BS EN 12463:2014

BSI Standards Publication

Food processing machinery — Filling machines and auxiliary machines — Safety and hygiene requirements

bsi.

...making excellence a habit.™

National foreword

This British Standard is the UK implementation of EN 12463:2014. It supersedes BS EN 12463:2004+A1:2011 which is withdrawn.

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.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

ISBN 978 0 580 78252 7

ICS 67.260

Compliance with a British Standard cannot confer immunity from legal obligations.

This British Standard was published under the authority of the Standards Policy and Strategy Committee on 30 November 2014.

Amendments issued since publication

Date	Text affected

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 12463

November 2014

ICS 67.260

Supersedes EN 12463:2004+A1:2011

English Version

Food processing machinery - Filling machines and auxiliary machines - Safety and hygiene requirements

Machines pour les produits alimentaires - Machines à pousser et machines auxiliaires - Prescriptions relatives à la sécurité et l'hygiène

Nahrungsmittelmaschinen - Füllmaschinen und Vorsatzmaschinen - Sicherheits- und Hygieneanforderungen

This European Standard was approved by CEN on 13 September 2014.

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. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

CEN members are the national standards bodies of 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 United Kingdom.

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

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

Contents

Page

Foreword

This document (EN 12463:2014) 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 May 2015 and conflicting national standards shall be withdrawn at the latest by May 2015.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

This document supersedes EN 12463:2004+A1:2011.

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.

Significant changes:

The significant changes with respect to the previous edition EN 12463:2004+A1:2011 are listed below:

— Clause 1: the scope now contains a list of auxiliary machines, auxiliary devices and interchangeable equipment and their combinations with a filling machine; displacement of requirements in the appropriate clauses; old 1.3 “Intended use” has been shifted into 7.4;

— Clause 2: normative references updated;

— Clause 3: terms partly unified, revised, supplemented (e.g. dividing device, hanging device, loading device, fixing device, machine, auxiliary machine, device, module, interchangeable equipment); consistent use throughout the standard;

— Clause 4: new presentation in a table;

— Clause 5: extensive 5.2 with new title “Mechanical hazards – General”, more specific requirements in 5.3 with new title “Mechanical hazards distinguished from type” (e.g. stopping time, cover over feed intake hopper, steps and ladders, static and dynamic test, auxiliary machines, ergonomic requirements);

— Clause 6: verification list updated;

— Clause 7: completion of 7.2 with all information referred to in Clause 5, now including operator training and combination of machines; 7.3 now contains also the marking of devices and interchangeable equipment;

— Annexes: old Annex C “Common hazard” deleted and shifted into appropriate clauses;

— Figures partly renewed.

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 hazardous 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 for:

— filling machines with cylinder with piston,

— filling machines with feed intake hopper with and without loading device,

— auxiliary machines for filling machines.

This European Standard does not apply to filling machines with cylinder and manual operation.

This European Standard applies to machines which process pasty or slightly frozen products (e.g. meat, cheese), excluding dry or deep frozen materials. They pump foodstuff into casings or bring it to a subsequent process. This European Standard also applies to the combinable appliances or auxiliary machines with which a wide range of additional functions can be implemented, for example: portioning, depositing, mincing, coextruding, dividing and forming.

This European Standard deals with all significant hazards, hazardous situations and events relevant to filling machines, fitting appliances and auxiliary machines, such as twisting and hanging devices, mincing devices, forming devices, etc., when they are used as intended and under the conditions foreseen by the manufacturer and also the reasonable foreseeable misuse (see Clause 4).

These significant hazards, hazardous situations and events exist during the whole life of filling machines.

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

a) auxiliary machines:

   1) portioning machine;

   2) twisting machine;

   3) mincing machine;

   4) calibrating machine;

   5) separation machine;

   6) hanging machine;

   7) co-extrusion machine;

   8) tying machine;

   9) grouping machine;

   10) filling stream divider machine;

   11) depositing machine;

   12) forming machine;

   13) peeling machine;

14) (casing-) spooling machine;

15) evacuating machine;

16) loading machine;

17) insertion machine;

18) handling machine (for full smoke sticks, single products or product groups);

b) auxiliary devices / modules:

1) portioning device / module;

2) twisting device / module;

3) mincing device / module;

4) calibrating device / module;

5) separating device / module;

6) hanging device / module;

7) co-extrusion device / module;

8) tying device / module;

9) filling stream divider device / module;

10) depositor device / module;

11) forming device / module;

12) peeling device / module;

13) (casing-) spooling device / module;

14) casing loading device / module;

15) evacuation device / module;

16) casing closing device / module;

17) loading device / module;

18) ejector device / module;

c) interchangeable equipment:

1) linking gear box;

2) holding device;

3) mincing attachment;

4) nozzles;

5) casing brakes;

6) separating unit;

7) reservoir / infeed hopper;

8) depositor;

9) voider unit;

10) dosing valve;

11) grinding sets;

12) forming inserts.

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

Filling machines described in this European Standard are no forming, filling and sealing machines as described in EN 415-3. Clipping machines are not covered by this document.

1.2 Types of filling machines and auxiliary machines covered by this standard

1.2.1 Filling machines with cylinder with piston

Filling machines with cylinder consist of piston, closing cover, machine frame accessory drive parts and electrical and hydraulic components (see Figure 1).

The material being processed will be fed by hand into the cylinder.

Filling machines with cylinder can be fitted with a dividing device.

1.2.2 Filling machines with feed intake hopper with and without loading device

Filling machines with feed intake hopper (with or without infeed auger, see Figure 2) consist of feeder on discharge side of the feed intake hopper, machine frame, accessory drive parts and electric, electronic or pneumatic components, depending on machine type.

The material being processed will be fed by hand or a loading device into the feeding hopper of the filling machine.

Filling machines will be switched on or off by knee-operated lever switches or hand operated switches and/or remote control signals.

Filling machines with feed intake hopper can be equipped with:

— dividing device,

— cover or photoelectric guard at the mouth of the feed intake hopper,

— pressure activated trip bar or light barrier at the hopper edge,

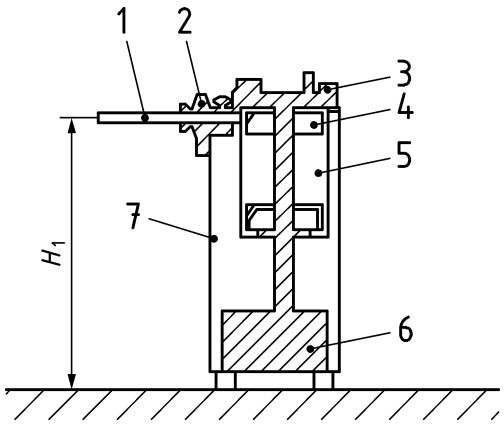
— divided hopper,

— plough or counter auger,

— step or ladder,

— two hand control at the mouth of the feed intake hopper,

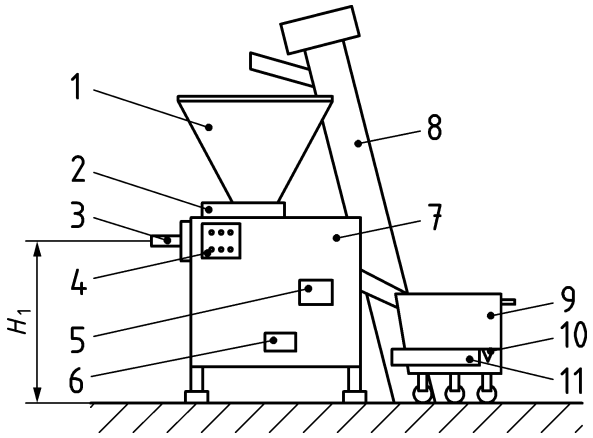
— loading device.



Key

1 filling horn
2 dividing device
3 closing cover
4 piston
5 cylinder
6 drive mechanism
7 ON / OFF switch, hood

Figure 1 — Filling machine with cylinder and piston



Key

1 feed intake hopper
2 feeder
3 filling horn
4 ON / OFF switch, hood
5 step
6 intermediate step
7 drive mechanism
8 mast-type loading device
9 transport car
10 fixing device
11 loading device

Figure 2 — Filling machine with feed intake hopper and loading device

1.2.3 Auxiliary machines for filling machines

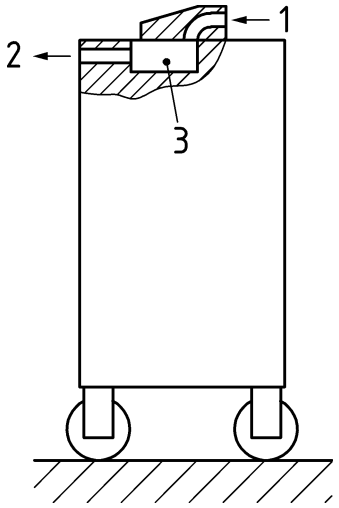
Auxiliary machines consist of a drive system and at least of one of the following devices for filling, portioning, twisting, displacing, forming, mincing (e.g. see Figures 3 to 8). Auxiliary machines do not operate independently. These machines will be actuated directly or by filling machines.

Auxiliary machines will be switched on or off by knee-operated lever switches or hand operated switches and/or remote control signals.

Auxiliary machines can be fitted with:

— dividing device,

— hanging device.



