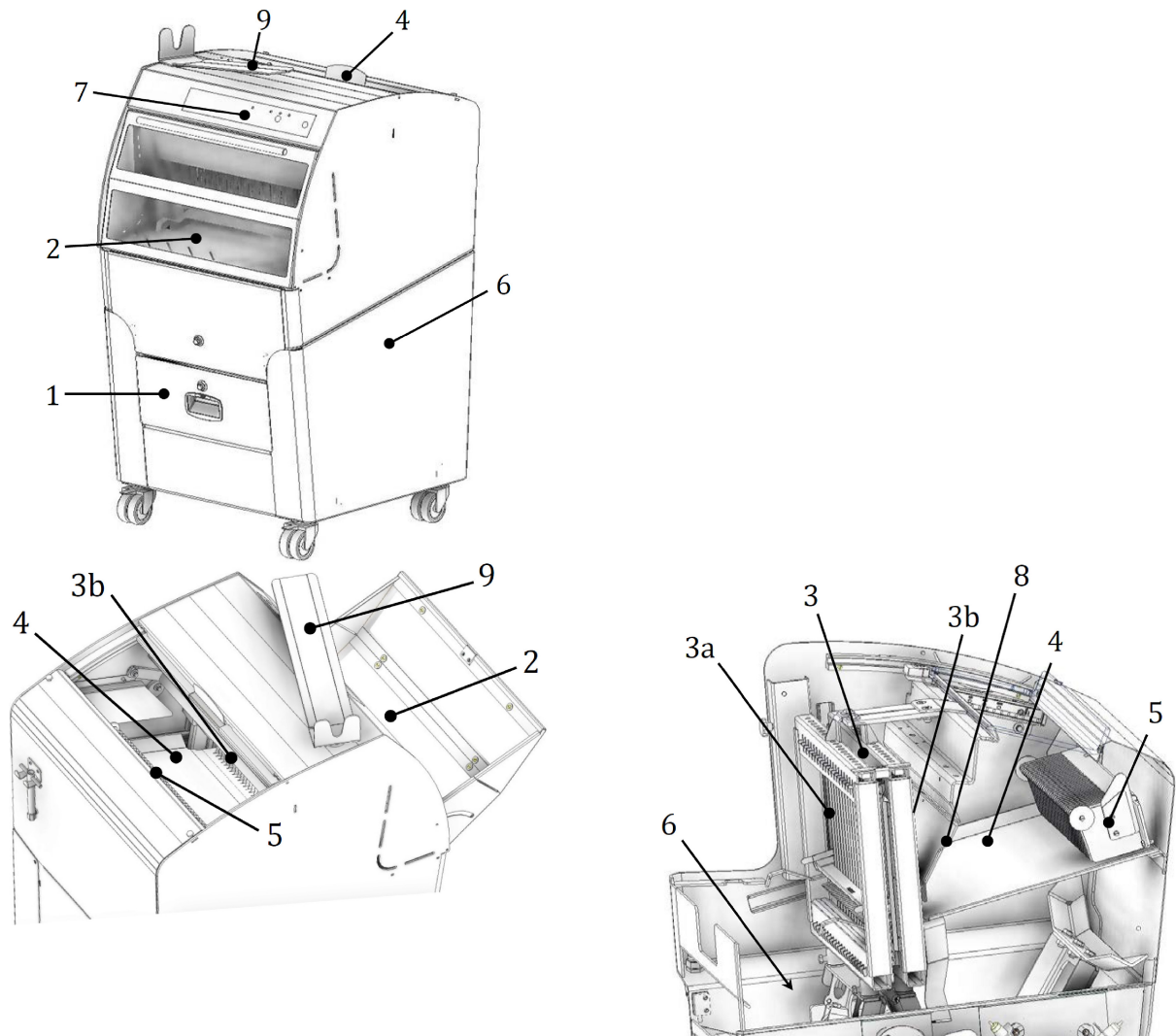
time interval between the actuation of the sensing function and the termination of the hazardous machine function

[SOURCE: EN ISO 13855:2010, 3.1.2, modified]

## 3.2 Description

### 3.2.1 Type 1 self-service machines

Type 1 bread slicers usually consist of a machine frame supporting the following main elements (see example in Figure 1).



