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Food processing machinery — Forming 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 - Formmaschinen - Sicherheits- und Hygieneanforderungen

This European Standard was approved by CEN on 6 September 2014.

EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels

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Foreword

This document (EN 15165:2014) 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of an identical text or by endorsement, at the latest by April 2015 and conflicting national standards shall be withdrawn at the latest by April 2015.

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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 document 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 applies to forming machines, used for forming food products with a mould into portions, as defined in 1.2.

This document applies to both machines standing on the floor and table top machines, and also to machines integrated in a processing line (i.e. interfaces, when the machine is combined with other machines).

This European Standard covers the following auxiliary devices and interchangeable equipment:

a) auxiliary devices:

   1) paper interleavers;

   2) croquette attachment;

   3) meat ball rollers;

   4) stick inserters;

   5) specific material/product conveyors;

   6) specific lifting and tilting devices.

b) interchangeable equipment:

   1) croquette attachment;

   2) meat ball rollers;

   3) stick inserters;

   4) specific material/product conveyors;

   5) specific lifting and tilting devices.

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

This European Standard deals with the significant hazards, hazardous situations and events arising during the whole lifetime of the machine, including the phases of transport, assembly and installation, commissioning, maintenance, dismantling, disabling and scrapping and use as defined in EN ISO 12100:2010, 5.4.

This European Standard is not applicable to forming machines which are manufactured before the date of publication of this document by CEN.

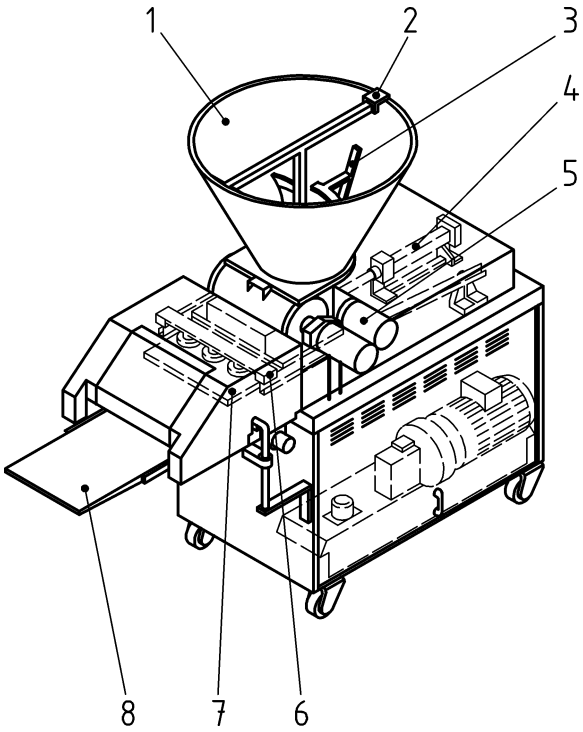
1.2 Machine description

This European Standard specifies requirements for the design, manufacture and operating of forming machines, e.g. for rissoles, hamburgers, in the following only referred to as machines.

It specifies safety and hygiene requirements for design and manufacture of forming machines, which are used for forming food products into portions with a mould. The mould may have a sliding or rotary movement and is filled with product in one position and emptied in another.

These machines have a feed provision, which is in the most cases a feed intake hopper (see Figure 1 and Figure 2). Moulds may be filled by the action of rotating worm, rotating paddles or reciprocating hydraulic arms. Machines produce single or multiple lines of products.

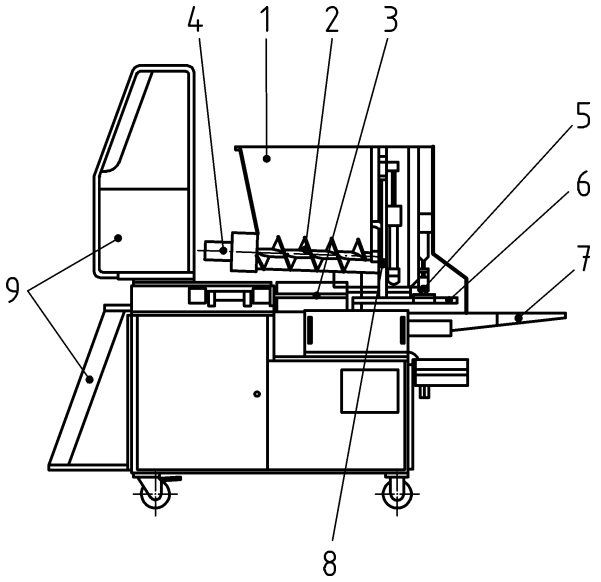
Forming machines are intended for use on ground or minced meat, meat products, fish, vegetables or similar products. Use includes manufacture of product, setting, treating or process changeover, cleaning, fault finding and maintenance.



Key

1	hopper	5	feed drive
2	hopper insert	6	knock out unit
3	feed spiral	7	mould plate
4	mould plate drive	8	conveyor

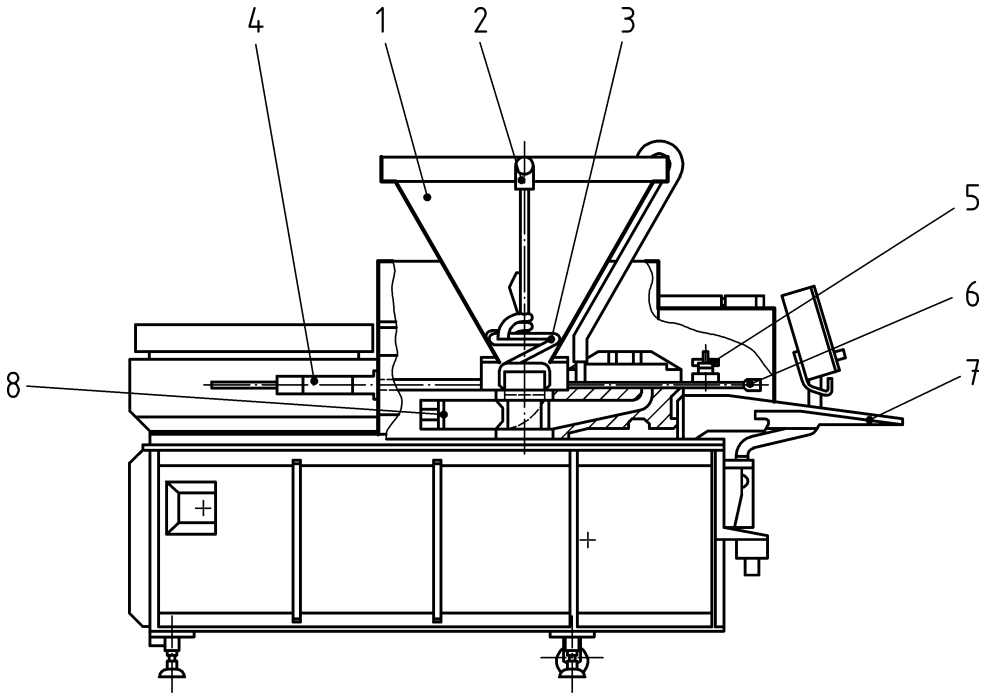
a) Floor machine with hopper



Key

1	trough	6	mould plate
2	feed spiral	7	conveyor
3	mould plate drive	8	press block
4	feed drive	9	stairs and cleaning platform
5	knock out unit		

b) Floor machine with trough

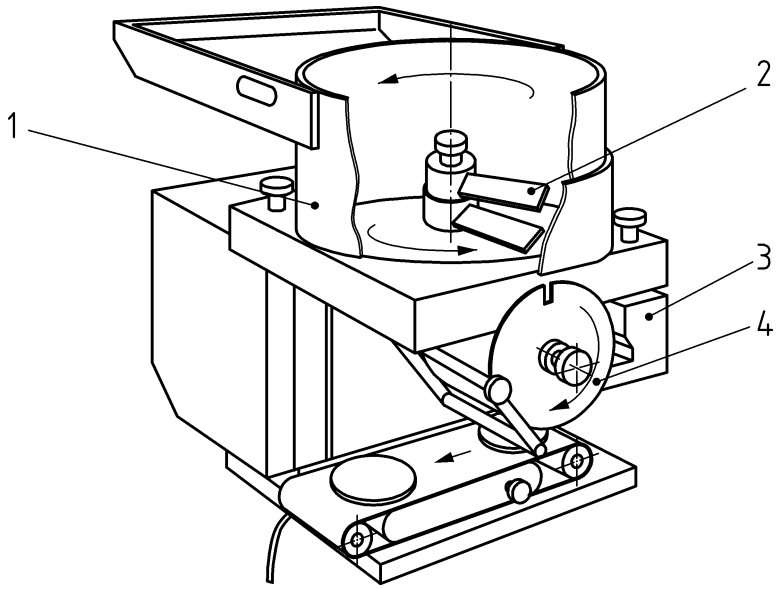


Key

1	hopper	3	feed spiral	5	knock out unit	7	conveyor
2	hopper insert	4	mould plate drive	6	mould plate	8	press plungers

c) Floor machine with hopper

Figure 1 — Floor machines



Key

1 hopper

2 paddles

3 interleaver

4 drum (mould plate)

Figure 2 — Table top machine with tray

1.3 Combinations of forming machines and auxiliary devices and/or interchangeable equipment

1.3.1 Definition

A combination of a forming machine with auxiliary devices and/or interchangeable equipment becomes a new machine, when the following requirements are fulfilled / met:

— the (combined) device/equipment works together as an entity, meaning from production related view they form an entity (i.e. the coaction will be focused on a shared aim) and

— they are controlled as an entity, via a shared or linked control system and

— they work – regarding safety – together as an entity and also form a unit in this aspect.

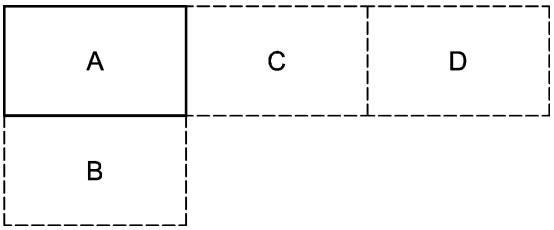
According to this definition a new machine is not existent when in a total complex single autonomous functional machines are connected in relation to function and control, but do not form a unit in relation to safety. This is given e.g. when:

— on the single interfaces / interconnection points none ore only minor hazards between the separate machines occur, due to their combination;

— the emergency stop of one machine is connected / looped through to the next machine since the operator’s position is only at the next machine.