Key

1 inlet

2 outlet

3 feeder

Figure 3 — Auxiliary twisting device

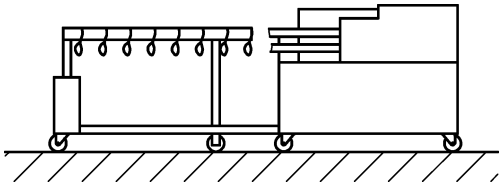


Figure 4 — Auxiliary portioning and hanging device

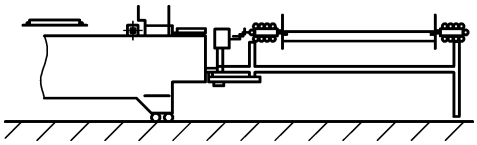


Figure 5 — Auxiliary portioning and hanging device

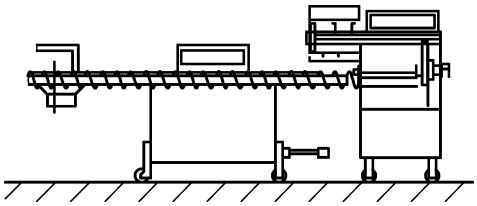
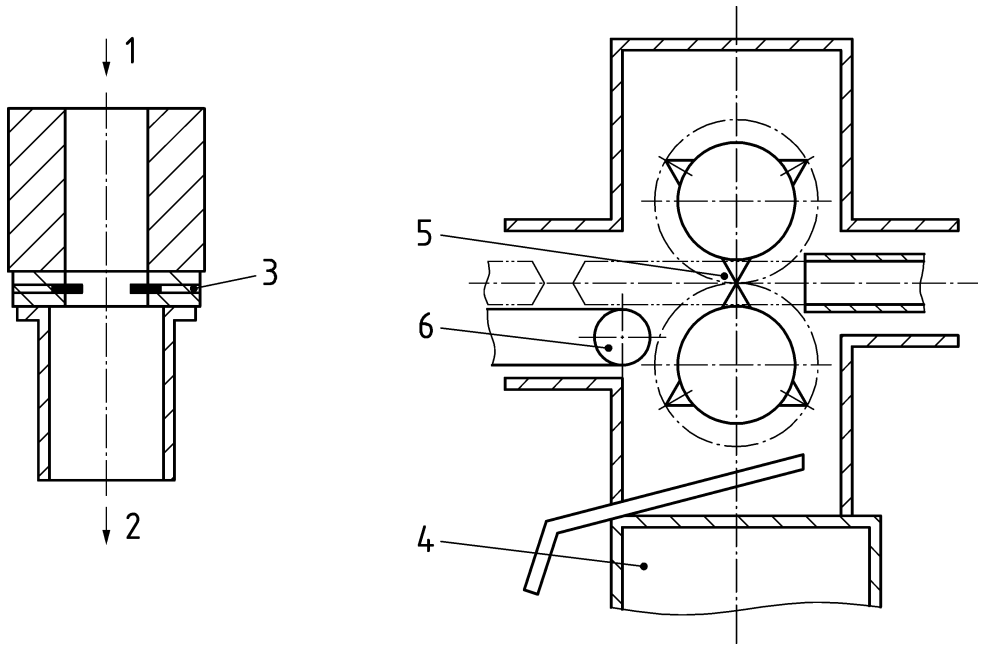


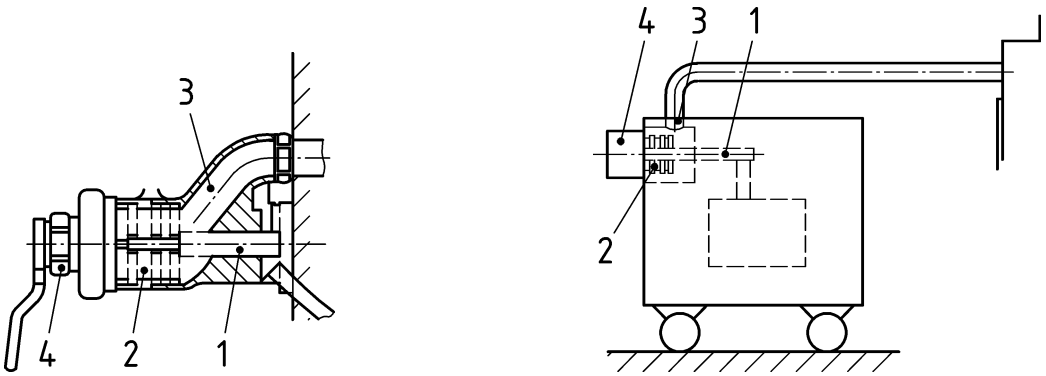
Figure 6 — Auxiliary portioning and hanging device



Key

1 inlet
2 outlet
3 forming device
4 base
5 forming device
6 conveyor belt

Figure 7 — Auxiliary forming devices



Key

1 drive shaft
2 set of cutting tools
3 feed intake canal
4 nut/plate

a) Driven by the filling machines

Key

1 drive shaft
2 cutting tools
3 feed intake canal
4 locking/plate

b) With direct drive

Figure 8 — Auxiliary mincing machine

1.3 Combinations of filling machines and auxiliary machines, devices/modules and interchangeable equipment

1.3.1 Definition

A combination of filling machines with auxiliary machines, auxiliary devices/modules and interchangeable equipment or a combination of some auxiliary machines or one auxiliary machine with auxiliary devices/modules and/or interchangeable equipment becomes a new machine, when 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.

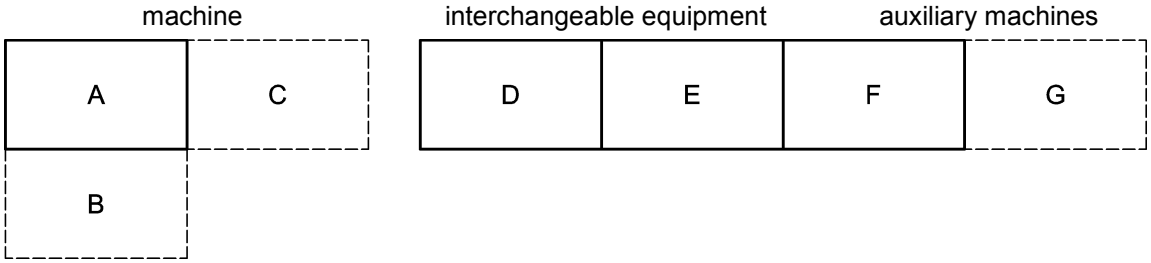
According to this definition a new machine is not existent, when in a total complex, single autonomous functional machines are connected in relation to function and control but do not form a unit in relation to safety. This is given e.g. when:

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

— 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.

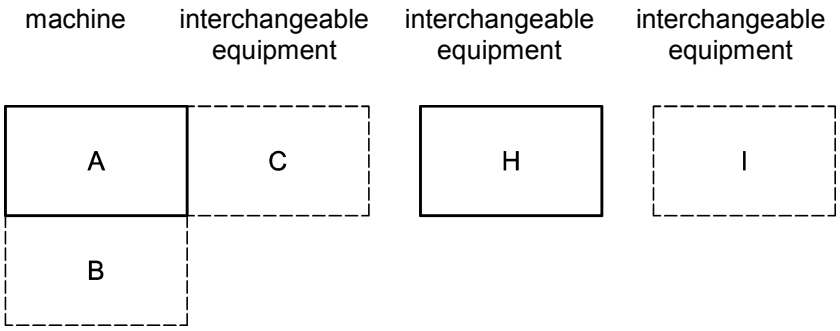
1.3.2 Examples of combinations



Key

A	filling machine	D	twisting module	F	separating module
B	loading device (optional)	E	calibrating module	G	hanging module (optional)
C	mincing device (optional)				

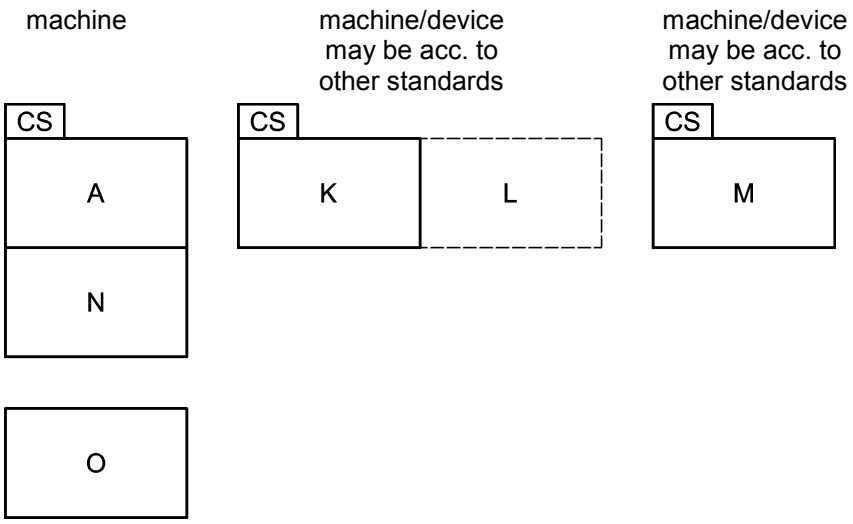
a) Filling machine with auxiliary machines consisting of different modules



Key

A filling machine
B loading device (optional)
C mincing device (optional)
H linking gear box
I holding device (optional)

b) Filling machine with interchangeable equipment



Key

A filling machine
K metal detector
L reject valve (optional)
M clipper
N evacuation module
O floor hopper
CS separate control system

c) Filling machine with attached machines

Figure 9 — Examples of combinations

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

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

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

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

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

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

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
twisting device
device to separate one portion from the next by twisting

3.2
dividing device
device to divide the product into portions

Note 1 to entry: Mainly used types in fillers with cylinder with piston are rotary slide or valve plate.

3.3
hanging device
device to suspend or transport the product

3.4
hanger
movable unit to convey the product onto a hanging device

3.5
ejector/extractor
device for detaching the set of cutting tools and the worm

3.6
extraction claw
tool for detaching the set of cutting tools and the worm

3.7
loading device
device for lifting and tilting of transport cars

3.8
casing brake
device for retaining and braking the product casing on the filling horn

3.9
casing clamp
device for centring and clamping the shirred product casing

3.10
feed intake hopper
container for receiving products to be processed with safety function

3.11
fixing device
device for locking the transport car in the loading device to prevent falling off

3.12
feeder
unit for product transport

3.13
plough
fixed curve-shaped counter-component to the in-feed auger

3.14
divided hopper
feed intake hopper with a disconnecting point in the upper hopper part

3.15
piston
moving part for pressing out the product

3.16
blade
cutting tool with one or several blades

3.17
rotating head
hinged installation with one or more filling horns

3.18
worm casing
casing for holding the worm and the set of cutting tools

3.19
set of cutting tools
rough-cutter, blade and hole plate for size reduction of product

3.20
counter auger
fixed counter-component to the in-feed auger

3.21
transport car
movable container for holding the processed or to the processed product

3.22
cutting device
device (e.g. knife, wire, scissor) for the cutting of portions filled into product casings

3.23
closing cover
closing plate with safety function at the opening of the cylinder

3.24
infeed auger
rotating conveying element in the feed intake hopper

3.25
machine/auxiliary machine
assembly, fitted with or intended to be fitted with a drive system consisting of linked parts or components, at least one of which moves, and which are joined together for a specific application

Note 1 to entry: The term “machinery” also covers an assembly of machines which, in order to achieve the same end, are arranged and controlled so that they function as an integral whole.

3.26
devices / modules
assembly which is almost machinery but which cannot in itself perform a specific application

Note 1 to entry: A other description is ‘partly completed machinery’ which is only intended to be incorporated into or assembled with other machinery or other partly completed machinery or equipment, thereby forming machinery.