#### Key

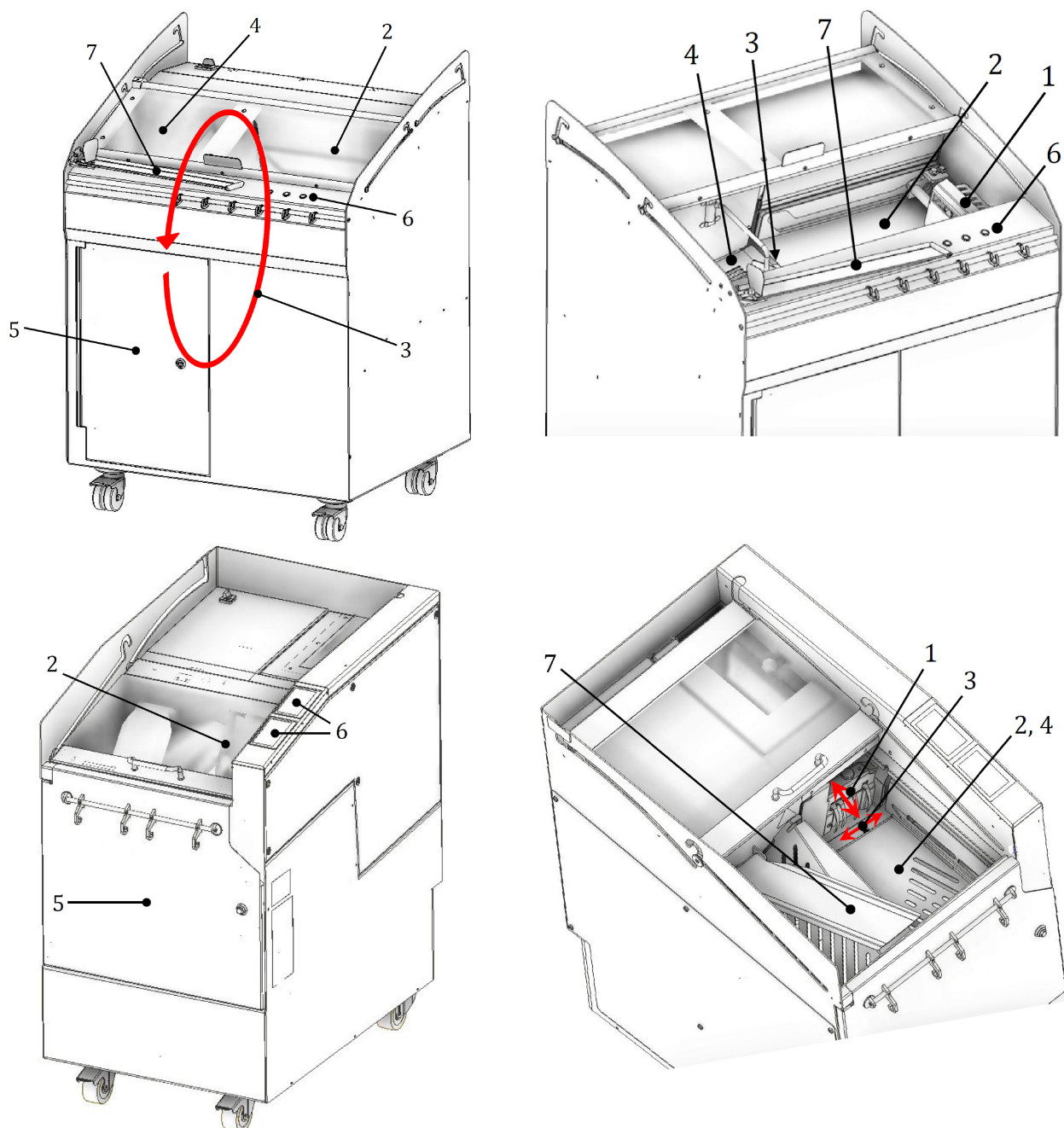
- 1 crumb tray
- 2 discharge area or device
- 3 frame/s with multiple blades (3a: blunt side of the blades seen from discharge area; 3b: sharp side of the blades seen from infeed area)
- 4 infeed area or device
- 5 pusher, which moves and guides the loaf of bread for the cutting action
- 6 drive mechanisms (behind cover)
- 7 operating panel
- 8 hold-down device (for the bread)
- 9 bagging tray (optional)