In such mechanical equipment each single machine can still be regarded autonomous in relation to safety.

1.3.2 Example for combinations



Key

A forming machine

B auxiliary device (optional; e.g. paper interleaver)

C interchangeable equipment (optional; e.g. croquette attachment)

D auxiliary device (optional; e.g. product conveyor)

Figure 3 — Example of combination

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 349, *Safety of machinery — Minimum gaps to avoid crushing of parts of the human body*

EN 574, *Safety of machinery — Two-hand control devices — Functional aspects — Principles for design*

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

EN 953:1997+A1:2009, *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 13288, *Food processing machinery — Bowl lifting and tilting machines — Safety and 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 61496-1, *Safety of machinery — Electro-sensitive protective equipment — Part 1: General requirements and tests (IEC 61496-1)*

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 11204:2010, *Acoustics — Noise emitted by machinery and equipment — Determination of emission sound pressure levels at a work station and at other specified positions applying accurate environmental corrections (ISO 11204:2010)*

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

EN ISO 13856-2, *Safety of machinery — Pressure-sensitive protective devices — Part 2: General principles for design and testing of pressure-sensitive edges and pressure-sensitive bars (ISO 13856-2)*

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)*

EN ISO 14122-3, *Safety of machinery — Permanent means of access to machinery — Part 3: Stairs, stepladders and guard-rails (ISO 14122-3)*

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
mould plate
tool for forming the product

3.2
ejector mechanism
equipment e.g. knock out device for discharging, dividing of product

3.3
discharge conveyor
conveyor belt for evacuation of formed product

3.4
interleaver
equipment for application of plastic film/paper sheets

3.5
stick inserter
attached part for sticking of formed portions

3.6
meat ball roller
attached part for forming meat balls

3.7
croquette attachment
attached part for forming croquettes

3.8
feed intake hopper
container for receiving products to be processed with safety function

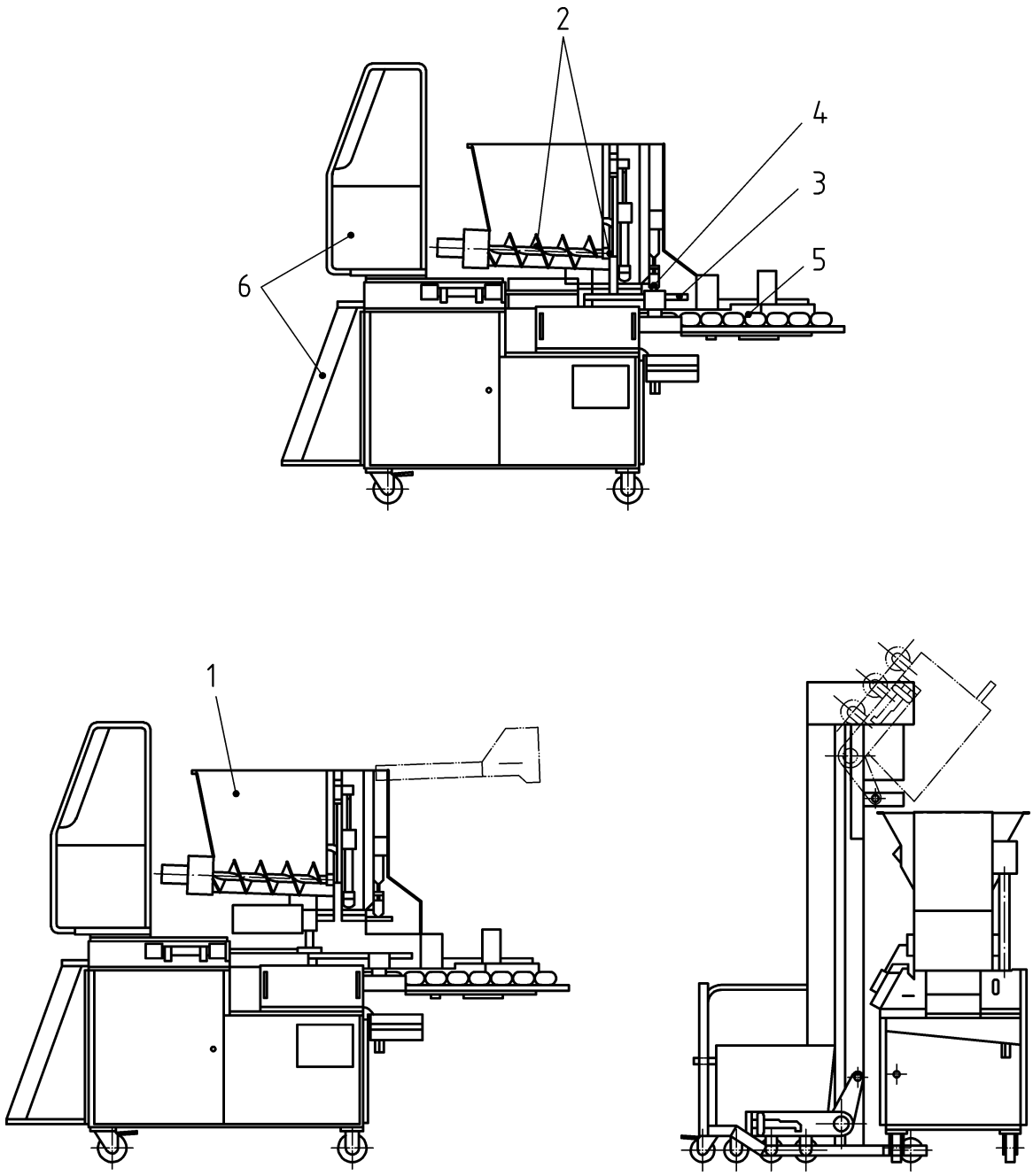
3.9
divided hopper
feed intake hopper with a disconnecting point in the upper hopper part

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 the risk associated with the identified hazards (see Table 1).

Table 1 — List of significant hazards

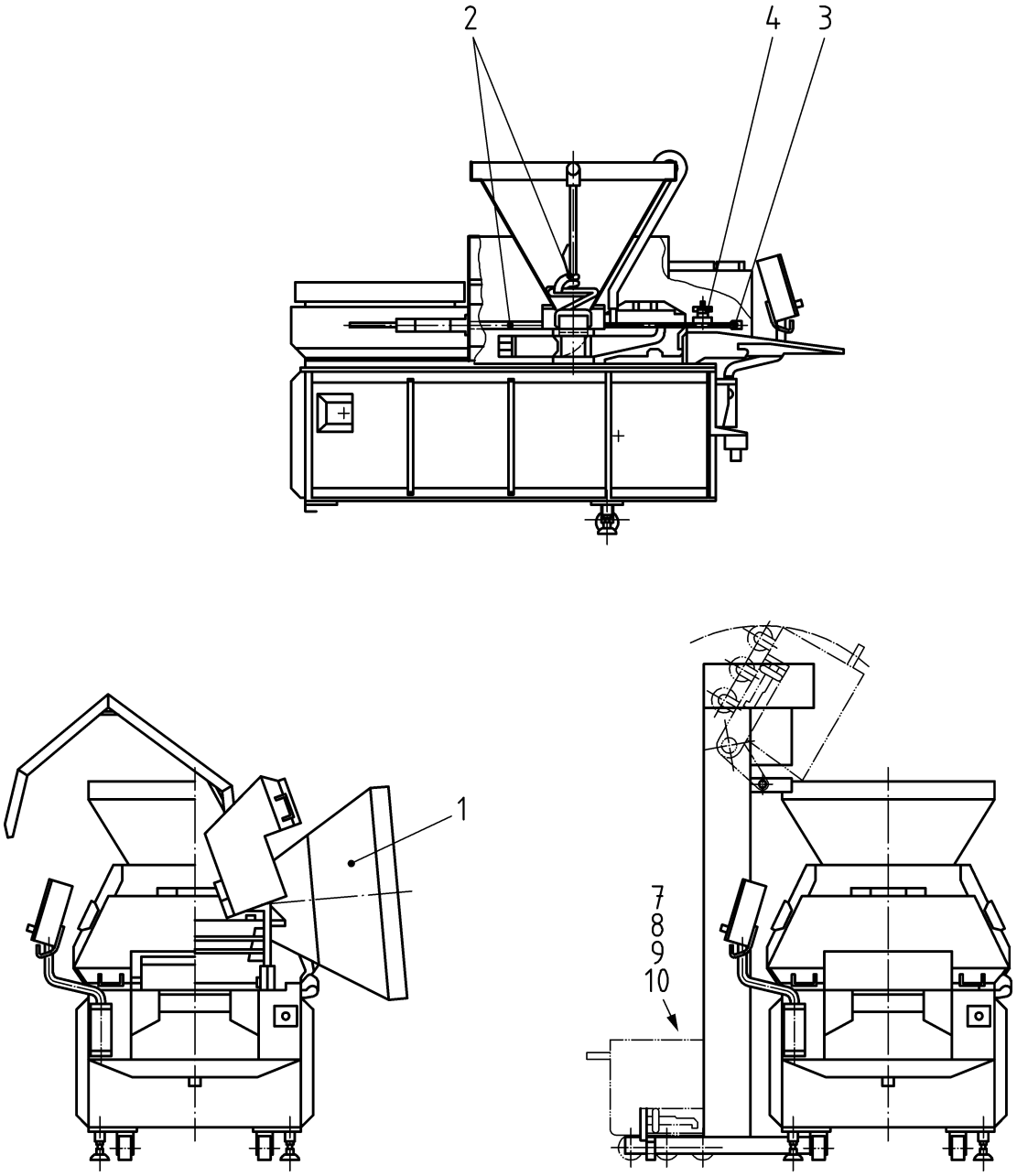
Hazards, hazardous situations and hazardous events	**Location or cause**	**Clause/subclause in this European Standard**
Hazards	**General**	5.1
Mechanical hazards	**General**	5.2
— crushing; — severing; — shearing; — trapping; — cutting; — drawing in	zone 1 and zone 2: feed intake hopper and infeed equipment (see Figure 4); zone 6: working platforms	5.3.1 to 5.3.2
	zone 3: mould filling area (see Figure 4)	5.3.3 to 5.3.4
	zone 4: ejector mechanism (see Figure 4)	5.3.5
	zone 5: discharge conveyor, transportation belt with drive or guide roller	5.3.6; to 5.3.10
	zone 7 to zone 10:loading devices	5.3.11 to 5.3.12
	table top machines	5.4
Electrical hazards	electric shock from direct or indirect contact with live components external influences on electrical equipment (e.g. cleaning with water)	5.5
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; - of mechanical damage and physical injury caused by malfunctions	5.6
Hazards generated by loss of stability	The complete machine and where used the loading device or auxiliary machine	5.7
Hazards generated by noise	Forming machines and their auxiliary components generate noise	5.8
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.	5.9
Hazard generated by neglecting hygienic design principles	e.g. contamination by microbial growth or foreign materials	5.10



Key

1 Zone 1
2 Zone 2
3 Zone 3
4 Zone 4
5 Zone 5
6 Zone 6

a) Floor machine with trough



Key

1 Zone 1
2 Zone 2
3 Zone 3
4 Zone 4
7 Zone 7
8 Zone 8
9 Zone 9
10 Zone 10

b) Floor machine with hopper

Figure 4 — Danger zones

5 Safety and hygiene requirements and/or –protective measures

5.1 General

Forming machines shall comply with the safety requirements and/or protective measures of this clause.