3.27
interchangeable equipment
device which, after the putting into service of machinery, is assembled with that machinery by the operator himself in order to change its function or attribute a new function

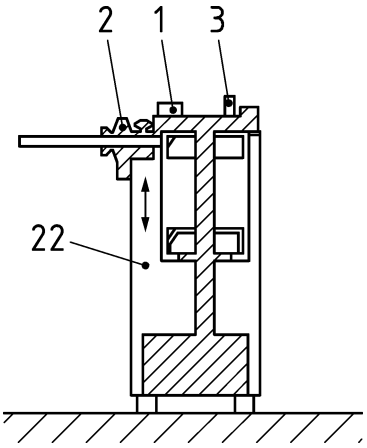
4 List of significant hazards

This clause contains all the significant hazards, hazardous situations and events, identified by risk assessment as significant for this type of machinery 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**
Mechanical hazards	**General**	5.2
— crushing; — severing; — shearing; — trapping; — cutting; — drawing in	zone 1: piston at outlet in the cylinder (see Figure 10); zone 2: dividing or twisting device in the outlet of the cylinder or filling horn side (see Figure 10); zone 3: free running piston in cylinder (see Figure 10)	5.3.1
	zone 4: rotating infeed auger and fixed plough or fixed curve-shaped counter auger in feed intake hopper (see Figure 11); zone 5: rotating feeder on discharge side of feed intake hopper (see Figure 11); zone 6: rotating feeder on the side of the filling horn (see Figure 11)	5.3.2
	zone 7: space below transport car (see Figure 11); zone 8: path of movement of transport car (see Figure 11); zone 9: drive elements and (where used) pulleys, chains or wire ropes (see Figure 11); zone 10: discharge area (see Figure 11)	5.3.3

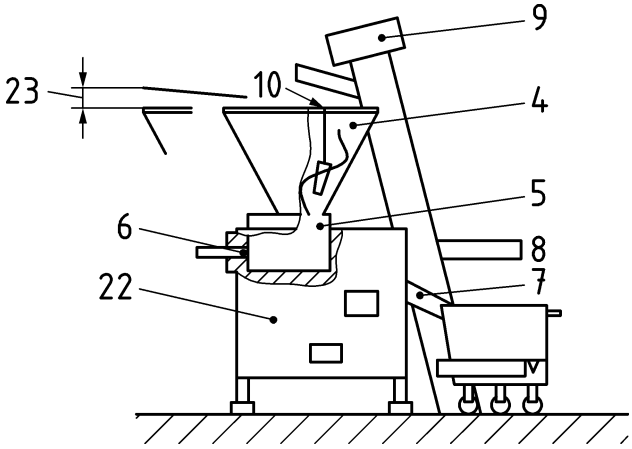
Hazards, hazardous situations and hazardous events	**Location or cause**	**Clause/subclause in this European Standard**
	zone 11: casing clamp (see Figure 12); zone 12: portioning, twisting and crimping device (see Figure 12); zone 13: hanger (see Figure 12); zone 14: transport device (see Figure 12); zone 15: feeder (see Figure 13); zone 16: rotating head or pivoting twisting mechanism (see Figure 14); zone 17: filling horn and casing brake (see Figure 14); zone 18: separator and cutting device (see Figure 14); zones 19 and 20: Forming device, continuous conveyor belt and drive and return pulley (see Figure 15); zone 21: outlet at attached mincing machine, rotating blade behind hole plate (see Figures 16 and 17) zone 22: drives of rotating machine components (see Figures 10 to 17)	5.3.4
	zone 23: unintended shutting of closing machine components and intended closing of machine components (see Figure 11)	5.3.6
Electrical hazards	electric shock from direct or indirect contact with live components external influences on electrical equipment (e.g. cleaning with water)	5.4
Hazards generated by loss of stability	The complete machine and where used the loading device or auxiliary machine	5.5
Hazards generated by noise	Filling machines and auxiliary machines generate noise	5.6
Hazard generated by neglecting ergonomic principles	Unhealthy body posture or excessive physical effort; Inadequate consideration of human hand/arm or foot/leg anatomy by design of machines; No respect of the working area.	5.7
Hazard generated by neglecting hygienic design principles	e.g. contamination by microbial growth or foreign materials	5.8



Key

1	zone 1
2	zone 2
3	zone 3
22	zone 22

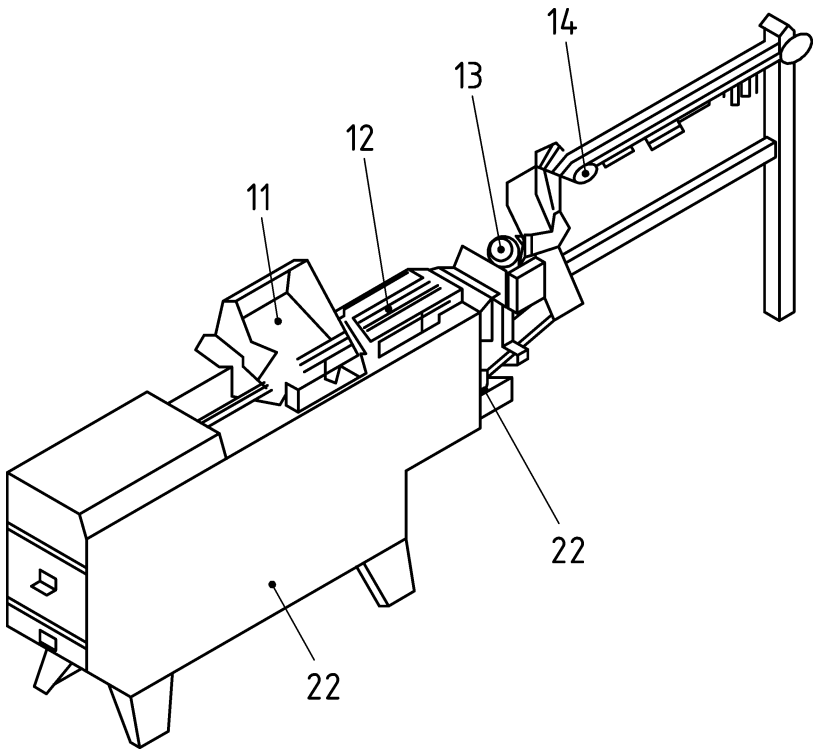
Figure 10 — Filling machine with cylinder with piston – Danger zones



Key

4	zone 4	9	zone 9
5	zone 5	10	zone 10
6	zone 6	22	zone 22
7	zone 7	23	zone 23
8	zone 8		

Figure 11 — Filling machine with feed intake hopper – Danger zones



Key

11 zone 11

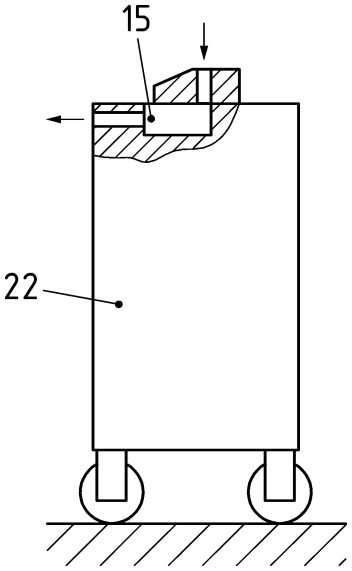
12 zone 12

13 zone 13

14 zone 14

22 zone 22

Figure 12 — Auxiliary, twisting and hanging device – Danger zones

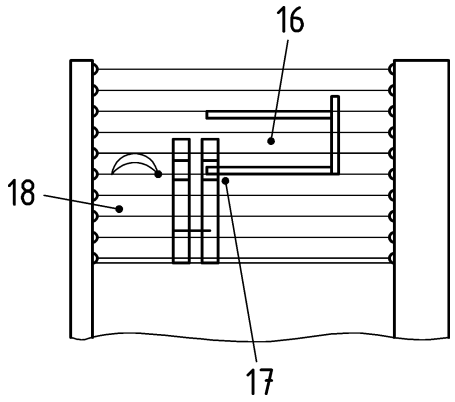


Key

15 zone 15

22 zone 22

Figure 13 — Auxiliary twisting device – Danger zones



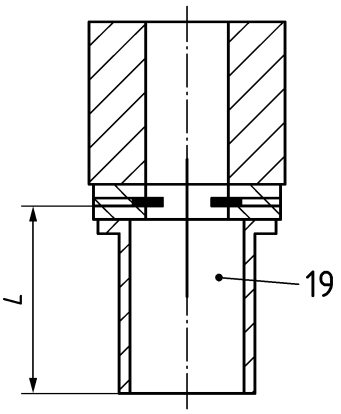
Key

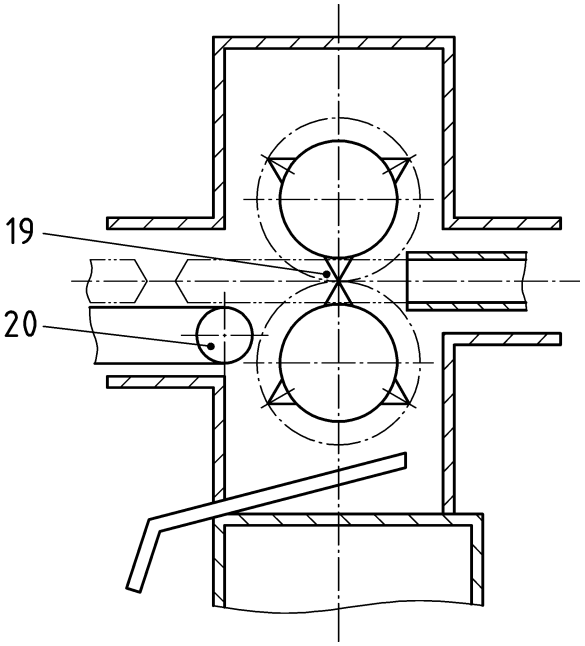
16 zone 16

17 zone 17

18 zone 18

Figure 14 — Auxiliary, dividing and hanging device – Danger zones



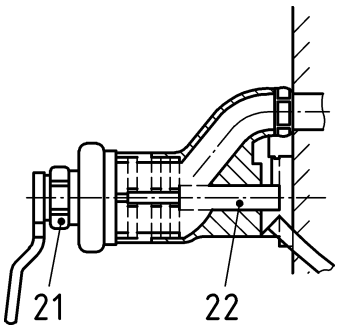


Key

19 zone 19

20 zone 20

Figure 15 — Auxiliary forming devices – danger zones

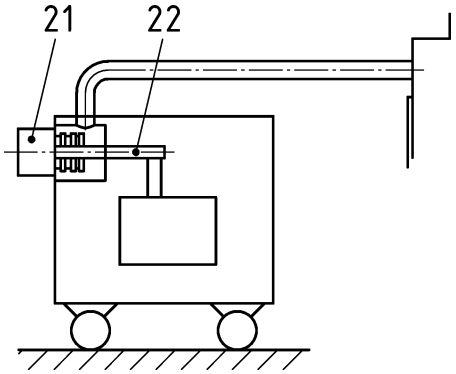


Key

21 zone 21

22 zone 22

Figure 16 — Auxiliary mincing machine driven by the filling machine



Key

21 zone 21

22 zone 22

Figure 17 — Auxiliary mincing machine with direct drive

5 Safety and hygiene requirements and/or protective measures

5.1 General

Filling machines and auxiliary 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.