**Figure 1 — Example of Type 1 bread slicer**

The bread is moved by a power-operated pusher. All slices of the bread are cut at the same time. The pusher is automatically returned to the feeding position.

### 3.2.2 Type 2 self-service machines

A type 2 self-service bread slicing machine consists of a machine frame supporting the following main elements (see examples in Figure 2).



#### Key

- 1 pusher and/or holder(gripper)
- 2 infeed area
- 3 (cutting gap of) rotary (sickle) crescent or circular blade
- 4 discharge area
- 5 crumb tray
- 6 operating panel
- 7 bagging tray (optional)

NOTE Infeed and discharge area can be the same

**Figure 2 — Examples of Type 2 bread slicer**

Either the blade is moved or the bread is moved to cut the bread. The bread is cut sequentially slice by slice.

## **4 Safety and hygiene requirements and/or protective measures**

### **4.1 General**

Machinery shall comply with the safety and hygiene requirements and/or protective measures of this clause.

In addition, the machine shall be designed according to the principles of EN ISO 12100:2010 for relevant but not significant hazards, which are not dealt with by this document.

When fixed guards, or parts of the machine acting as such, are not permanently fixed e.g. by welding, their fixing systems shall remain attached to the guards or to the machinery when the guards are removed. An exception may be made for parts that are necessary for the function of the machine.

Information about residual risks concerning allergens shall be given in the instruction handbook (see 6.1 cm<sup>3</sup>c)).

Warnings for trained and instructed personnel concerning cleaning and maintenance after cutting of prohibited products shall be provided with the instructions (see 6.1 y))

### **4.2 Mechanical hazards**

#### **4.2.1 Mechanical hazards for Type 1 machine**

##### **4.2.1.1 General**

##### **4.2.1.1.1 General requirements**

Openings in guards shall comply with EN ISO 13857:2019.

Interlocking devices shall comply with EN ISO 14119:2013, Clause 7, and EN ISO 14120:2015.

Information for trained operator's personnel concerning regular visual control shall be provided with the instructions (see 6.1 s)).

Guards shall be so constructed that either the possibility to apply mechanical forces (pull -, push -, torsion force) is prevented or does not lead to a gap that allows to reach the danger zone.

If a closed guard is able to be gripped so that a force of 150 N can be applied, this shall be tested by applying this force at the most unfavourable point and in each direction.

Fasteners of guards within the customer's field of vision shall be secured against loosening by simple means.

Warnings for trained and instructed personnel concerning cleaning and maintenance and concerning the storage of tools shall be provided with the instructions (see 6.1 u))

The manufacturer shall clarify in the instructions which work is to be performed by the trained and instructed personnel and which by the service technician (see 6.1 v)).

The pusher and other machine parts – except those parts that are sharp for functional reasons – shall be designed without sharp edges to avoid bump injuries.

Unless specified otherwise in specific clauses, the parts of the control system associated with interlocking shall meet at least a performance level “c” according to EN ISO 13849-1:2015.

If the interlock is implemented in performance level “c”, the electronic control unit shall also perform the following plausibility check:

- Before each new cutting cycle of the machine, the guard above the infeed or discharge area shall have been opened and closed at least once.