In addition, they shall be designed according to the principles of EN ISO 12100 for hazards relevant but not significant, which are not dealt with by this document (e.g. sharp edges).

The outside walls shall be designed (e.g. vertical and smooth) to prevent the operator climbing on the machine. This also applies to interlocked steps in their folded position.

5.2 Mechanical hazards – General

5.2.1 Guard interlocking

The safety related parts of the control system implementing the interlocking function shall comply at least with EN ISO 14119:2013, 4.2 (interlocking devices without guard locking) and the safety related components of the control system shall comply with at least performance level “c” in accordance with EN ISO 13849-1.

The interlocking devices shall be built inside the machine housing and shall comply with EN ISO 14119:2013, 4.2 and Clause 7.

Position detectors used for guard interlocking shall be designed or selected and installed:

— in accordance with the requirements of 5.10 for hygiene (taking account of cleaning methods and agents, cleaning with water);

— in accordance with the requirements of EN ISO 14119 for minimising defeat possibilities;

— for withstanding the mechanical constraints that can be reasonably expected.

Preferably they shall be located inside the machine enclosure.

5.2.2 Cutting hazards

Piston and feeder shall be removed periodically. These components are sharp, and special measures shall be taken. For such components, designers shall provide means of attaching a tool for mounting and dismounting to avoid hand contact and a box, or surround guard, to protect against the sharp edges of the tools during handling and transportation. Explanations on the use of these protective means shall be included in the Instructions for use.

5.3 Forming machines with feed intake hopper

5.3.1 Technical solutions for infeed area

The access to the danger points on the feeding mechanism, infeed auger or plough in the feed intake hopper shall be prevented or restricted.

5.3.1.1 The access is prevented by the observance of one of the following measures:

— closed feed intake hopper including a closed loading device for products (e.g. feed screw, pipeline with pump), see 5.3.2.1;

— the design of a closed loading device and additional measures at the feed intake hopper mouth, see 5.3.2.2;

— the use of a cover at the feed intake hopper in accordance with EN 953 and 5.3.2.3.

5.3.1.2 The access is restricted by the observance of one of the following measures:

— the use of fixed distance guards (e.g. fence) in accordance with EN 953 and 5.3.2.4;

— the use of a trip bar at the complete circumference of the feed intake hopper edge with use of adequate safety distances, see 5.3.2.5 and Figure 5;

— the use of a light barrier at the complete circumference of the feed intake hopper edge with use of adequate safety distances, see 5.3.2.6 and Figure 5;

— the use of a divided hopper with use of adequate safety distances, see 5.3.2.7 and Figure 6.

5.3.1.3 Additional measures can be required for:

— use of interlocked steps and ladders, see 5.3.2.8;

— feed intake hoppers with plough, see 5.3.2.9;

— view into the hopper, see 5.3.2.10.

5.3.2 Specific requirements for types of hoppers

5.3.2.1 Forming machines with a closed feed intake hopper

If the loading device is not connected in a permanent way to the hopper, there shall exist an interlocking device.

On these forming machines the feed intake hopper and the loading device (e.g. lift-tilt device) shall be designed to be completely closed. The loading device (e.g. lift-tilt device) shall completely enclose the mouth of the hopper. The openings in the enclosure and the gaps in the enclosure shall comply with EN ISO 13857:2008, Table 4.

For requirements relating to the interlocking device see 5.2.2.

5.3.2.2 Forming machines with feed intake hopper and additional measures at the hopper mouth

Alternative measures at the hopper mouth:

When the requirements of 5.3.2.1 are not completely fulfilled, alternative measures shall be necessary for preventing access.

Such alternative measures can be:

— horizontal bars in the hopper mouth with a distance < 120 mm between themselves and a safety distance > 850 mm up to the danger point at the feeder or at the plough/counter auger;

— by using this measure, there shall be mirrors for looking into the feed intake hopper or filling level indicators and there shall be sloping surfaces of the machine base housing.

5.3.2.3 Forming machines with a cover over feed intake hopper

On these forming machines a cover shall be provided on the hopper edge at the feed intake hopper. The cover shall be interlocked. When the filling machine is running with or without product, the feeding mechanism shall come to a standstill within 1 s after the front edge of the cover has been raised more than 50 mm.

For requirements relating to the interlocking system of the cover, see 5.2.2.

Openings in the cover shall be designed as specified in EN ISO 13857:2008, Table 4.

5.3.2.4 Forming machines with a fixed distance guard

On these forming machines the requirements relating to fixed distance guards shall meet EN 953:1997+A1:2009, 3.22. The height of the fence shall be in accordance with EN ISO 13857:2008, Table 2. Accesses (e.g. doors) shall be interlocked.

For requirements relating to the interlocking system of the doors, see 5.2.2.

5.3.2.5 Forming machines with mechanical trip bar at the feed intake hopper

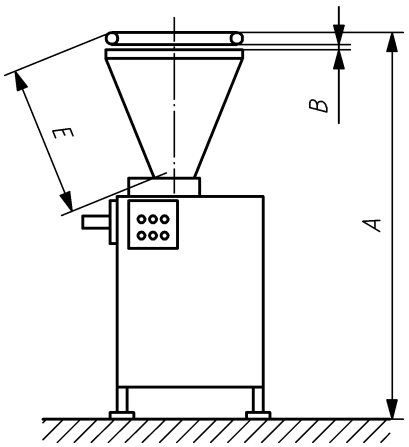
At these forming machines there shall be a mechanical trip bar on the complete circumference of the hopper edge at the feed intake hopper. When the forming machine is running with or without product, the feeding mechanism shall come to a standstill within 1 s after activating the trip bar (see Figure 5).

The design of the trip bar shall be in accordance with EN ISO 13856-2.

For requirements relating to the interlocking of the trip bar, see also 5.2.2.

The design dimension *S*, being the sum of distance *A* measured from the floor/standing area to the upper edge of the trip bar and the distance *E* measured from the upper edge of the trip bar to the danger point at the feeder in the feed intake hopper shall be $S = A + E \geq 2250$ mm.

The distance *A* from the floor/standing area up to the upper edge of the trip bar shall be ≥ 1 600 mm. The distance *B* between hopper edge and trip bar shall be ≤ 50 mm (see Figure 5).



Key

A ≥ 1 600 mm

S = *A* + *E* ≥ 2 250 mm

B ≤ 50 mm

Figure 5 — Forming machine with feed intake hopper and switch bar/light barrier – safety distances

5.3.2.6 Forming machines with light barrier at feed intake hopper

At these forming machines, a light barrier shall be provided on the complete circumference of the hopper edge of the feed intake hopper. When the forming machine is running with or without product, the feeding mechanism shall come to a standstill within 1 s after the light barrier has been activated (see Figure 5).

The design of the light barrier shall be in accordance with ESPE Type 2 of EN 61496-1.

For requirements relating to the safety distances see Figure 5.

5.3.2.7 Forming machines with divided hopper

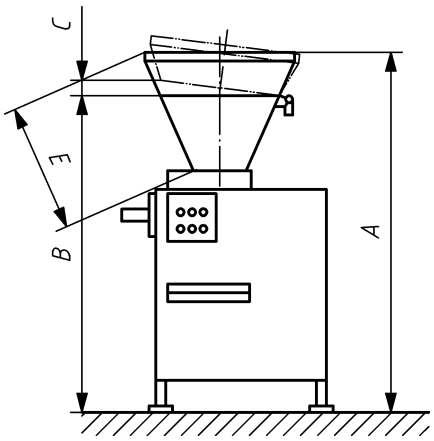
5.3.2.7.1 On these forming machines the upper part of the feed intake hopper shall be movable. The upper part of the hopper shall be interlocked. If the machine is running with or without product, the feeder shall come to standstill within 1 s, after the gap C between lower and upper part of the hopper has been opened > 50 mm (see Figure 6).

For requirements relating to the interlocking of the upper part of the hopper, see 5.2.2.

The design dimension *S*, being the sum of distance *A* measured from the floor/standing area to the upper edge of the feed intake hopper and the distance *E* measured from the hopper edge to the danger point at the feeder in the feed intake hopper shall be *S* = *A* + *E* ≥ 2450 mm.

The distance A from the floor/standing area to the hopper edge of the feed intake hopper shall be ≥ 1 600 mm (see Figure 6).

5.3.2.7.2 On these forming machines without loading device, the distance B from the floor/standing area to the separation point of the feed intake hopper shall be ≤ 1 400 mm (see Figure 6).



Key

A ≥ 1 600 mm

B ≤ 1 400 mm

C ≤ 50 mm

S = *A* + *E* ≥ 2 450 mm

Figure 6 — Forming machines with divided hopper – safety distances

5.3.2.8 Additional requirements in case of interlocked steps and ladders

5.3.2.8.1 Steps and ladders

If danger points in the feed intake hopper of forming machines can be reached from the standing area of a step or ladder (falling below the safety dimension of 2 250 mm, see 5.3.2.5, or 2 450 mm, see 5.3.2.6 and 5.3.2.7.), the steps or ladders shall be interlocked (see Figure 7). When the forming machine is running with or without product, the feeder shall come to a standstill within 1 s after the interlocking system has been actuated when the step or ladder has been moved into its working position.

For requirements relating to the interlocking system of the step or ladder, see 5.2.2.