If auxiliary machines are installed on the machine, the manufacturer shall carry out a risk assessment. This specific risk assessment shall be part of the general risk assessment of the machine. Where reducing the risk is by the physical arrangement or positioning of the machine the manufacturer shall include in the Information for use a reference to the reduction means to be provided, and to any limiting value of the requirement, and, if appropriate, to the means of verification.

The stopping time shall be less than or equal to 1 s from safety device actuation. In this case restarting shall only be possible by actuating the starting control.

The safety related parts of the control system shall present at least a performance level “c” in accordance with EN ISO 13849-1.

5.2 Mechanical hazards – General

5.2.1 General

Filling machines and auxiliary machines shall be designed and constructed in accordance with the conditions mentioned below.

Fixing systems for fixed guards, or for demountable parts of the machine casing when they are designed as fixed guards, shall remain attached to the guards or to the machine when the guards are removed.

5.2.2 Guard interlocking

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

5.2.3 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.

5.2.4 ON-/OFF-switch

On filling machines, ON- and OFF-switches shall be provided. The switches shall be arranged on the operator side of machines (see Figure 1 and Figure 2). The ON-switch shall be protected against unintentional switch-on (e.g. by a protective collar).

5.3 Mechanical hazards distinguished from type

5.3.1 Filling machines with cylinder with piston

5.3.1.1 Zone 1

5.3.1.1.1 General

At filling machines without dividing device the access to the danger point at the piston in the cylinder shall be prevented or restricted. This shall be achieved e.g. by the observance of the following measures:

5.3.1.1.2 On the edge of a cylinder without recess a movable interlocked cover shall be provided, which prevents the upward motion of the piston, if the cover is opened.

5.3.1.1.3 The safety distance L between the cylinder and the dividing device as well as between dividing device and the filling horn side, for a diameter D of the outlet, shall be as follows:

— $D \leq 46$ mm, then $L \geq 100$ mm;

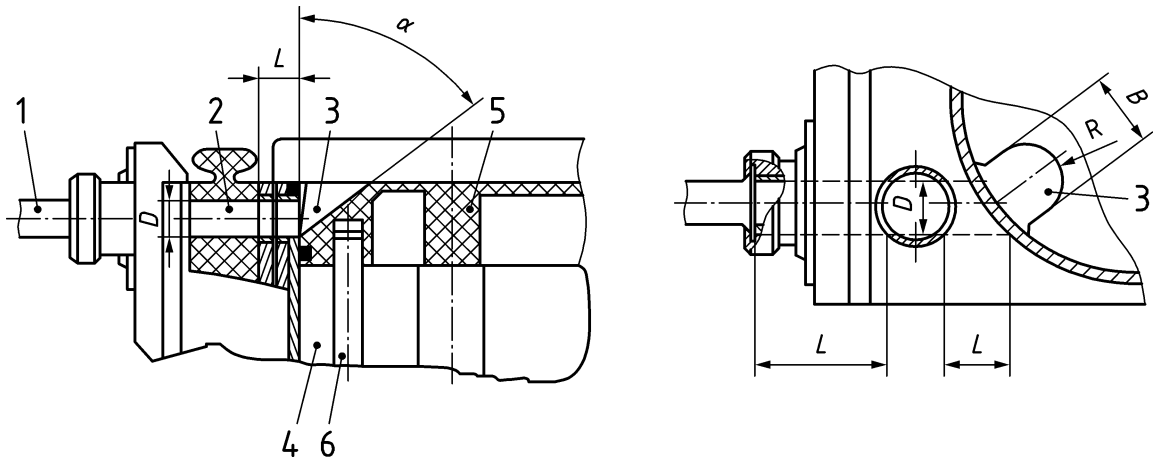
— $46 \text{ mm} < D \leq 60$ mm, then $L \geq 120$ mm.

See Figure 18.

5.3.1.1.4 An interlocking of the cover is not needed if the recess in the piston will be larger than the discharge opening in the cylinder, the inclination $\alpha \geq 50°$, the width $B \geq 70$ mm and the radius of curvature $R \geq 10$ mm (see Figure 18).

The piston shall be not allowed to twist in relation to the discharge opening. This can be achieved e.g. by a piston rod (see no. 6 in Figure 18).

5.3.1.1.5 It shall not be possible to move the piston out of the cylinder with the drive mechanism. For the removal of the piston, there shall exist a special tool.



$D \leq 46$ mm → $L \geq 100$ mm

or

46 mm < $D \leq 60$ mm → $L \geq 120$ mm

$B \geq$ 70 mm

$R \geq$ 10 mm

$\alpha \geq$ 50°

Key

1 fill horn

2 dividing device

3 recess in the piston

4 cylinder

5 piston

6 piston gain rod

Figure 18 — Filling machine with cylinder with piston and dividing device – Safety dimensions

5.3.1.2 Zone 2

5.3.1.2.1 General

At filling machines with dividing device the access to the danger point at the piston in the cylinder and at the dividing device in the discharge port on the side of the cylinder and filling horn shall be prevented or restricted.

This shall be achieved e.g. by the observance of all following measures:

5.3.1.2.2 For a piston without recess there shall exist at the edge of the cylinder a movable, interlocked cover, which prevents the upward motion of the piston, if the cover is opened.

At the discharge opening there shall exist an interlocked filling horn, to prevent the operation of the machine without filling horn.

5.3.1.2.3 An interlocking of the movable cover is not needed if:

— the safety distance L and the diameter D of the discharge opening between the side of the cylinder and the dividing device meets the requirements of 5.3.1.1.3,

— the recess of the piston meets the requirements of 5.3.1.1.4,

— the piston meets the requirements of 5.3.1.1.5.

5.3.1.2.4 An interlocking of the filling horn is not needed if the safety distance *L* and the diameter *D* of the discharge opening between the side of the filling horn and the dividing device meet the requirements of 5.3.1.1.3.

5.3.1.3 Zone 3

5.3.1.3.1 General

On filling machines with a free running piston in the cylinder, the piston shall be prevented from being ejected by opened cover.

This shall be achieved e.g. by the observance of all following measures:

5.3.1.3.2 If the free running piston by opened cover can be moved upwards by means of compressed air or fluid, a mechanical restraint device (e.g. yoke) shall be fitted, which is interlocked with the air/fluid supply to prevent the jump out of the piston.

5.3.1.3.3 A manometer shall be fitted and the maximum allowable pressure marked with a red line mark. A device (e.g. safety valve) shall be provided to prevent the maximum allowable pressure being exceeded.

5.3.2 Filling machines with feed intake hopper

5.3.2.1 Infeed side – Zones 4 and 5

5.3.2.1.1 General

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

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

   1) closed feed intake hopper including a closed loading device for products (e.g. feed screw, pipeline with pump), see 5.3.2.1.2;

   2) the use of a cover at the feed intake hopper, see EN 953 and 5.3.2.1.3.

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

   1) the use of fixed distance guards (e.g. fence), see EN 953 and 5.3.2.1.4;

   2) the use of a trip bar at the complete circumference of the feed intake hopper edge with use of adequate safety distances, see 5.3.2.1.6 and Figure 19;

   3) the use of a light barrier at the complete circumference of the feed intake hopper edge with use of adequate safety distances, see 5.3.2.1.6 and Figure 19;

   4) the use of a divided hopper with use of adequate safety distances, see 5.3.2.1.7 and Figure 20;

   5) the use of a feed intake hopper with use of adequate safety distances and steps or ladders, see 5.3.2.1.8 and Figure 21 and Figure 22.

5.3.2.1.2 Filling machines with a closed feed intake hopper

On these filling machines the feed intake hopper and the loading device shall be designed to be completely closed. At the point of separation between feed intake hopper and loading device shall exist an interlocking device to prevent the operation of the machine while opening of the hopper.

5.3.2.1.3 Filling machines with a cover over feed intake hopper

On these filling machines with a height of the feed intake hopper < 1 400 mm (distance from the floor/standing area to the hopper edge), 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 feeder shall come to a standstill within 1 s after the front edge of the cover has been raised more than 50 mm.

The cover shall be prevented from slamming shut. This can be achieved e.g. by the observance of one of the following measures:

— on non-powered covers or upper parts of hoppers, e.g. a counterweight, a spring shall be provided if, when these machine components are open, they do not swing back sufficiently to a position behind their top dead centre. The cover or the upper part of the hopper shall be provided with a grab handle;

— on powered covers, the closing time for the last 250 mm of the closing travel shall be ≥ 4 s. The measuring point shall be located at the largest opening width of the cover. In the event of a drive failure (e.g. pipe or hose break), the movement of the cover shall be stopped.

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

5.3.2.1.4 Filling machines with a fixed distance guard

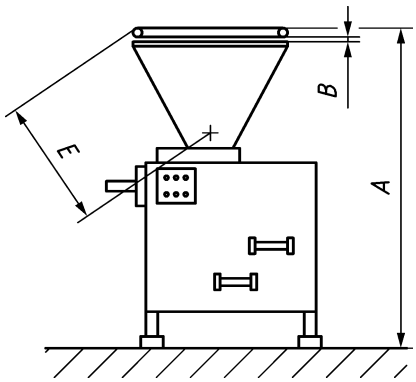
On these filling machines the requirements relating to guards shall meet EN 953:1997+A1:2009, 5.3 and 5.4. The height of the fence shall be in accordance with EN ISO 13857:2008, Table 2. Accesses (e.g. doors) shall be interlocked.