If a mechanical or electronic brake is used, the failure of the brake shall be detected and shall block the restart. The plausibility check and the blocking of the restart shall meet at least a performance level “a” according to EN ISO 13849-1:2015.

**NOTE** If the brake is realized by a frequency converter the requirement is fulfilled due to the strong process failure detection.

The interlocking guards may be designed as an interlocking guard with a start function.

#### **4.2.1.1.2 Specific requirements for interlocking devices without guard locking**

The machine controls shall ensure that hazardous functions stop before dangerous movements can be reached after an interlocked guard has been opened.

For interlocking guards the following requirement shall apply:

The interlocking device shall be activated at the latest after opening of the guard by more than 8 mm. At this moment, the safety distance shall be at least 100 mm.

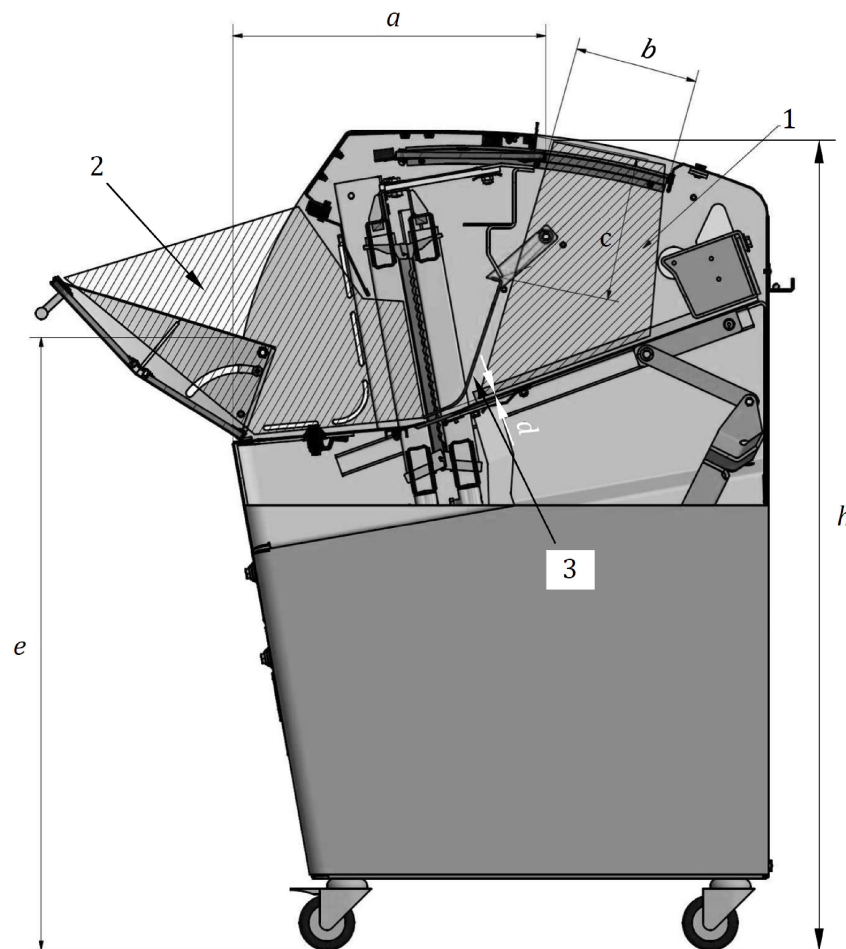
#### **4.2.1.1.3 Specific requirements for interlocking devices with guard locking**

If one of the requirements of 4.2.1.1.2 is not fulfilled, the interlocking guard shall be with guard locking. In this case the interlocking guards with guard locking shall meet the following requirements:

- the guard locking shall not be released until the hazardous movements have come to a safe standstill. The safe standstill can be achieved, for example, by using one of the following methods:
  - Solution via time relay, whereby opening of the guard locking at least after 1,1 times the maximum stopping time of the mechanics (without felts and measured on a machine after 100'000 cycles) is considered sufficient to evaluate the remaining residual risk as acceptable.
  - Solution via standstill detection, whereby this safety function shall meet at least a performance level = “a” according to EN ISO 13849-1:2015.
- all hazardous movements shall only be possible if all guards are closed, interlocked and locked.
- the guard locking shall be in accordance with EN ISO 14119:2013, 5.7. The monitoring of the guard locking shall meet at least a performance level “a” according to EN ISO 13849-1:2015.
- the stability of the guard locking shall be constructed in such way that it withstands the foreseeable forces in use

#### 4.2.1.2 Hazard zone I: Access to the cutting side of the blades

##### 4.2.1.2.1 Access to the still-standing blades through the infeed area



#### Key

- 1 Infeed area
- 2 Discharge area
- 3 Hold-down device
- a* Machine front to infeed opening
- b* Depth of infeed opening
- c* Infeed opening to upper edge of hold-down device
- d* ≤ 8 mm (space under hold-down device with access to the cutting side of the blades)
- e* height of the discharge opening
- h* height of the infeed opening

**Figure 3 — Distances in an exemplary Type 1 machine**

Access to the blades through the infeed area shall be prevented by:

- The height  $h$  of the infeed opening shall be at least 1000 mm. For table-top machines, the instruction handbook shall require the appropriate minimum table or support height (see 6.1 bb)).

and by one of the following measures:

- a guard that prevents unintentional access to the still standing blades.

The risk is considered to be sufficiently reduced if the exposed part of the blades is  $d \leq 10$  mm before the bread is placed into the machine. This requirement shall also be met when a force of  $\geq 5$  N is applied to the guard at any point and in direction for straight-line access to the blades.

NOTE: The hold-down device can be used as guard.

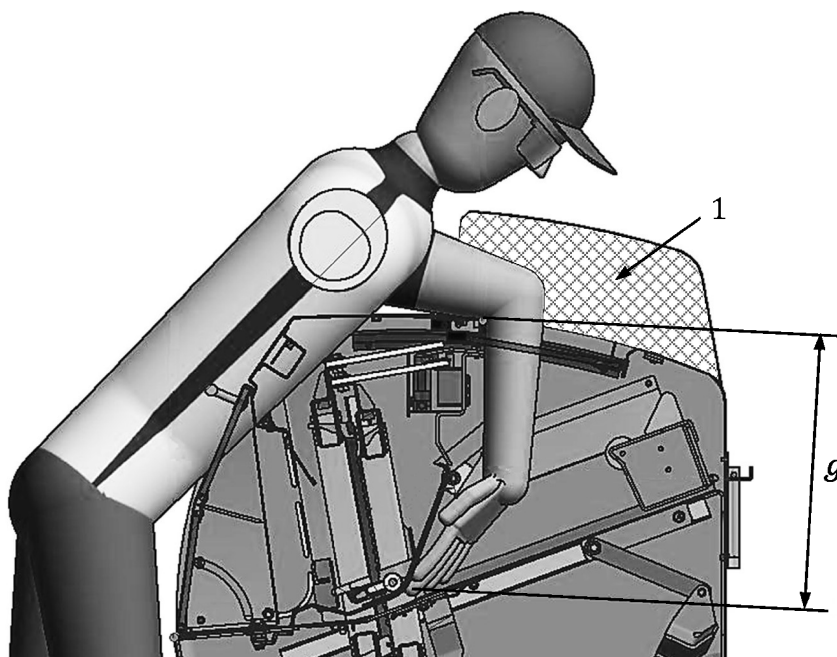
or

- a fixed guard with an opening to place the bread (e.g. realized by a hood), which allows access only from the front (see Figure 4), whereby reaching the still standing blade is prevented by at least double reaching around an obstacle

and

with a distance  $g \geq 230$  mm from the access opening to the next cutting edge of one of the blades (for access to the moving blade see chapter 4.2.1.2.2).

The operating instructions shall specify requirements for the installation (see 6.1).