The distance A_1 from the standing area of a step to the hopper edge shall be > 1 100 mm (see Figure 7). On feed intake hoppers with a diameter of the feed intake hopper mouth < 1 100 mm, a distance A_1 from the standing area to the hopper edge ≥ 700 mm is sufficient (see Figure 7).

The standing area of steps shall have a width ≥ 500 mm, a length ≥ 400 mm and a toe rail of a height of 15 mm. If the standing area is < 500 mm above ground, an area of a width ≥ 400 mm and a length ≥ 350 mm is sufficient. The standing area shall be of the non-slip type.

Standing areas of steps which are located > 1 200 mm above ground shall also be limited with handrail that shall fulfil the requirements of EN ISO 14122-3.

The standing area of the intermediate step shall have a width of ≥ 300 mm and a length of ≥ 200 mm. Treads of ladders shall have a width of ≥ 500 mm and a depth of ≥ 80 mm.

The ladder shall be arranged at an angle of < 70° to the horizontal (see Figure 7) and equipped with a handrail commencing from a measurement higher than 1 200 mm.

The outside walls shall be designed (e.g. vertical and smooth) to prevent the operator climbing on the machine. This also applies to interlocked steps in their folded position.

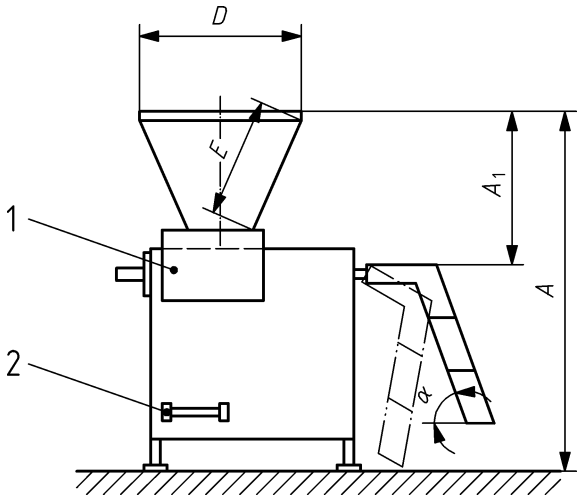
The intermediate step should not be interlocked if the distance to danger zone is big enough.

5.3.2.8.2 Two-hand control at feed intake hopper edge

On the feed intake hopper edge a two-hand control may override the interlocking of the step or the ladder (see Figure 8). The safety distance between the two-hand control and the danger zone is higher than or equal to 550 mm.

The two-hand control shall fulfil the requirements of EN 574, Type 2.

The use of the step and the two-hand control shall be described in the instruction handbook.



$S = A + E \geq 2\,250$ mm or $\geq 2\,450$ mm

$A_1 \geq 1\,100$ mm, if $D \geq 1\,100$ mm

$A_1 \geq 700$ mm, if $D < 1\,100$ mm

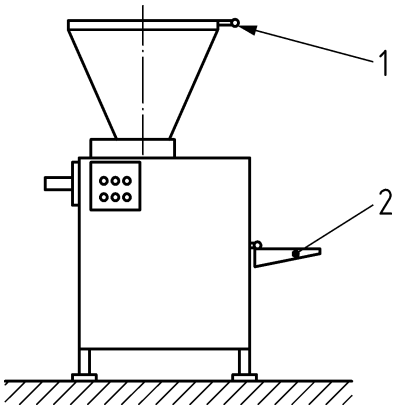
α ≤ 70°

Key

1 feeder

2 step/ladder, interlocked

Figure 7 — Forming machine with feed intake hopper — Example: ladder – safety distances



Key

1 two-hand control

2 step, interlocked

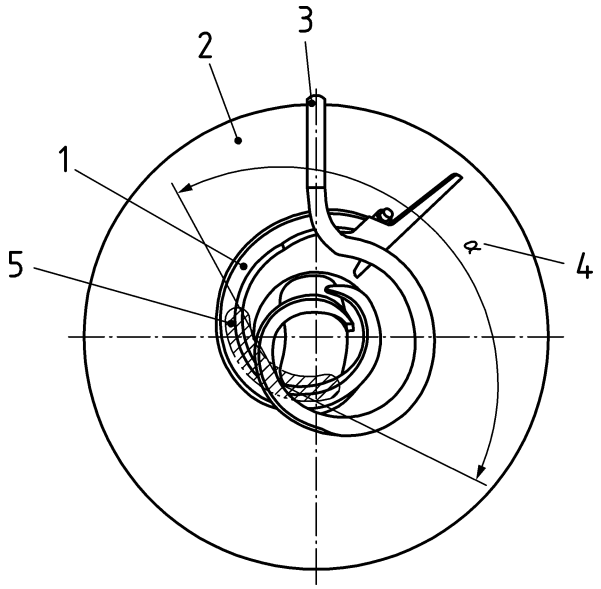
Figure 8 — Forming machine with feed intake hopper — Example: step, two-hand control

5.3.2.9 Forming machines with plough in the feed intake hopper

The access to the danger point at the plough/counter auger and the infeed auger in the feed intake hopper shall be prevented or restricted. This can be achieved by the observance of one of the following measures:

5.3.2.9.1 The distance between plough/counter auger (fixed) and the infeed auger (rotating) in the feed intake hopper shall be ≤ 6 mm and have an angle of pitch > 90° (see Figure 9).

5.3.2.9.2 The relative position of plough/counter auger (fixed) and infeed auger (rotating) in the feed intake hopper results in a safety situation, if there is a distance > 30 mm between plough/counter auger and infeed auger.



Key

1 infeed auger

2 hopper wall

3 plough/counter auger

4 α = angle of pitch

5 danger point at the plough/counter auger

Figure 9 — Plough in feed intake hopper

5.3.2.10 View into feed intake hopper

With a feed intake hopper height > 1 600 mm above the standing surface, a view into the feed intake hopper (e.g. by means of a mirror, fill level indication) shall be ensured.

5.3.3 Mould filling area in the feed intake hopper

Zone 3

Access to the danger zone shall be prevented when the rams/knock out bar are in normal operation.

This can be achieved by means of the safeguards described under 5.3.1 above.

5.3.4 Crushing points between the mould plate and other parts of the machine

Zone 3

If hazards cannot be eliminated by design, e.g. by use of distances according to EN ISO 13857 and EN 349, the access to any remaining crushing point between the moving mould plate and other parts of the machine shall be prevented.

This can be achieved by a combination of fixed and interlocking guards. The safety related parts of the control system implementing the interlocking function shall be at least performance level “c” in accordance with EN ISO 13849-1. Apart from the actual discharge opening all openings shall comply with EN ISO 13857:2008, Table 4.

Discharge openings shall meet the following requirements:

— For openings of heights less than or equal to 20 mm the distance to the nearest hazardous area shall be greater than or equal to 120 mm.

— For openings of height greater than 20 mm and less than or equal to 40 mm this distance shall be greater than or equal to 550 mm.

— For openings of height greater than 40 mm and less than or equal to 160 mm the distance shall be greater than or equal to 850 mm. The guarding to provide this safety distance shall be interlocked and arranged by hinge or act as an ESPE.

If the discharge conveyor is acting as a guard and also removable, it shall be interlocked.

5.3.5 Ejector mechanism

Zone 4

Where hazards cannot be eliminated by design, access to the danger zone shall be prevented by a movable interlocking guard.

For requirements relating to the interlocking device see 5.2.2, EN 953 and EN ISO 13857.

5.3.6 Plastic film/paper interleaver (where fitted)

Zone 5

Access to the danger zone shall be prevented while the machine is in motion.

This can be achieved by fixed and/or interlocking guard. For requirements relating to the interlocking device see 5.2.2, EN 953 and EN ISO 13857. The paper containers themselves may act as guard, if access is not possible in the absence of paper.

5.3.7 Mechanism to insert sticks (where fitted)

Zone 5

Where a stick inserter is fitted access to the danger zone shall be prevented.

This can be achieved by fitting an interlocking guard. For requirements relating to the interlocking device see 5.2.2, EN 953 and EN ISO 13857.

5.3.8 Meat ball roller (where fitted)

Zone 5

If access to danger zones is not prevented by mould plate and ejector safeguarding then a movable interlocking guard shall be used. For requirements relating to the interlocking device see 5.2.2, EN 953 and EN ISO 13857.

5.3.9 Drives (e.g. vee-belts and pulleys; chains and sprockets; gears, drive shafts and clutches)

Access to the danger zone of the machine drives shall be prevented while the drives are in motion.

Given by the infrequent need for access this is normally achieved by fixed guards in accordance with EN 953 and EN ISO 13857. For requirements relating to the interlocking device see 5.2.2, EN 953 and EN ISO 13857.

5.3.10 Discharge conveyor (where fitted)

Zone 5

Access to the inrunning nips between conveyor belt and the end rollers shall be prevented by fixed guards in accordance with EN 953 and EN ISO 13857.

5.3.11 Loading devices

— Zone 7 to 10

This standard deals with loading devices and lift-tilt devices.

Loading devices shall comply with the requirements of EN 13288 as far as applicable.

Lift-tilt devices of various designs exist, e.g. with

— fixed lifting arms for holding the transport cars,

— lifting arms which allow the transport car to swivel in a gondola and thus remain horizontal,

— vertical pillar mast with forks for holding transport cars or containers.

Additional requirements for lift-tilt devices on forming machines see 5.3.12.

5.3.12 Additional requirements for lift-tilt devices

5.3.12.1 Installation

Lift-tilt devices can be free standing or connected to the forming machine.

Lift-tilt devices shall be designed in such way that they are stable.

A special device shall be provided to prevent the lift-tilt device or the machine falling over, if the loading device is lowering and meets an obstacle. This can be achieved e.g. by the observance of one of the following measures:

— use of a hold to-run control for the lowering of the loading device,

— use of gravity only for lowering the loading device,

— a special device on the machine or lift-tilt device so that powered descent of the loading device onto an obstacle cannot cause instability. This can be e.g. a level switch, to automatically stop the descent.

Where the machine or the lift-tilt device is fixed to the floor, overload conditions to the loading components of the lift-tilt device shall be prevented in the event of the power operated loading device meeting an obstacle.

This can be achieved e.g. by the observance of one of the following measures:

— a slipping clutch,

— over travel switch (e.g. control limit switch with snap action and slow action switching elements, positive break contacts) to automatically stop the lowering motion.