5.3.2.1.5 Filling machines with trip bar at the feed intake hopper

At these filling machines there shall be a trip bar at the complete circumference of the hopper edge at the feed intake hopper. When the filling machine is running with or without product, the feeder shall come to a standstill within 1 s after activating the trip bar (see Figure 19).

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 $S = A + E \geq 2\,250$ 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 19) and not less than 16 mm for cleaning.



Key

A ≥ 1 600 mm

S = A + E ≥ 2 250 mm

B ≤ 50 mm

Figure 19 — Filling machine with feed intake hopper and trip bar/light barrier – Safety dimensions

5.3.2.1.6 Filling machines with light barrier at feed intake hopper

At these filling machines, a light barrier shall be provided on the complete circumference of the hopper edge of the feed intake hopper. When the filling machine is running with or without product, the feeder shall come to a standstill within 1 s after the light barrier has been activated (see Figure 19).

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

If a light curtain is used, the sensor detection capability of the protective device shall be less or equal to 14 mm.

For requirements relating to the safety distances see 5.3.2.1.5 and Figure 19.

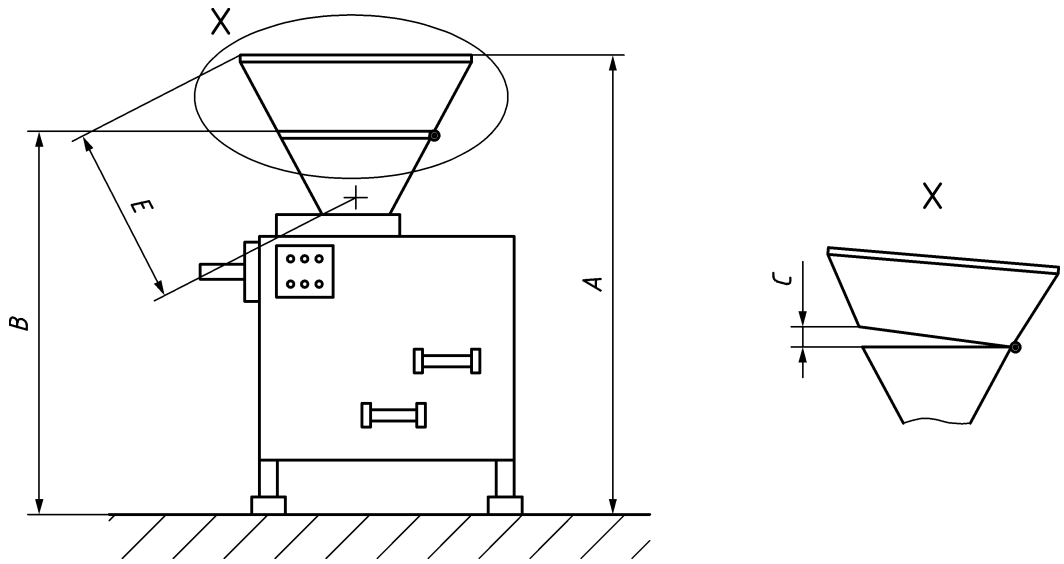
5.3.2.1.7 Filling machines with divided hopper

5.3.2.1.7.1 On these filling 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 20).

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 $S = A + E \geq 2\,450$ 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 20).

5.3.2.1.7.2 On these filling machines without loading device, the distance *B* from the floor/standing area to the separation point of the feed intake hopper shall be ≤ 1 500 mm (see Figure 20).



Key

A ≥ 1 600 mm

B ≤ 1 500 mm

C ≤ 50 mm

S = *A* + *E* ≥ 2 450 mm

Figure 20 — Filling machine with divided hopper – Safety distances

5.3.2.1.8 Filling machines with adequate safety distances and steps or ladders

5.3.2.1.8.1 Steps and ladders

If danger points in the feed intake hopper of filling machines can be reached from the standing area of a step, falling below the safety dimension of 2 450 mm (or 2 250 mm for cases at 5.3.2.1.5 or 5.3.2.1.6), the steps or ladders shall be interlocked (see Figure 21 and Figure 22). When the filling 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.

The distance A_1 from the standing area of a step to the hopper edge shall be > 1 100 mm (see Figure 21 and 5.7.5). 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 21).

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 > 500 mm above ground shall be fitted with intermediate steps or ladders and grab handles. The standing areas and steps shall be sufficiently large and of the non-slip type and arranged at identical distances from one another.

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 21) 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.

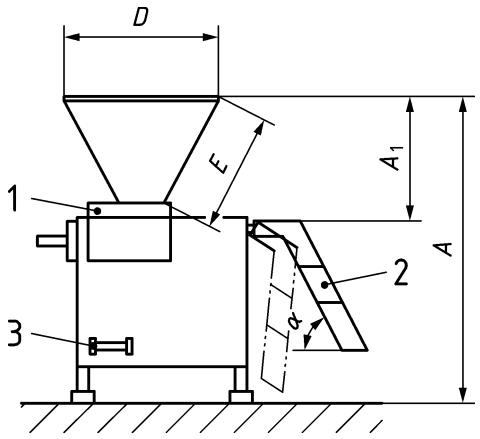
The intermediate step should not be interlocked if the distance to danger zone is big enough.

5.3.2.1.8.2 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 22). 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

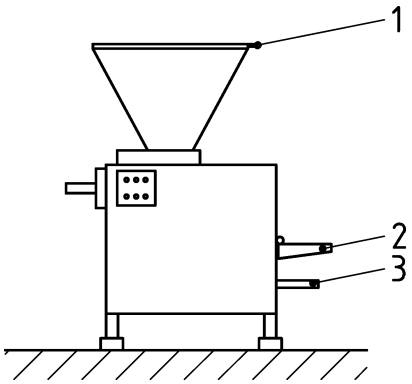
$A_1 \geq 700$ mm, if $D < 1\,100$ mm

α ≤ 70°

Key

1 feeder
2 ladder, interlocked
3 intermediate step

Figure 21 — Filling machine with feed intake hopper – Example: ladder – Safety dimensions



Key

1 two-hand control
2 step, interlocked
3 intermediate step

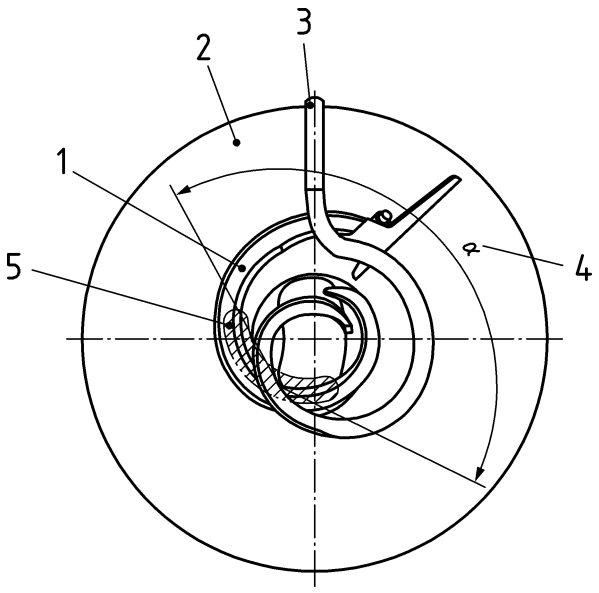
Figure 22 — Filling machine with feed intake hopper – Example: steps, two-hand control

5.3.2.1.9 Filling machines with plough in the feed intake hopper

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

— the distance between plough/counter auger (fixed) and the in-feed auger (rotating) in the feed intake hopper shall be ≤ 6 mm and have an angle of pitch > 90° (see Figure 23);

— the relative position of plough/counter auger (fixed) and in-feed auger (rotating) in the feed intake hopper results in a safety situation, if there is a distance > 30 mm between plough/counter auger and in-feed auger (see Figure 23).



Key

1 in-feed auger

2 hopper wall

3 plough / counter auger

4 α = angle of pitch

5 danger point at the plough/counter auger

Figure 23 — Plough in feed intake hopper

5.3.2.1.10 View into feed intake hopper

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

5.3.2.2 Discharge side – Zone 6

Access to the feeder on the side of the filling horn shall be protected or made safe. This shall be achieved e.g. by the observance of the measures according to 5.3.1.1.3 or 5.3.1.2.2.

5.3.3 Loading devices

5.3.3.1 General

Loading devices (see Figure 11, zone 7 to 10) of various designs exist, e.g. with:

— fixed device for holding the transport cars,

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

— vertical pillar mast with forks for holding transport cars.

These shall fulfil the following additional requirements for loading devices.

5.3.3.2 Additional requirements

5.3.3.2.1 Installation

5.3.3.2.1.1 Loading devices can be free-standing or connected to the filling machine.

5.3.3.2.1.2 Loading devices shall be designed in such way that they are stable. Static and dynamic tests shall be carried out on the filling machines.

a) Static test:

The test consists of loading the transport car with a load equal to 150 % of the maximum load declared by the manufacturer and raising it to the position just before bowl tipping. The test duration shall be at least of one hour without moving the transport car.

During the test, the capability of the structure to maintain the load in position shall be verified.

In case of hydraulic and pneumatic devices, a lowering of 10 cm/h is permissible.

At the end of the test, after load removal, no permanent deformation shall be observed.

b) Dynamic test:

The test consists of loading the filling machine with the maximum load declared by the manufacturer and carrying out three complete raisings and lowering movements with this load without tilting at the nominal speed (or the highest speed in case of different speed).

The mechanisms shall function correctly during the test, but neither velocity nor heating is to be considered.

5.3.3.2.1.3 A special device shall be provided to prevent the loading 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 loading device so that powered descent of the loading device onto an obstacle cannot cause instability. This can be e.g. an over travel switch, to automatically stop the descent.

5.3.3.2.1.4 Where the machine or the loading device is fixed to the floor, overload conditions to the loading components of the loading 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 to automatically stop the lowering motion.

5.3.3.2.2 Loading device

5.3.3.2.2.1 Loading devices shall be designed to prevent transport cars from falling off. This can be achieved by a fixing device at the loading device for transport cars.

5.3.3.2.2.2 Loading devices shall be so designed that transport cars do not create danger points during up and down movements. This can be achieved by fulfilling all of the following conditions:

— a distance between the loading device, transport car and the machine base shall be > 120 mm,

— a distance between transport car or loading device and the delivery chute > 25 mm.

By using a hold-to-run control theses distances are not required.

5.3.3.2.3 Mast-type loading device

The danger points between the loading device and the mast on the side opposite the loading device shall be protected.