**Key**

- 1 hood
- $g$  infeed opening to accessible blade

**Figure 4 – Solution with hood**

#### 4.2.1.2.2 Access to the moving blades through the infeed area

Access to the moving blades through the infeed area shall be prevented by one of the following measures:

- an interlocking guard (see 4.2.1.1.2) with the following requirements:

The dangerous movements shall stop within a stopping time of  $\leq 0,3$  s;

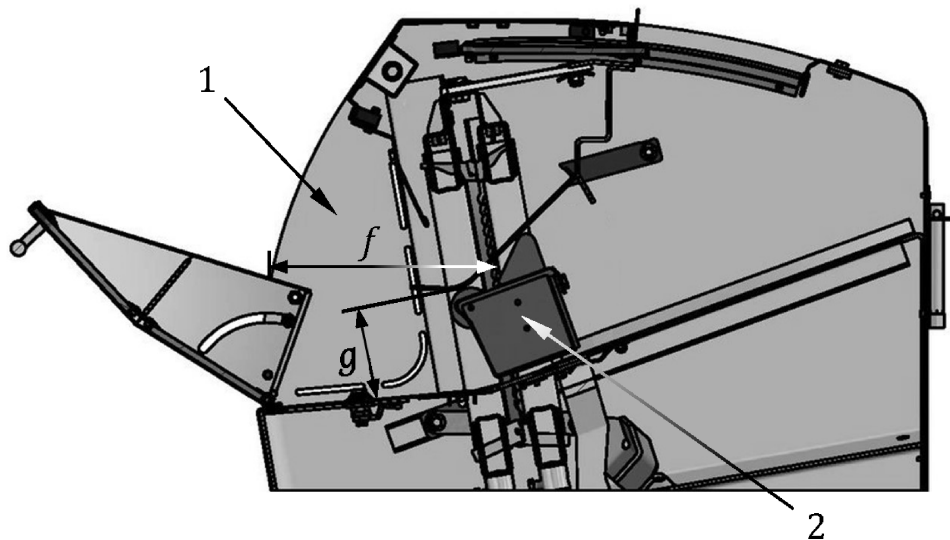
NOTE The after-run time of a well-run-in machine without braking components such as oiling felts is decisive.

- a fixed distance guard complying with EN ISO 13857:2019 or a fixed guard according to 4.2.1.2.1 in combination with an interlocking guard;
- an interlocking guard with guard locking (see 4.2.1.1.3).

In all cases, the dimensions of any openings shall be in accordance with EN ISO 13857:2019, Table 5, while the guard is closed.

#### 4.2.1.2.3 Access to the still-standing blades through the discharge area

- The gap between the blades and the blades and other parts of the machine shall be  $\leq 18$  mm at any point of the blade. The depth of the blades shall be  $\geq 6$  mm and the cutting side of all blades shall be in the same plane.
- Access shall be limited by the following dimensions:
  - It shall not be possible to access the blade through any opening below a height of  $e = 900$  mm from the floor (see Figure 3).
  - The shortest distance between any opening of the machine and the cutting side of the blades shall be  $f \geq 230$  mm.
  - The cumulative dimension to access the cutting side of the blades starting from the floor shall be  $S \geq 1300$  mm, where  $S = e + f$  (see Figures 3 and 5).
- At the end of the slicing cycle the pusher shall be in a position where access to the cutting side of the blades is prevented like shown in Figure 5. The detection of this position is not required. The height of the protected area that prevents access to the cutting side of the still-standing blades shall be  $g \geq 100$  mm measured from the bottom of the discharge area (see Figure 5)
- A warning concerning the risk of cutting shall be provided with the instructions (see 6.1 w)), and a warning label W022 according to EN ISO 7010:2020 shall be placed on the machine. The label shall be visible while the guard is opened.