5.3.12.2 Lifting device

Lifting devices shall be designed to prevent transport cars or containers from falling off. This can be achieved e.g. by the observance of all following measures:

— a locking device at the lifting device for transport cars or container,

— a distance from the lifting device to the machine base > 120 mm,

— a distance from the transport car or lifting device to the feed intake hopper edge > 25 mm.

By using a hold-to-run control it is permitted to use a smaller distance.

5.3.12.3 Mast-type lift-tilt device

The danger points between the lifting device and the mast on the side opposite the loading device shall be protected. This can be achieved by the observance of following measures:

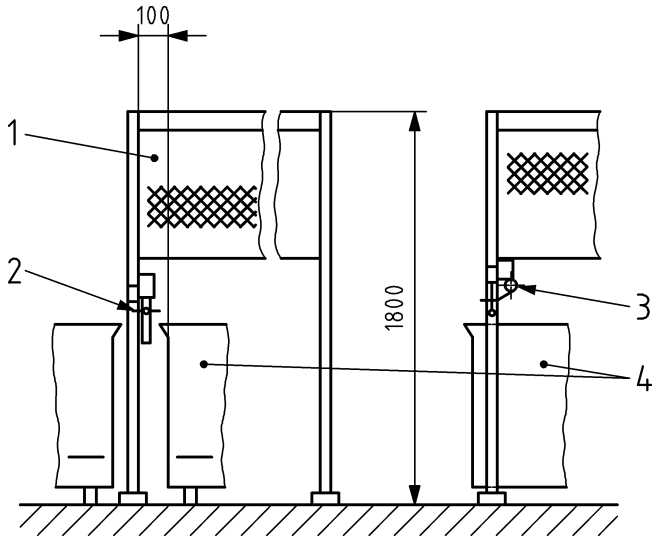
5.3.12.3.1 A distance between the lifting device and the mast of ≥ 120 mm.

5.3.12.3.2 If the tilt range of the lifting device is > 2 000 mm or more above the floor (standing area), no guarding is required if the distance between the lifting device and the mast is ≥ 60 mm.

5.3.12.4 Lift-tilt devices for feed heights > 2 500 mm

The path of movement of the loading device, with the exception of the run-in and run-out opening, shall be protected by means of a guard (e.g. a protective fence). An electro-sensitive protective device (e.g. a light barrier, mechanical bar or flap) shall be fitted on the upper edge of the run-in and run-out opening to prevent lifting of incorrectly positioned transport cars or containers (see Figure 10).

For requirements relating to the interlocking system of the mechanical bar or mechanical flap see 5.2.2 as well as the light barrier, see 5.3.2.6.



Key

1 cover designed as lattice rods

2 suspended mechanical flap

3 mechanical flap

4 container

Figure 10 — Safety device for container position

5.3.12.5 Lowering velocity of the loading device

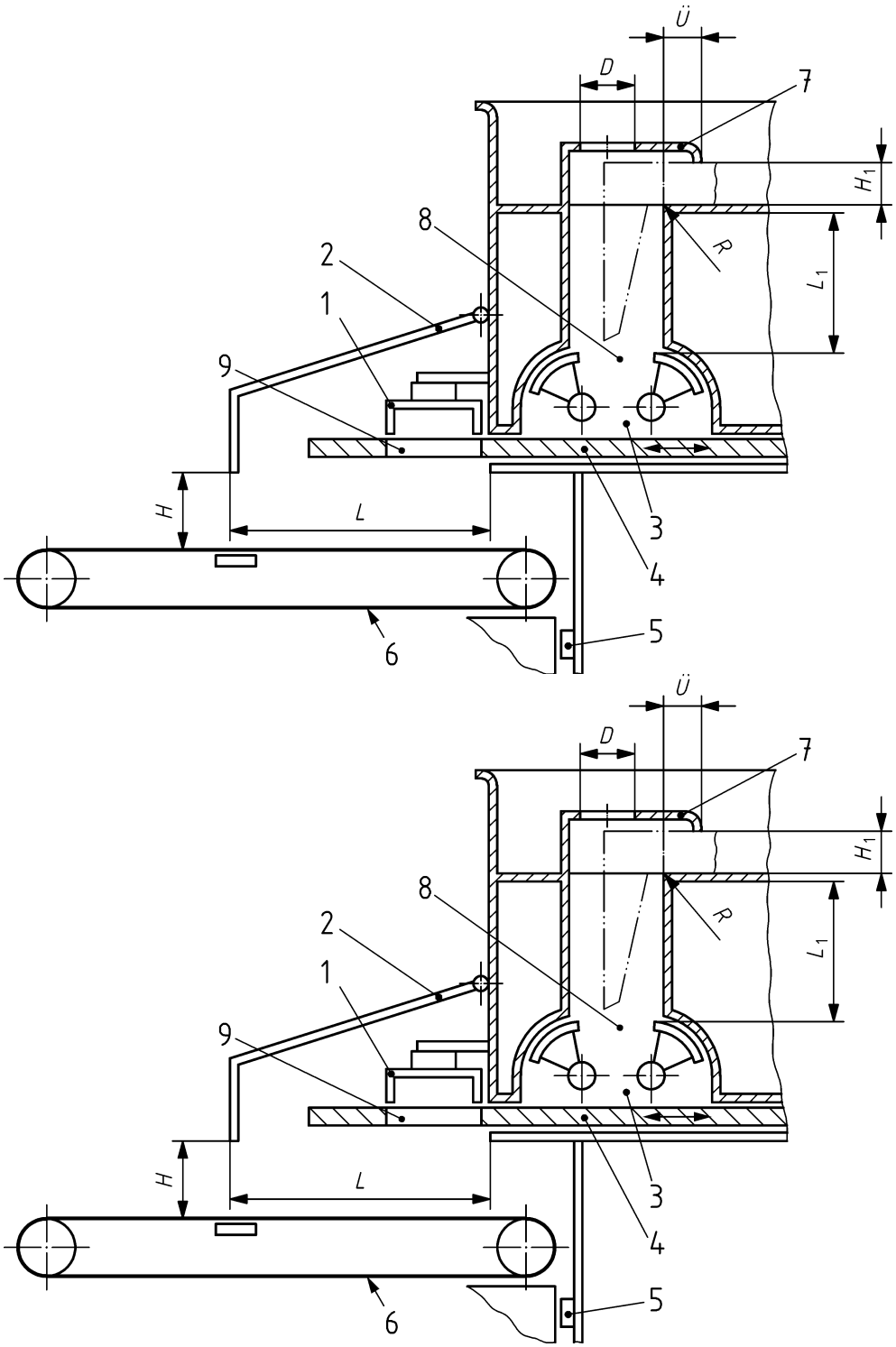
5.3.12.5.1 The lowering velocity shall be ≤ 0,4 m/s when it is controlled by a hold-to-run control.

5.3.12.5.2 The lowering velocity shall be ≤ 0,1 m/s when the lowering motion is controlled automatically or without a hold-to-run control. In this case, the last 0,5 m until the transport car or container touches the floor shall be controlled by a hold-to-run control.

5.4 Additional requirements for table top machines with tray

5.4.1 Infeed side

The access to the danger point at the infeed side (portioning device/auger) shall be prevented by a non-removable restrictor plate above the infeed with dimensions in accordance with Figure 11.



Outfeed side

$H \leq 20$ mm	$H \leq 40$ mm	40 mm < $H \leq 160$ mm
$L \geq 120$ mm	$L \geq 550$ mm	$L \geq 850$ mm

Infeed side

$H_1 \leq 40$ mm	$Ü \geq 40$ mm
$L_1 \geq 120$ mm	$D \leq 52$ mm

Key

1	extraction device	6	conveyor
2	hood	7	non removable restrictor plate
3	auger	8	danger point at the infeed side
4	portioning slide	9	danger point at the outfeed side
5	position switch		

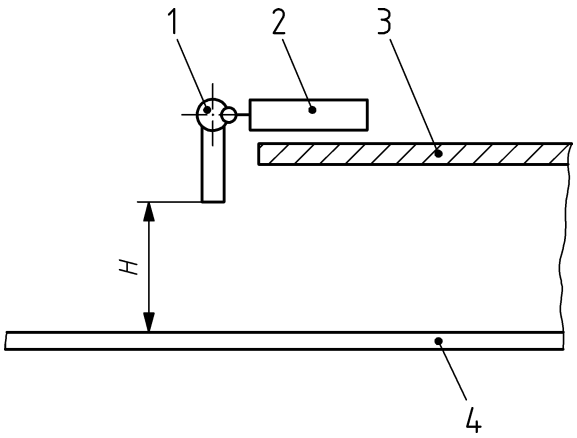
Figure 11 — Infeed and outfeed side of table top machines

5.4.2 Outfeed side

The danger point at the outfeed side (portioning slide/extraction device) shall be made safe by a fixed guard or a mobile hood with an interlocking device (see Figure 11).

This shall be designed with dimensions in accordance with Figure 11.

Fixed hoods shall be fitted at the outfeed opening with a trip bar (see Figure 12).



Key

1 trip bar

2 position switch

3 hood

4 conveyor

Figure 12 — Outfeed side of table top machines

Stopping time of the moving parts after opening of the movable guard or of the trip bar shall be not more than 1 s.

5.5 Electrical hazards

5.5.1 General

The electrical equipment shall comply with EN 60204-1. Additional requirements for the electrical equipment shall meet the following requirements.

5.5.2 Emergency stop-device

In general forming machines do not require an emergency stop device.

If no emergency stop device is fitted the normal OFF-switch shall be easily reachable from the operator position.

5.5.3 Protection against water ingress

5.5.3.1 IP degrees of protection

Electrical operating components shall comply with the following degrees of protection in accordance with EN 60529:

a) IP X5 External electrical operating components

1) on the machine;

2) on the control box enclosure on the machine;

3) on the control box enclosure located in the process room;

b) IP X3 Internal electrical operating components;

1) in the machine with enclosed housing with the degree of protection IP X5 and open lower surface;

2) protection against direct and indirect impact of a water jet shall be ensured;

c) IP X2 Internal electrical operating components

1) in a machine with completely enclosed housing with the degree of protection IP X5. Protection against condensate water shall be provided;

2) in the control box enclosure;

d) IP X0 Internal electrical operating components

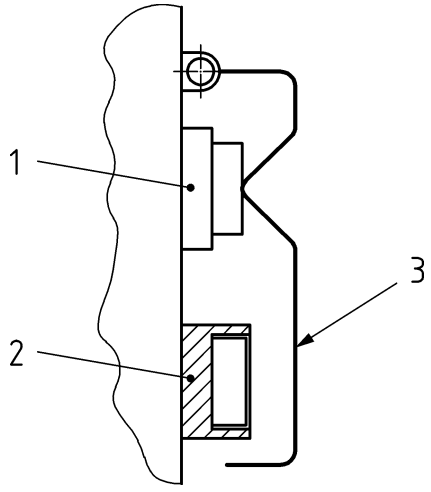
1) in a machine with completely enclosed housing with the degree of protection IP X5. Protection against condensate water shall be provided. The safety of fingers and the back of hand shall be ensured by the design of the electrical components according to EN 60529.