This can be achieved by the observance of following measures:

— a distance between the loading device and the mast of ≥ 120 mm;

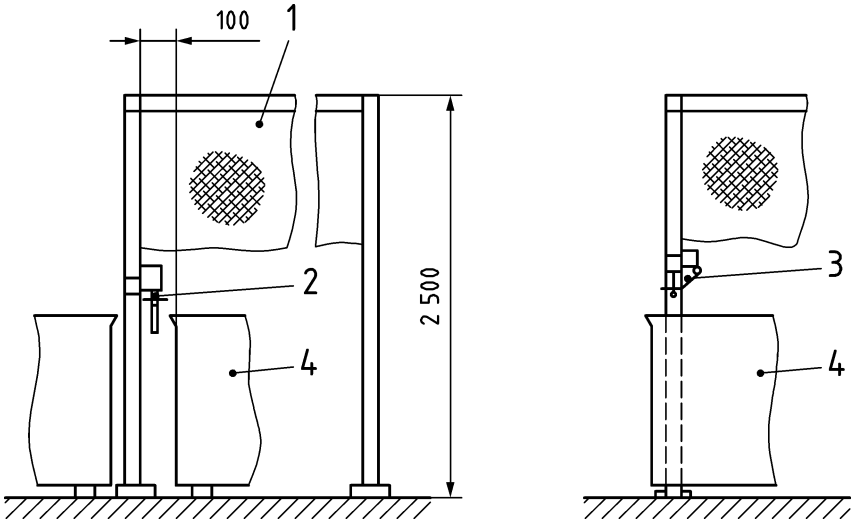
— if the tilt range of the loading device is > 2 000 mm or more above the floor (standing area), no guarding is required if the distance between the loading device and the mast is ≥ 60 mm.

5.3.3.2.4 Loading 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 (see Figure 24).

For requirements relating to the light barrier see 5.3.2.1.6.

Dimensions in millimetres



Key

1 cover designed as lattice rods

2 suspended mechanical flap

3 mechanical flap

4 transport car

Figure 24 — Safety device for transport car position

5.3.3.2.5 Lowering velocity of the loading device

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

5.3.3.2.5.2 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 touches the floor shall be controlled by a hold-to-run control.

5.3.4 Auxiliary machines

5.3.4.1 General

When implementing a fixed safeguard with an interlocked trip bar or comparable devices (e.g. light barrier) or a movable interlocked guard following requirements of Table 2 shall be applied.

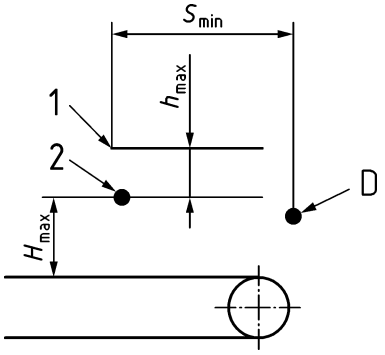
Table 2 — Safety dimensions

Maximum opening height H_{max} [a]	Maximum opening height H_{max} [b]	Minimum distance from the opening to the first danger point S_{min} [c]
≤ 40	≤ 50	≥ 230
≤ 120	≤ 135	≥ 550
≤ 220	≤ 250	≥ 850

[a] Opening height H_{max} (see Figure 25) including the contact travel on the front edge of the safeguard (protective hood) or trip bar (actuating force of safeguard or trip bar shall not exceed 50 N).

[b] Opening height H_{max} of a fixed safeguard under the lowest light barrier on the infeed or outfeed opening in combination with one or more light barriers (the distance h_{max} between the separate light barriers or the next edge of the opening shall not exceed 40 mm, see Figure 25).

[c] If the first danger point *D* (see Figure 25) is a cutting device, the measurement of S_{min} goes to the cutting edge, if the first danger point is a drawing-in zone with squeezing point, the measurement of S_{min} shall be applied to the position of a minimum distance of 20 mm between the fixed or movable parts of the drawing-in zone.



Key

1 next edge of the opening

2 light barrier

D danger point

NOTE The maximum opening height H_{max} is defined by taking the top surface of the conveyor belt as height 0 mm. This is only applicable if the conveyor is securely supported by a fixed carrier and therefore cannot be pushed down farther at the opening and that the conveyor is the only automated feeding system of the machine.

Figure 25 — Opening with light barrier

5.3.4.2 Casing clamp – Zone 11

A protective hood shall be provided on the casing clamp (see Figure 12). The protective hood shall prevent the access to the danger point and shall be interlocked (see 5.3.4.1).

5.3.4.3 Portioning, twisting and crimping device – Zone 12

A protective hood shall be provided on the portioning, twisting and crimping device (see Figure 12). The protective hood shall prevent the access to the danger point and shall be interlocked.

Alternatively, the safety distance *L* between the portioning, twisting and crimping device and the infeed or discharge side shall meet the requirements of 5.3.1.1.3.

5.3.4.4 Hanger – Zone 13

A protective hood shall be provided on the hanger (see Figure 12). The protective hood shall prevent the access to the danger point and shall be interlocked (see 5.3.4.1).

When, for operational reasons, the hanger cannot be protected, it shall be equipped with an overload cut-out which disengages the drive or devices for moving aside or swinging out hazardous components or drives before an injury occurs.

5.3.4.5 Transport devices – Zone 14

Nip points between the transport devices (e.g. belts, chains, straps, spindles) and the drive and return pulleys or drive and return wheels or housing sections shall be protected by fixed or movable guards (e.g. protective hoods) (see Figure 12). The protective hood shall be interlocked (see 5.3.4.1).

5.3.4.6 Feeder – Zone 15

The access to the feeder in the casing shall be prevented by a movable cover (see Figure 13). The cover shall be interlocked (see 5.3.4.1).

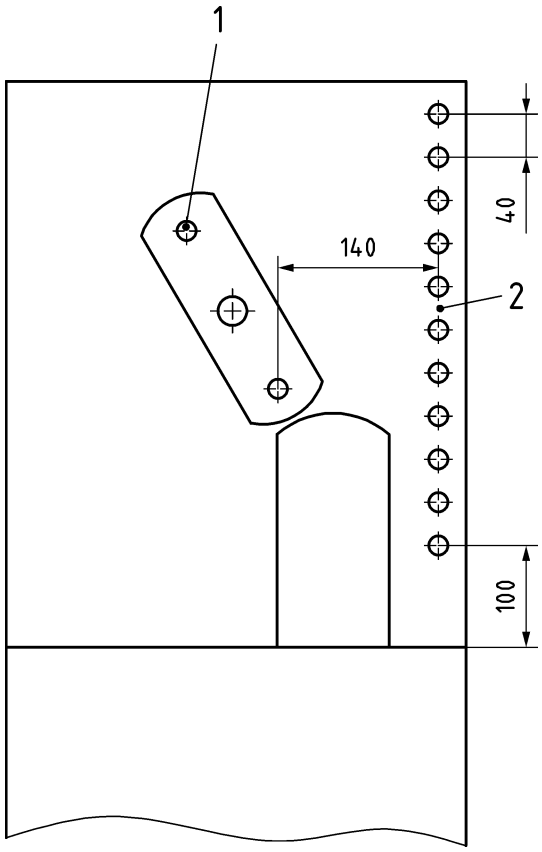
The safety distance *L* and the diameter *D* on the infeed side of the cover and the discharge opening in the casing of the feeder shall be in accordance with 5.3.1.1.3.

5.3.4.7 Rotating head or twisting mechanism – Zone 16

A protective hood or an electro-sensitive protective device shall be provided on the rotating head or twisting mechanism (see Figure 26). The protective hood shall prevent the access to the danger point and shall be interlocked (see 5.3.4.1). The rotating head or the twisting mechanism shall come to a standstill within the stopping time, if they are working as auxiliary machines with or without product, after activating the interlocking of the protective hood.

When using an electro-sensitive protective device, a risk assessment shall be carried out to determine the stopping time as a function of the distance of the danger point (EN ISO 13855).

For requirements relating to the light barrier see 5.3.2.1.6.



Key

1 rotating head

2 light barrier

Figure 26 — Rotating head with light barrier

5.3.4.8 Filling horn and casing brake – Zone 17

A protective hood or an electro-sensitive protective device shall be provided on the inlet and outlet side between filling horn and casing brake (see Figure 12). The protective hood shall prevent the access to the danger point and shall be interlocked (see 5.3.4.1). The filling horn and the casing brake shall come to a standstill within 1 s, if they are working as auxiliary machines with or without product, after the interlocking of the protective hood has been activated.

When using an electro-sensitive protective device, a risk assessment shall be carried out to determine the stopping time as a function of the distance of the danger point (EN ISO 13855).

For requirements relating to the light barrier see 5.3.2.1.6.

Alternatively, the safety distance *L* between the outside and the casing brake shall meet the requirements of 5.3.1.1.3.

5.3.4.9 Dividing and cutting device – Zone 18

A protective hood shall be provided on the dividing and cutting device (see Figure 14). The protective hood shall prevent the access to the danger point and shall be interlocked. The dividing and cutting device shall come to a standstill within 1 s, if they are working as auxiliary machines with or without product, after the interlocking of the protective hood has been activated.

When using an electro-sensitive protective device, a risk assessment shall be carried out to determine the stopping time as a function of the distance of the danger point (EN ISO 13855).

For requirements relating to the light barrier see 5.3.2.1.6.

Alternative, the safety distance *L* between the outside and the dividing and cutting device shall meet the requirements of 5.3.1.1.3.

5.3.4.10 Forming device – Zone 19 and 20

A protective hood shall be provided on the forming device (see Figure 15). The protective hood shall prevent the access to the danger point and shall be interlocked (see 5.3.4.1).

When using an electro-sensitive protective device, a risk assessment shall be carried out to determine the stopping time as a function of the distance of the danger point (EN ISO 13855).

For requirements relating to the light barrier see 5.3.2.1.6.

Alternatively, the safety distance L between the outside and the forming device shall meet the requirements of 5.3.1.1.3.

Access to the in-running nips of the belt conveyor shall be protected by design measures (e.g. fixed protective devices) in accordance with EN 953:1997+A1:2009, 3.2.

5.3.4.11 Ancillary mincing machine – Zone 21

5.3.4.11.1 Discharge outlet

5.3.4.11.1.1 General

The access to the danger zone on the blade behind the last hole plate at the outlet side shall be protected or prevented. This may be achieved by observance of one of the following measures.

The access will be prevented by:

— designing the hole plate,

— use of a guard, e.g. protective hood with transport car.

The access will be protected by:

— using a protective hood.