**Key**

- 1 discharge area
- 2 pusher
- g* height to which the blades are protected by the pusher
- f* distance between front edge and blade

**Figure 5 — By the pusher-protected zone at the discharge area**

#### 4.2.1.2.4 Access to the moving blades through the discharge area

The crushing hazard between the blade frame and the machine frame shall be avoided. To achieve this, the maximum clearance between the blade frame and the machine frame, where accessible, shall be less than 4 mm, or the clearance between the blade frame and the machine frame shall be in accordance with EN ISO 13854:2019.

Access to the moving blades through the discharge area shall be prevented by one of the following measures:

- an interlocking guard (see 4.2.1.1.2) with the following requirements:

The dangerous movements shall stop within a stopping time of  $\leq 1$  s. The specified stopping time shall also be achieved after actuation of the emergency stop if existent;

NOTE The after-run time of a well-run-in machine without braking components such as oiling felts is decisive.

- an interlocking guard with guard locking (see 4.2.1.1.3).

The interlocking device shall be actuated after opening the guard by  $\leq 10$  mm.

As an alternative, the access to the cutting side of the blade can be prevented by measures according to EN ISO 13857:2019. Table 5.

#### **4.2.1.2.5 Access to the cutting side of the blades through the crumb tray/ crumb tray opening and through other areas of the machine**

Access shall be prevented by all the following requirements:

- The safety guard that gives access through these openings shall only be openable by means of tools, e.g. a special sash lock that is different from other sash locks used at the machine or another kind of lockable access.
- The dimensions of remaining gaps shall comply with EN ISO 13857:2019, Table 5, for the closed state of the guard.
- For the opened state of the guard access to the blades shall be prevented by dimensions complying with EN ISO 13857:2019, Table 4.
- If the opened state of the guard does not comply with EN ISO 13857:2019, Table 4, the safety guard that gives access through the crumb tray shall be interlocked.
- Warnings for trained personnel concerning cleaning and maintenance shall be provided with the instructions (see 6.1 u)).

#### **4.2.1.3 Hazard zone II: Access between the pusher and the blade frame or fixed parts**

The movement of the pusher shall be limited to  $\leq 0,5$  m/s.

The interlocking of the guards shall also effect on the pusher.

The stopping time of the pusher shall be  $\leq 0,3$  s or the interlocked guard shall be with guard locking.

#### **4.2.1.4 Hazard zone III: Access between the moving blade frame and fixed parts**

##### **4.2.1.4.1 Access between the moving blade frame and fixed parts through the infeed area**

The hazard is prevented by measures for access to the moving blade, see 4.2.1.2.2.

##### **4.2.1.4.2 Access between the moving blade frame and fixed parts through the discharge area**

The hazard is prevented by measures for access to the moving blade, see 4.2.1.2.4.

##### **4.2.1.4.3 Access between the moving blade frame and fixed parts through the crumb tray/ crumb tray opening**

The hazard is prevented by measures for access to the moving blade, see 4.2.1.2.5.

##### **4.2.1.4.4 Access between the moving blade frame and fixed parts through other areas of the machine**

The requirements of 4.2.1.2.5 shall be fulfilled.

#### **4.2.1.5 Hazard zone IV: Access to other moving parts of the machine (e.g. chains, belts, pulley)**

The requirements of 4.2.1.2.5 shall be fulfilled.

#### **4.2.1.6 Hazard zone V: Unintentional or intentional closing of doors and covers**

If the movement of a guard might cause a hazard, a safe end position using e.g. a spring or a counterweight shall be provided which, when open, ensures that the hood or cover swings back to a position beyond top dead centre or to another inherently safe position.

The contact energies on affected parts of the body shall be reduced to a safe level. It is assumed that only fingers and hands are affected.

Sufficient risk reduction can be assumed if all the following requirements are met:

- kinetic contact energy in the worst case  $\leq 4$  J;
- a contact pressure of  $\leq 50$  N/cm<sup>2</sup>;
- avoidance of shearing points, sharp edges, and tips;
- the protective hoods or covers shall be provided with a grab handle if not motor-driven.