5.5.3.2 Hoods for cleaning

If machines are intended to be cleaned by means of pressurized water (tap water), ingress of water into the external electrical operating components shall be prevented. This can be achieved e.g. by adopting the following measures:

The electrical operating components shall be covered by hoods. A statement indicating their use shall be included in the manufacturer's instruction handbook.

Hoods covering the external operating components may be lifted for actuating On- and Off-switches. Hoods shall not, when closed, restrict the use of the Off-switch (see Figure 13). When using membrane switches or similar systems, no hoods are needed if the membrane switch or similar systems are suitable for cleaning with pressurized water.



Key

1 OFF

2 ON

3 protection hood (OFF)

Figure 13 — On/Off switch with hood

5.5.4 On- and Off-switch

On forming machines, On- and Off-switches shall be provided. The switches shall be arranged on the operator side of machines. The On-switch shall be protected against unintentional switch-on (e.g. by a protective collar).

5.5.5 Safety requirements related to electromagnetic phenomena

Forming machines shall have sufficient immunity to electromagnetic disturbances to enable them to operate safely as intended and not fail to danger when exposed to the levels and types of disturbances intended by the manufacturer.

The manufacturer of the machines shall design, install and wire the equipment and sub-assemblies taking into account the recommendations of the suppliers of these sub-assemblies.

5.6 Hydraulic and pneumatic hazards

The hydraulic and pneumatic equipment shall be in accordance with:

— EN ISO 12100:2010, 6.2.10;

— EN ISO 4413;

— EN ISO 4414.

The bursting pressure of hydraulic hoses shall be four times the maximum working pressure.

The instruction handbook shall indicate the maximum working pressure.

5.7 Hazards from loss of stability

5.7.1 Forming machines shall be designed to be stable under normal operating conditions.

5.7.2 When non-fixed machines are placed on the floor, sufficient inherent tilt stability shall be ensured. Machines tested in accordance with Table 2 shall not start tilting at their location.

5.7.3 Movable machines shall under normal operating conditions not roll, slip or tilt, e.g. by the type of design, the position of the point of gravity (wheels and position of legs).

5.7.4 Movable machines shall not topple over. They shall be equipped e.g. with minimum 2 support rollers (or legs) and 2 pivot castors with locking brake to prevent them rolling and turning.

5.8 Noise reduction

When designing forming machines, the information and technical measures to control noise at source given in EN ISO 11688-1 shall be taken into account. The success of the applied noise reduction measures is assessed on the basis of the actual noise emission values (see Clause 6 and Annex A) in relation to other machines of the same family.

5.9 Ergonomic requirements

5.9.1 The ergonomic principles and requirements described in EN ISO 12100:2010, 6.2.8, in EN 614-1 and in EN 1005-1, EN 1005-2 and EN 1005-3 shall be taken into account.

5.9.2 All information required for achieving the ergonomic objectives to be followed by the user shall be described in the instruction handbook.

5.9.3 For table top machines the limits of the table height shall be indicated.

5.9.4 On forming machines with a hand-operated cover on the feed intake hopper, the grab handle shall be designed and located such that the operating force is in accordance with EN 1005-3.

5.9.5 On forming machines with a feed intake hopper and a design height > 1 400 mm, steps or ladders shall be provided for operating, setting-up and cleaning procedures which cannot be done from the floor. The distance from the standing area of steps or ladders to the feed intake hopper edge shall be < 1 200 mm.

5.9.6 On forming machines with a feed intake hopper, a loading device shall be provided if the distance from the standing area to the feed intake hopper edge is > 1 400 mm. No loading device is required in the case of small production quantities which can be fed from a vessel handled manually.

5.9.7 Wheel mounted forming machines shall have appropriate handles for moving the machine.

5.10 Hygiene and cleaning

The design of the machines shall be in accordance with EN 1672-2 and with the requirements laid down below as well as in accordance with Annex B.

Hygiene areas see Figure 14 and Figure 15.

5.10.1 Food area.

— inside of feed intake hopper and feed intake hopper guard,

— product feeding components inside feed intake hopper,

— inside of mould filling area where product passes through,

— mould plate, ejector mechanism,

— take-away conveyor belts,

— attached components.

The inside of the mould filling area is excepted from the requirement in the food area to be without seams and/or sharp corners.

5.10.2 Splash area.

— External surface of the machine,

— transport cars.

5.10.3 Non-food area.

— Step,

— working platform,

— machine underside,

— lift bearing device,

— lift-tilt device.

5.10.4 Surface conditions.

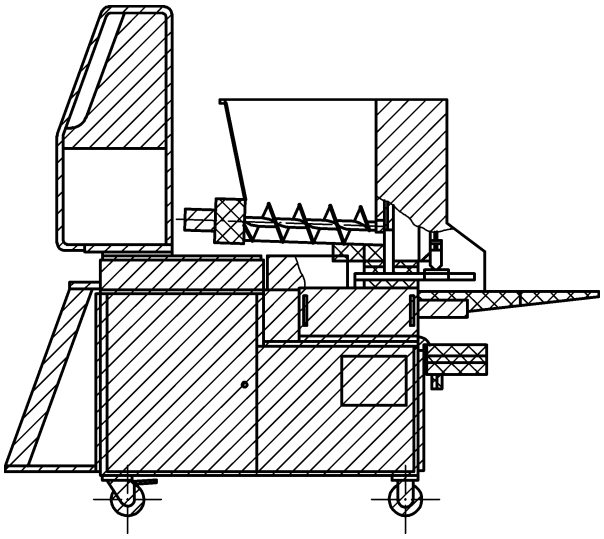
The surface design shall comply with the requirements of EN 1672-2.

The maximum surface roughness values shall comply with those of Annex B.

5.10.5 Cleaning.

All surfaces in the food area shall be easy to clean and disinfect. They shall be designed such that cleaning liquids can run off freely.

Some components in the food area e.g. the mould, ejector mechanism and attached components are not easy to clean. Specific information on cleaning and adequate removal of cleaning and disinfection agents shall be given in the instruction handbook (see 7.2).



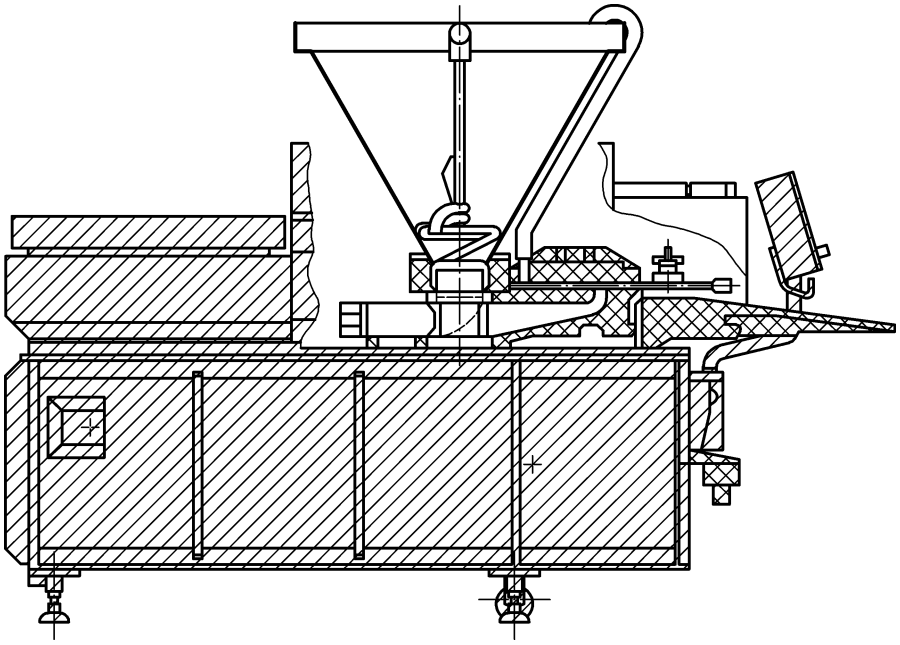
Key

food area

splash area

non-food area

Figure 14 — Hygiene areas of forming machines



Key

food area

splash area

non-food area

Figure 15 — Hygiene areas of forming machines

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

This clause contains the methods for verification of the compliance with the safety requirements of the standard. As far as the criteria for acceptance and the conditions during verification are not self-evident, they can also be found in Table 2. These testing methods shall be applied with machines

— fully commissioned; or

— partially dismantled.

A dismantling can be necessary for some tests. A partially dismantled machine shall not invalidate the result of the verification.

Table 2 — Verification list

Subclause	Test method
5.2.2	Functional test
5.2.3	Visual inspection of the machine and its documentation
5.3.1	Measurement of dimensions Verification of interlocking devices Measurement of stopping time Verification of electrical circuit diagram
5.3.2	Measurement of dimensions Measurement of stopping time Functional test of cover, step, mechanical bar, protective grid, light barrier Verification of electrical circuit diagram Visual inspection
5.3.3	Measurement of dimensions Measurement of stopping time Functional test of On-switch and protective hood Verification of electrical circuit diagram Visual inspection
5.3.4	Measurement of dimensions Visual inspection
5.3.5	Measurement of dimensions Verification of interlocking devices Visual inspection
5.3.6	Measurement of dimensions Verification of interlocking devices
5.3.7	Measurement of dimensions Verification of interlocking devices
5.3.8	Functional test
5.3.9	Measurement of dimensions Verification of interlocking devices
5.3.10	Measurement of dimensions
5.3.11	Measurement of dimensions Functional test
5.3.12	Measurement of dimensions Verification of interlocking devices
5.4	Measurement of dimensions

5.5	The tests according to EN 60204–1:2006, Clause 18, shall be carried out on each machine EMC compatibility: Verification of the detection of used elements and sub-assemblies Verification of IP-Codes
5.6	Visual inspection
5.7	Calculation or test the loss of stability on a surface with an inclination of 10°. In this position there shall be a functional test with full loaded machine. Test the loss of stability with partially dismantled machine. For movable machines the wheels shall be locked in unfavourable position. Visual inspection
5.8	Measurement of the noise emission values according to Annex A
5.9	Measurement of forces Functional test Visual inspection
5.10	Measurement of surface roughness, radii and grooves Visual inspection especially of welding seams
7.2	Verification that the required information is provided

7 Information for use

7.1 General

The user information shall fulfil the requirements of EN ISO 12100:2010, 6.4. An instruction handbook shall be provided.