5.3.4.11.1.2 Design of the hole plate

The diameter of the holes in the last hole plate towards the outlet shall be ≤ 8 mm. The thickness of the plate shall be ≥ 5 mm.

The last hole plate towards the outlet and the worm-housing shall be designed in that way, that only a plate like described above can be put into the worm-housing at the outlet side.

The manufacturer shall indicate in the instruction handbook, that the last hole plate towards the outlet is not allowed to be ground thinner than 5 mm thickness.

5.3.4.11.1.3 Design of the protective hood

If it is possible to use plates with holes ≥ 8 mm diameter, there shall exist a protective hood at the outlet. The protective hood shall have a projecting length in working direction L_1 ≥ 1,8 x D (D = diameter of the plate in mm) and a lateral projecting length of L_2 ≥ 1,2 x D (see Figure 27).

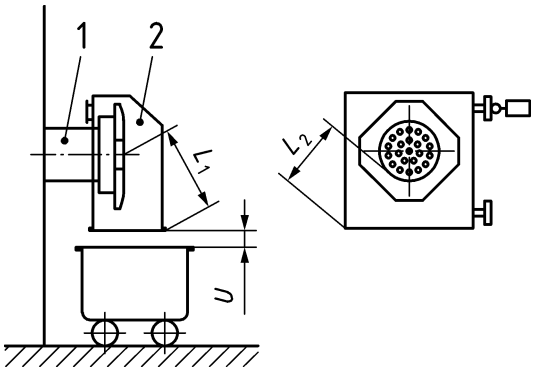
The protective hood shall be interlocked. The knife shall come to a standstill within 2 s after opening the protective hood 50 mm at the point of maximum movement, if the ancillary mincing machine is running without product.

5.3.4.11.1.4 Protective hood and transport car

The dimensions of the protective hood (see 5.3.4.11.1.3) are not necessary, if the access to the danger point at the hole plate is protected by the design of the protective hood in combination with a transport car (see Figure 27).

The protective hood and the transport car shall be interlocked. The knife shall come to a standstill within 2 s after opening the protective hood 50 mm at the point of maximum movement or if the transport car is not in the interlocking position, if the ancillary mincing machine is running with or without product.

The distance U between transport car and protective hood shall be ≤ 50 mm (see Figure 27).



Key

L_1 ≥ 1,8 x D

L_2 ≥ 1,2 x D

U ≤ 50 mm

1 outlet at the mincing machine

2 protective hood

Figure 27 — Discharge outlet of an auxiliary mincing machine with protective hood and transport car - safety dimensions

5.3.4.11.2 Installation and removal of worm and set of cutting tools

5.3.4.11.2.1 General

It shall be ensured that the worm and the set of cutting tools can be installed and removed without any danger. This will be achieved e.g. by the observance of one of the following measures:

5.3.4.11.2.2 Ejector or extractor

On mincing machines with a hole plate of diameter ≥ 106 mm, an ejector or extractor shall be fitted for the removal of the set of cutting tools and the worm. The ejector or extractor shall disengage the worm key on the drive side.

5.3.4.11.2.3 Extraction claw

On mincing machines with a hole plate of diameter ≤ 106 mm, an extraction claw is necessary.

5.3.4.11.2.4 Worm casing

In the case of a removable worm casing, an ejector or extractor is not required if the set of cutting tools and the worm can be loosened by knocking.

5.3.5 Drive system – Zone 22

Access to the danger zones on the drive system shall be prevented. A fixed guard or moveable interlocked guard shall be provided on the drive mechanism.

5.3.6 Machine components – Zone 23

Movable machine components (e.g. cover, upper part of the hopper) shall be prevented from slamming shut. This can be achieved e.g. by the observance of one of the following measures:

— on non-powered covers or upper parts of hoppers, e.g. a counterweight, a spring shall be provided if, when these machine components are open, they do not swing back sufficiently to a position behind their top dead centre. The cover or the upper part of the hopper shall be provided with a grab handle;

— on powered covers, the closing time for the last 250 mm of the closing travel shall be ≥ 4 s. The measuring point shall be located at the largest opening width of the cover. In the event of a drive failure (e.g. pipe or hose break), the movement of the cover shall be stopped.

5.4 Electrical hazards

5.4.1 General

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

5.4.2 Emergency stop device

In general filling 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.

5.4.3 Protection against water ingress

5.4.3.1 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.

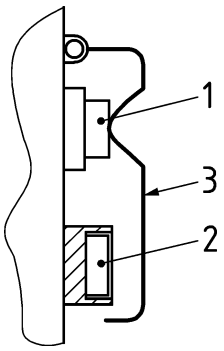
d) IP X0 Internal electrical operating components

1) in a machine with completely enclosed housing with the degree of protection IP X5; protection against condensate water shall be provided, and the safety of fingers and the back of the hand shall be ensured, by the design of the electrical elements.

5.4.3.2 Hoods

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

— the electrical operating components shall be covered by hoods. A statement indicating their use shall be included in the instruction handbook (see Figure 28);



Key

1 OFF

2 ON

3 protection hood (OFF)

Figure 28 — ON-/OFF-switch with hood

— hoods covering the external operating components may be lifted for actuating ON- and OFF-switches. Hoods covering installed emergency stop buttons shall not, when closed, restrict the use of the button (see Figure 28);

— when using membrane switches or similar systems, no hoods are needed if the membrane switches or similar systems are suitable for cleaning with a water hose or a pressure cleaning apparatus.

5.4.4 Safety requirements related to electromagnetic phenomena

Filling 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.

5.5 Hazard from loss of stability

5.5.1 Measures to reach stability:

5.5.1.1 Filling machines (fixed) and auxiliary machines (movable) shall be designed to be stable under normal operating conditions.

5.5.1.2 Filling machines not bolted to the floor shall be stable.

5.5.1.3 Movable auxiliary 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).

5.5.1.4 Movable auxiliary 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.

5.5.2 The manufacturer shall give details on foundation load and types of fixing in the instruction handbook. The use of the locking brake for the wheels and the type of the floor shall be described.

5.5.3 Machines tested in accordance with Table 3 shall not roll, slip or tilt at their location.

5.6 Noise reduction

Noise reduction shall be an integral part of the design process thus taking into account measures at source as given in EN ISO 11688-1.The success of the applied noise reduction measures is assessed on the basis of the actual noise emission values (see Annex A) in relation to other machines of the same family.

5.7 Ergonomic requirements

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

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

5.7.3 On filling machines with a hand-operated cover on the feed intake hopper, the grab handle shall be designed and located such that an operating force < 250 N is required.

5.7.4 On filling machines where the weight of the piston or feeder is > 25 kg, suitable lifting and transporting devices shall be provided to install, remove and transport these components.

5.7.5 On filling machines with a feed intake hopper and a design height (height of the feed intake hopper edge measured from the floor) > 1 500 mm, steps or ladders shall be provided for operating, setting-up and cleaning procedures which cannot be done from the floor.

5.7.6 On filling 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 > 1 500 mm. No loading device is required in the case of small production quantities which can be fed from a vessel handled manually.

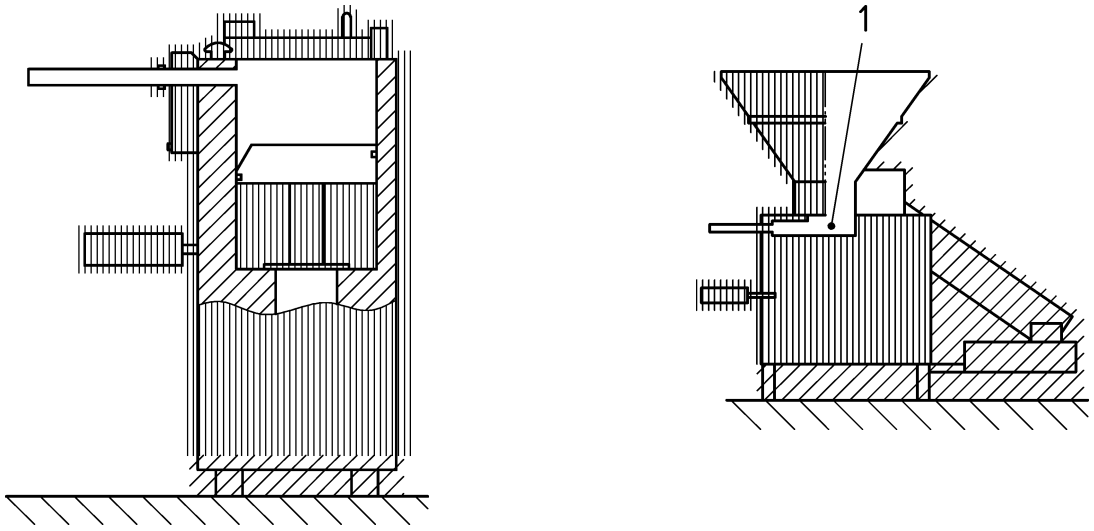
5.7.7 On filling machines where in the predominant working time the workplace is at the discharge port (filling horn), a distance $H_1 \geq 975$ mm from the floor (standing area) to the middle of the discharge port (filling horn) is required for ergonomic reasons (see Figure 1). This also increases the filling height of the hopper, but that is acceptable to hand-fed hopper, since the accumulated working time for the manual loading is considerably lower than the accumulated working time at the outlet of the machine (see Figure 2).

5.8 Hygiene and cleaning

5.8.1 General

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 29.



a) Filling machine with cylinder with piston **b) Filling machine with feed intake hopper**

Key

1 feeder

food area

splash area

non-food area

Figure 29 — Hygiene areas on filling machines

5.8.2 Filling machines

5.8.2.1 Food area

5.8.2.1.1 Filling machines with cylinder

— Cylinder, inside;

— edge of the cylinder;

— bottom face of the closing cover;

— top face of the piston;

— cylindrical part of the piston;

— discharge, inside;

— filling horn.

5.8.2.1.2 Filling machines with feed intake hopper

— Inside of feed intake hopper;

— edge of feed intake hopper;

— in-feed auger;

— plough and counter auger;

— feeder;

— feeder housing, inside;

— closed cover, inside;

— closed cover, outside (if by opening product may fall into the food area);

— cover made from bars or perforated sheet metal, inside and outside;

— discharge, inside;

— filling horn.

5.8.2.2 Splash area

5.8.2.2.1 Filling machines with cylinder

— Closing cover, outside;

— bottom face of piston;

— bottom portion of cylinder;

— outer faces of machine.