#### **4.2.1.7 Hazard zone VI: Impact and cuts through the bagging tray (bagging sheet, bread rail), bag dispenser or other protruding machine parts**

The bagging tray (bagging sheet, bread rail), bag dispenser or other protruding parts of the machine shall be so designed as to prevent injury by impact and/or cutting.

The instructions shall provide information concerning the installation of the machine (see 6.1 z) and 6.1 aa)).

#### **4.2.1.8 Loss of stability**

Machines shall be designed not to tilt and fall and shall comply with all the following requirements as far as applicable:

- For machines designed to be fixed to the floor, the instruction handbook shall indicate the values of forces at the fixing points and the dimensions of the fixing elements.
- Machines not fixed to the building equipped with castors shall have at least two castors (or sets of castors) fitted with a locking device.
- Machines not fixed to the building shall not tilt and fall when inclined by 10° from the horizontal plane in the most unfavourable direction. Machines with castors shall be arranged in a position which entails the condition of lowest stability (minimum distance between the points of contact of the wheels with the supporting plane), and the wheels shall be blocked.

### **4.2.2 Mechanical hazards for Type-2-machines**

#### **4.2.2.1 General**

##### **4.2.2.1.1 General requirements**

Guards shall comply with EN ISO 13857:2019. When closed, gaps and holes shall have the dimensions according to EN ISO 13857:2019, Table 5.

Interlocking devices shall comply with EN ISO 14119:2013, Clause 7, and EN ISO 14120:2015. Warnings for trained and instructed personnel concerning regular visual control shall be provided with the instructions (see 6.1 s)).

Guards shall be so constructed that either the possibility to apply mechanical forces (pull -, push -, torsion force) is prevented or does not lead to a gap that allows to reach the danger zone. If a closed guard is easy to grip it shall be tested by applying a force of 150 N at the most unfavourable spot and in each direction.

Fasteners of guards within the customer's field of vision shall be secured against loosening by simple means, e.g. by gluing them in.

Warnings for trained and instructed personnel concerning cleaning and maintenance and concerning the storage of tools shall be provided with the instructions (see 6.1 u))

The manufacturer shall clarify in the instructions which work is to be performed by the trained and instructed personnel and which by the service technician (see 6.1 v)).

The pusher and other machine parts, except those parts that are sharp for functional reasons, shall be designed without sharp edges to avoid bump injuries.

Unless specified otherwise in specific clauses, the parts of the control system associated with interlocking shall fulfil all the following requirements:

- The electronic control unit shall perform the following plausibility check:

Before each new cutting cycle of the machine, the guard above the infeed or discharge area shall have been opened and closed at least once.

- The loss of any safety function (e.g. safety-related stop function initiated by safeguard) shall be detected and lead to a stop and prevent the restart of the machine.
- If a mechanical or electronic brake is used, the failure of the brake shall be detected and shall block the restart. The detection and the blocking of the restart shall meet at least a performance level “a” according to EN ISO 13849-1:2015.

NOTE This function can be realized by simple electronics.

- The interlocking guards may be designed as an interlocking guard with a start function.

In the case of damage that could lead to personal injury or contamination of the food, the machine shall be blocked for use by the personnel.

Unless specified otherwise in specific clauses, the parts of the control system associated with interlocking shall meet at least a performance level = “c” according to EN ISO 13849-1:2015.

#### **4.2.2.1.2 Specific requirements for interlocking devices without guard locking**

The machine controls shall ensure that hazardous functions stop before any hazard zones can be reached after an interlocked guard has been opened.

An interlocking guard without guard locking is only allowed

- if access through the openings is only limited to trained and instructed personnel. An appropriate measure is e.g. a tool-operated lock or another kind of lockable access.

The lockable access of the safety guard shall not permit any hazardous movement unless it is locked in such a way that it can only be opened with tools;

- if the stopping time complies with Table 1;
- if the interlocking device is activated at the latest after opening of the guard by more than 8 mm.

If the requirements mentioned above are not fulfilled, the interlocking guard shall be with guard locking.