7.2 Instruction handbook

The instruction handbook shall fulfil the requirements of EN ISO 12100:2010, 6.4.5.

In particular, the instruction handbook shall provide:

a) Information relating to transport, installation and storage

   1) of the machine,

   2) of the forming components,

   3) of the foundation load and the type of floor fixing,

   4) at a sufficient lighted place,

   5) that the wheel-mounted machine shall be switched off and the main plug pulled before being moved and the use of the locking brake for the wheels,

   6) the electrical supply cable shall not be damaged when the machine is moved.

b) Information relating to commissioning

   1) mounting and installation conditions,

2) for fixed machines the instruction handbook shall give details of the foundation load and the type of floor fixing.

c) Information relating to the machines

1) description of the machine, guards and safety devices,

2) intended use, foreseeable misuse and residual risks,

3) description of hazards e.g. on forming machines with feed intake hoppers, which could not be eliminated by safety devices, e.g. in the feed intake hoppers,

4) declaration of noise emission values in accordance with the requirements of Annex A,

5) information on the electrical installation (see EN 60204-1:2006, Clause 17) and the electrical circuit diagram or indication of depot (e.g. pocket) internal of machine,

6) information on maximum working pressure of hydraulic and pneumatic equipment,

7) the business name and full address of the manufacturer and, where applicable, his authorized representative.

d) Information relating to normal operating conditions

1) description of the use of operating elements which will effect standstill of the machine,

2) information relating to the use of the electrical supply cable and that before moving the machine it shall be switched off and the electrical plug shall be disconnected and that while moving the electrical supply cable shall not be damaged,

3) description of daily verifications of protective and interlocking devices,

4) description of wearing personal protective equipment, e.g. hearing protection,

5) information required for achieving the ergonomic objectives.

e) Information relating to cleaning

1) description of the

i) cleaning method,

ii) cleaning agent with reference to safety data sheet of manufacturer,

iii) disinfection method,

iv) disinfection agent with reference to safety data sheet of manufacturer,

v) rinsing agent and application time to avoid toxic hazards,

2) description of rules of action during cleaning and disinfection operations and wearing of personal protective equipment,

3) description of use of hoods over external electrical operating components when the machines are cleaned with pressurized water, and how the areas underneath the hood shall be cleaned, covered by the hood during the cleaning operation,

4) description of removal and installation of protective devices for cleaning purposes.

f) Information relating to maintenance

1) description of execution and frequency of inspections and maintenance actions, taking account of rules of action (disconnection, locking, neutralization of residual energy, testing of safe state of the machine),

2) description of lubricants used,

3) description of non-suitable lubricants,

4) information on grinding of the hole plate,

5) drawings which are necessary to carry out these tasks,

6) list and description of spare parts.

g) The instruction handbook shall contain the information that the operator shall be trained, skilled and specifies the elements of training and the standard of training required.

7.3 Marking

Forming machines conforming to this standard shall be marked with the following information on its rating plate:

— business name and full address of the manufacturer and, where applicable, his authorized representative,

— designation of the machine,

— mandatory marking[1)],

— year of construction, that is the year in which the manufacturing process is completed,

— designation of series or type, if any,

— serial or identification number, if any,

— rating information (mandatory for electro-technical products: voltage, frequency, power, etc.).

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 forming machines (grade 2)

A.1 Sound measurements

A.1.1 Emission sound pressure level determination

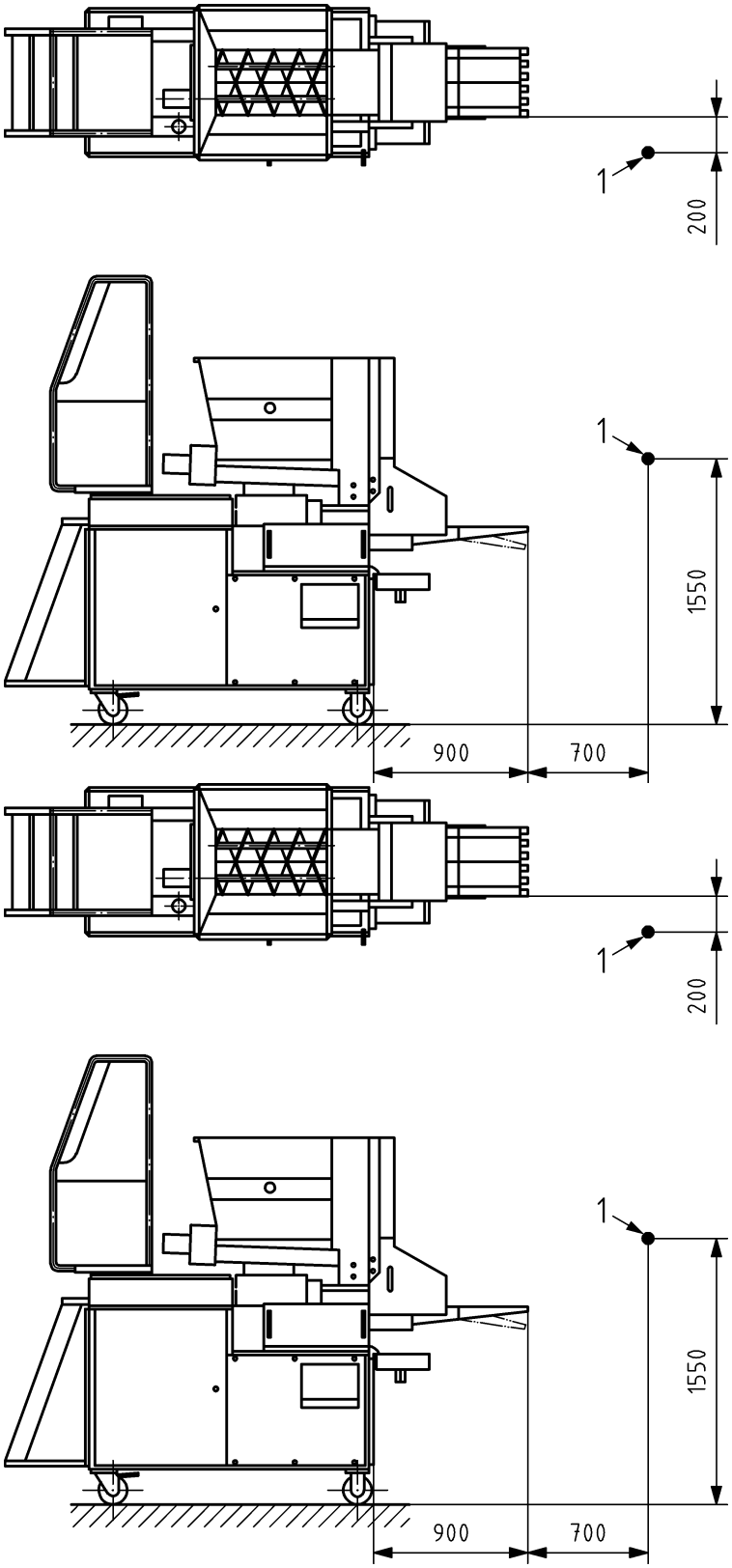
The emission sound pressure level shall be measured according to EN ISO 11204.

The measurement shall be taken at the normal operator position in a distance of 0,5 m in front of the forming machine.

As there is no typical operator's position, the measurement shall be taken at a distance of 0,5 m from the discharge outlet in line with the longitudinal axis of the outlet and with the microphone positioned at a height of 1,55 m above the floor and directed towards the machine.

A.1.2 Sound power level determination

The sound power level shall be determined according to EN ISO 3744 using the parallelepiped measurement surface.



Key

1 measuring point

Figure A.1 — Position of measuring point

A.2 Installation and mounting conditions

The test field shall be in accordance with EN ISO 11204:2010, Clause 6. It shall be laid out in accordance with EN ISO 3744:2010, Annex A.

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

A table-top machine to be tested shall be placed on a reflecting (acoustically hard) testing table, as described in EN ISO 11204:2010, Annex B.

Floor mounted machines shall be placed on a reflective floor and be sufficiently removed from any reflective walls or ceilings or any other objects.

A.3 Operating conditions

The test shall be carried out with the machine running at maximum speed and the hopper is loaded with a substitute product.

Substitute product: plasticine, sawdust/soap mixture

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 11204:2010, Clause 5 and 10.2.1. The measurement shall be carried out over a complete working 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 11204:2010, Clause 12. All deviations from this noise test code and from EN ISO 11204 shall be documented together with the technical justification for these deviations.

A.6 Information to be reported

The information to be given shall be in accordance with EN ISO 11204:2010, Clause 13.

This information shall at least contain:

— a reference to EN ISO 11204,

— description of the operating and mounting conditions,

— locations of measuring positions,

— recorded noise emission values,

— declaration that all requirements of the noise test code have been fulfilled, or when this is not the case, all non-fulfilled requirements shall be described.

The deviations from the requirements shall be recorded together with the technical justification for these deviations.

A.7 Declaration and verification of noise emission values

The manufacturer shall declare the noise emission value according to the two number declaration of EN ISO 4871 thus declaring the emission sound pressure level L_{pA} at the workstation and the uncertainty K_{pA}. K_{pA} is assumed at 2,5 dB.

The manufacturer shall indicate the noise emission value in accordance with EN ISO 12100.

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

The noise emission declaration shall explicitly state that the emission value has been measured according to the specification of this noise test code as well as the basic Standard EN ISO 11204.

If this is not the case, it shall be explicitly mentioned which deviation with regard to EN ISO 11204 exists.

The verification shall be carried out according to EN ISO 4871 and under the same mounting-, installation- and operating conditions as those which were applied to the original determination of the noise emission values.

Declaration and verification of sound power level shall be in accordance with EN ISO 3744:2010.

NOTE Additional noise emission values can be indicated in the declaration.

Noise emission data should also be given in the sales literature.

Annex B
(normative)

Design principles to ensure the cleanability of forming machines

B.1 Terms and definitions

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

B.1.1

food area

area composed of those surfaces in contact with food; the food area also includes the surfaces with which the product may come in contact with under normal condition of use, after which it returns into the product (see Figures 14 and 15)

B.1.2

splash area

area composed of surfaces on which a part of the food may splash or flow along under condition of use and does not return into the product (see Figures 14 and 15)

B.1.3

non-food area

any area other than those specified above (see Figures 14 and 15)

B.1.4

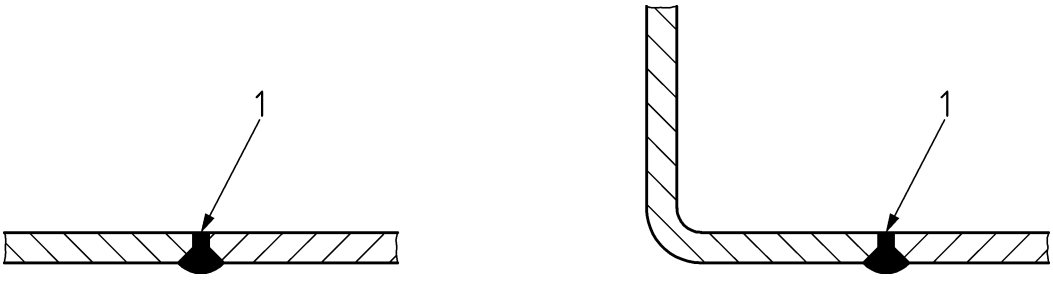
joined surfaces

surfaces are joined such so that no particle or product becomes trapped in small crevices, thus becoming difficult to dislodge and so introduce a contamination hazard (see Figure B.1)

B.1.5

easy to clean

machines are designed and constructed such that the elimination of contaminants can be achieved through a simple cleaning method, e.g. cleaning agents and water under pressure



Key

1 joined surfaces

Figure B.1 — 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 for food area

All legal requirements in force for materials and articles in contact with food shall be met, as well the general requirements as those related to specific materials, e.g. plastics.

B.2.2.2 Materials for 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 with the following requirements:

B.3.2 Food area

B.3.2.1 Surfaces

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

B.3.2.2 Inside corners

The angle formed by the intersection of two surfaces shall be ≥ 90° and shall have a radius $R \geq 3$ 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. welding seam) or economic feasibility.

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, e.g. tooth, transport or cleaning rolls can have recesses, grooves and corners with smaller radii due to product manufacturing necessities. These rolls shall be easy to clean.

A corner with an angle of ≥ 135° without a radius is permissible. The distance between two edges shall than be ≥ 8,0 mm. (see Figure B.3).

Dimensions in millimetres

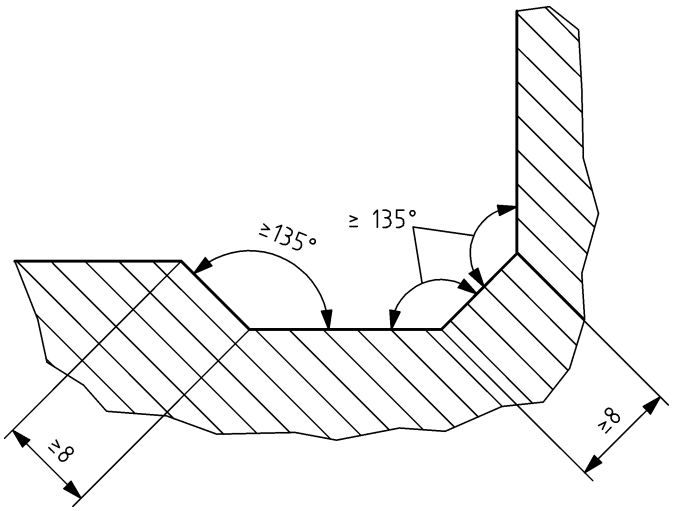
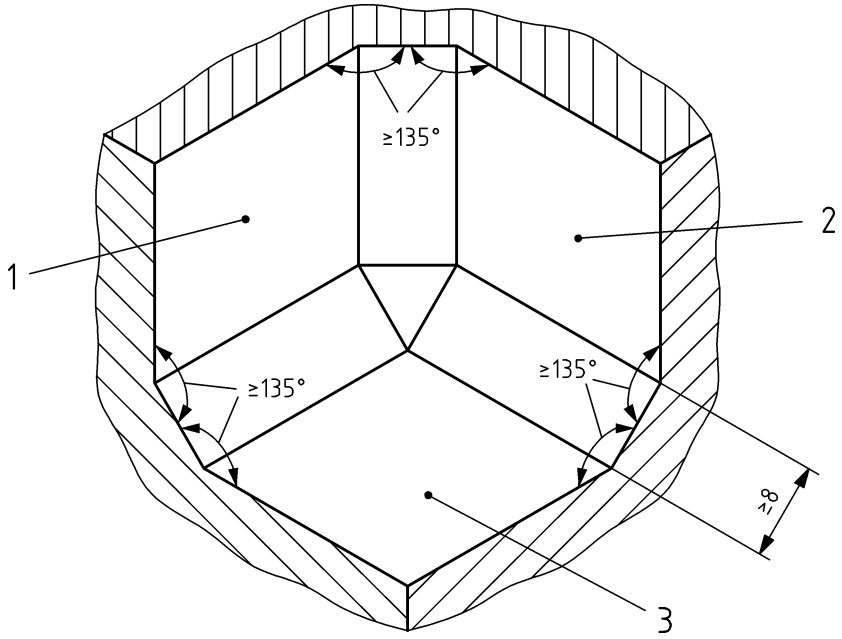


Figure B.3 — Angles in the food area

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

Dimensions in millimetres



Key

1 surfaces A

2 surfaces B

3 surfaces C

Figure B.4 — Intersecting surfaces in the 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

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

B.3.2.5 The surface roughness

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

B.3.3 Splash Area

B.3.3.1 Surfaces

Surfaces shall be smooth (see Figure B.1).

B.3.3.2 Inside corners

The angle formed by intersection of two surfaces shall be ≥ 80° and shall have a radius of ≥ 3 mm (see Figure B.2).

Should a corner be formed by the intersection of three surfaces, then the corner formed shall have a radius of ≥ 6 mm. No requirements apply to the radius for the joining points of a third plane.

Angles ≥ 110° without radii are admissible (see Figure B.4).

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 shall go right through and have a diameter of > 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

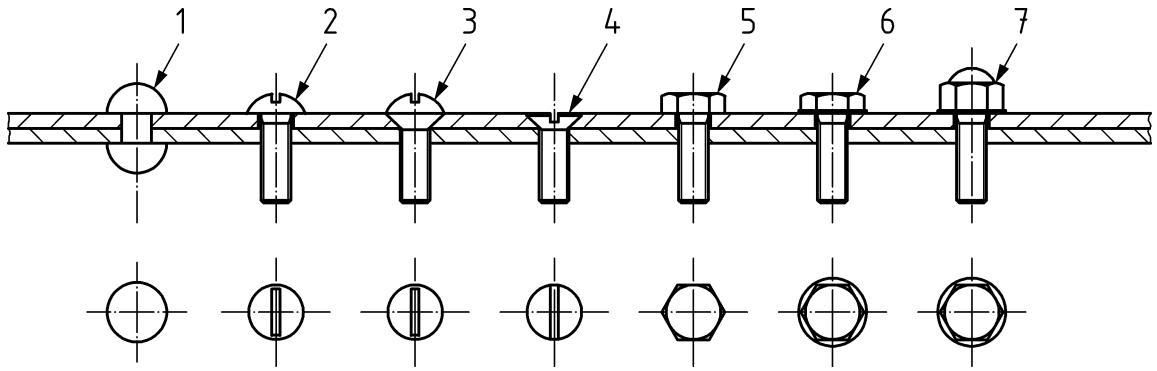
Screws and rivets with low profile heads and of the types shown in Figure B.5 may be used only when other fastening methods are impracticable and they are easy to clean (see Figure B.5).

The following types of screws shall not be used:

— cross-head recessed screws,

— hexagon socket head cap screws,

— screws with a diameter < 3 mm.



Key

1	round head	5	hexagon head
2	oval head	6	hexagon head with flange
3	slotted raised countersunk head	7	hex domed head
4	slotted countersunk head		

Figure B.5 — Acceptable joining elements – head profiles

B.3.3.7 Surface roughness

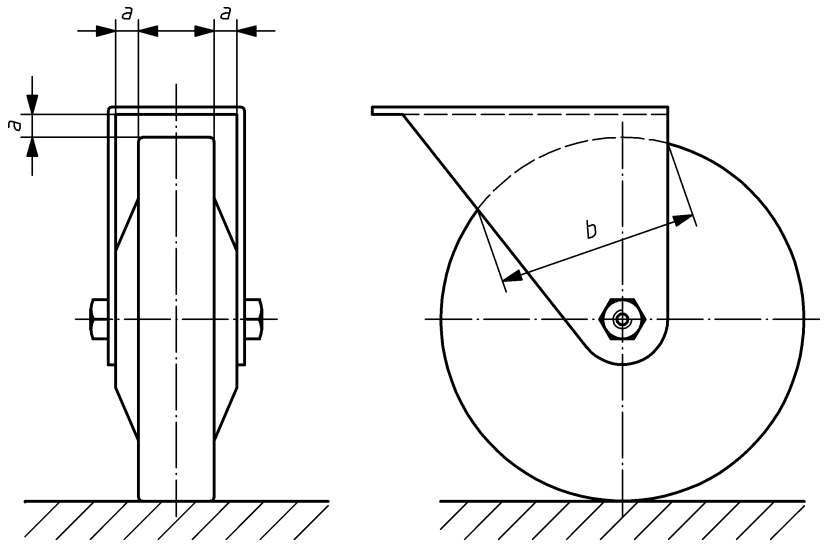
Surface roughness conditions shall comply with the requirements of B.3.2.5.

B.3.4 Non-food area

Surfaces shall be smooth as far as possible. Grooves, corners, holes, gaps and joints shall be avoided as far as possible. Closed hollow spaces shall be sufficiently wide to allow thorough cleaning and, where required, disinfection.

B.3.5 Machines standing on a floor – mobile machines

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



Key

b < 25 mm *a* ≥ 3,5 mm

b > 25 mm *a* ≥ 6 mm

b is the largest area of coverage at 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 Machinery 2006/42/EC.

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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