5.8.2.2.2 Filling machine with feed intake hopper

— Outside of feed intake hopper;

— closed cover, outside (if by opening product may fall into the food area);

— feeder housing, outer faces;

— top face of machine;

— outer faces of machine.

5.8.2.3 Non-food area

5.8.2.3.1 Filling machine with cylinder

— All other surfaces not specified in 5.8.2.1 and 5.8.2.2.

5.8.2.3.2 Filling machines with feed intake hopper

— Step;

— intermediate step;

— ladder;

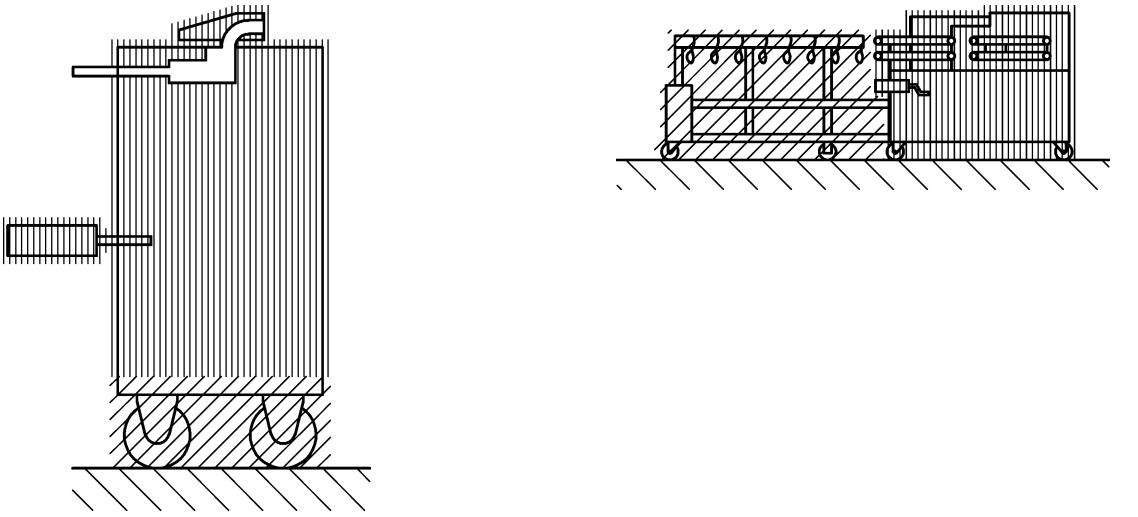
— loading device;

— all other surfaces not specified in 5.8.2.1 and 5.8.2.2.

5.8.3 Auxiliary machines

5.8.3.1 General

Hygiene areas see Figure 30.



a) Auxiliary twisting device **b) Auxiliary portioning and hanging device**

Key

food area

splash area

non-food area

Figure 30 — Hygiene areas on auxiliary machines

5.8.3.2 Food area

In the food area, as defined in EN 1672-2, the only parts included are the immediate product feeding components (e.g. feeder, filling horn, separating device). This requirement requires an instruction in the instruction handbook that product which comes out of the casings and accidentally comes into contact with the surfaces of auxiliary machines shall not be returned into the main product flow.

5.8.3.3 Splash area

Components and machine surfaces which come into contact with products that come out of the casings are considered part of the splash area, as defined in EN 1672-2.

5.8.3.4 Non-food area

— Outer faces of machine;

— hanger;

— all other surfaces not specified in 5.8.3.2 and 5.8.3.3.

5.8.4 Surface conditions

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

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

5.8.5 Cleaning

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

5.8.5.2 Some components in the food area, e.g. piston, feeder are not easy to clean. Specific information on cleaning and adequate removal of cleaning and disinfecting agents shall be given in the instruction handbook (see 7.2).

5.8.6 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.

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 3. These testing methods shall be applied with machines:

— fully commissioned; or

— partially dismantled.

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

Table 3 — Verification list

Subclause	Test method
5.3.1.1.2	Inspection and functional test of the interlocking of the cover Verification of the electrical diagram
5.3.1.1.3	Measuring of the dimensions
5.3.1.1.4	Measuring of the dimensions
5.3.1.1.5	Verification of the non-ejecting of the piston
5.3.1.2.2	Inspection and functional test of the interlocking of the cover and of the filling horn Verification of the electrical diagram
5.3.1.2.3	Measuring of the dimensions
5.3.1.2.4	Measuring of the dimensions
5.3.1.3.2	Inspection and functional test of the gripping device
5.3.1.3.3	Verification of the manometer
5.3.2.1.2	Inspection and functional test of the interlocking of the separation point Verification of the electrical diagram
5.3.2.1.3	Measuring of the dimensions Inspection and functional test of the interlocking of the cover Verification of the electrical diagram Measuring of the stopping time
5.3.2.1.4	Measuring of the dimensions Inspection and functional test of the interlocking of the accesses Verification of the electrical diagram
5.3.2.1.5	Measuring of the dimensions Inspection and functional test of the interlocking of the tri bar Verification of the electrical diagram Measuring of the stopping time
5.3.2.1.6	Measuring of the dimensions Inspection and functional test of the interlocking of the light barrier Verification of the electrical diagram Measuring of the stopping time
5.3.2.1.7	Measuring of the dimensions Inspection and functional test of the interlocking of the divided hopper Verification of the electrical diagram Measuring of the stopping time
5.3.2.1.8.1	Measuring of the dimensions Inspection and functional test of the interlocking of steps and ladder Verification of the electrical diagram Measuring of the stopping time

Subclause	Test method
5.3.2.1.8.2	Inspection and functional test of the interlocking of the two hand control Verification of the electrical diagram
5.3.2.1.9	Measuring of the dimensions and of the angle Inspection of the infeed auger and the plough/counter auger
5.3.2.2.	Measuring of the dimensions Inspection and functional test of the interlocking of the filling horn Verification of the electrical diagram
5.3.3.1	Measuring of the dimensions Inspection and functional test of the interlocking of the control device, switch device for highest and lowest position of loading device
5.3.4.2	Inspection and functional test of the interlocking of the hood) Verification of the electrical diagram
5.3.4.3	Measuring of the dimensions Inspection and functional test of the interlocking of the hood Verification of the electrical diagram
5.3.4.4	Inspection and functional test of the interlocking of the hood Verification of the electrical diagram Verification of the overload clutch
5.3.4.5	Inspection and functional test of the interlocking of the hood Verification of the electrical diagram
5.3.4.6	Measuring of the dimensions Inspection and functional test of the interlocking of the separation point Verification of the electrical diagram
5.3.4.7 5.3.4.8 5.3.4.9 5.3.4.10	Measuring of the dimensions Inspection and functional test of the interlocking of the hood and of the light barrier Verification of the electrical diagram Measuring of the stopping time
5.3.4.11.1.2	Measuring of the dimensions Verification of the information for use
5.3.4.11.1.3	Measuring of the dimensions Inspection and functional test of the interlocking of the hood Verification of the electrical diagram Measuring of the stopping time
5.3.4.11.1.4	Measuring of the dimensions Inspection and functional test of the interlocking of the hood and of the transport car Verification of the electrical diagram Measuring of the stopping time

Subclause	Test method
5.4	Tests according to EN 60204–1:2006, Clause 18, shall be done. EMC compatibility: Verification of the detection of used elements and sub-assemblies Verification of IP-grades
5.5	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 filling machine. Test the loss of stability with partially dismantled machine. For movable machines the wheels shall be locked in unfavourable position. Inspection
5.6	Measurement of the noise emission values according to Annex A
5.7	Measurement of the forces, e.g. by a spring balance Functional test Inspection
5.8	Visual inspection of the machine and its documentation. Verification of the hygiene requirements according to Annex B
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 meet the requirements of EN ISO 12100:2010, 6.4.5.

In particular, the instruction handbook shall provide:

a) Information relating to transport, the possibilities of installation and storage:

   1) of the machine,

   2) of the piston, feeder, plough, infeed auger with weight indication;

b) Information relating to commissioning:

   1) Mounting and installation conditions (see 5.1 and 5.5.2);

   2) For the loading device:

      i) Where relevant, a test report detailing the static or dynamic tests carried out or,

      ii) for devices assembled at the user`s premises, the instructions for performing the static and dynamic tests necessary for the verification of the fitness for use;

3) Where reducing the risk is by the physical arrangement or positioning of the machine the manufacturer shall include in the Information for use a reference to the reduction means to be provided, and to any limiting value of the requirement, and, if appropriate, to the means of verification.

c) Information relating to the machine:

1) Description of the machine, guards and other protective devices,

2) Description of hazards e.g. on filling machines with feed intake hoppers which could not be fully eliminated by protective devices, e.g. hazards on open feed intake hopper, outlets,

3) The instruction handbook (and any sales literature describing the performances of the machine) shall contain the following information on airborne noise emissions, determined and declared in accordance with Annex A of this European Standard:

i) the A-weighted emission sound pressure level at workstations, where this exceeds 70 dB(A); where this level does not exceed 70 dB(A), this fact shall be indicated,

ii) the peak C-weighted instantaneous sound pressure value at workstations, where this exceeds 63 Pa (130 dB in relation to 20 µPa),

iii) the A-weighted sound power level emitted by the machinery, where the A-weighted emission sound pressure level at workstations exceeds 80 dB(A),

4) Information on the electrical installation (see EN 60204-1:2006, Clause 17) and the electrical circuit diagram or reference to the place of deposit (e.g. pocket) inside the machines,

d) Information relating to normal operating conditions:

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

2) Description of the use of the interlocked cover, step, ladder, two-hand control and mechanical flap (see 5.3.2.1),

3) Description about clapping down the feed intake hopper or opening and swivelling the parts of the feed intake hopper on filling machines without loading device, if there shall be works in the hopper for maintenance, cleaning or preparations,

4) Description of the use of the interlocked protective hoods (see 5.4.3.2),

5) Description of the non-manipulation of guards,

6) Information on attainment of ergonomic targets (see 5.7.2),

7) Description of prohibited use e.g. filling of explosives,

8) Description of how to secure filling machines in the case of trouble without danger,

9) Description of daily verifications of protective and interlocking devices before using the machine,

10) Filling machines shall be installed in a sufficiently lighted place;

e) Information relating to cleaning (see 5.8.5.2):

1) Description of:

i) frequency of cleaning and disinfecting,

ii) the cleaning method, cleaning agent with reference to safety data sheet of manufacturer, disinfecting method, disinfecting agent with reference to safety data sheet of manufacturer, rinsing agent and application time to avoid toxic hazards,

iii) non-suitable cleaning agents,

iv) disinfecting methods,

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

vi) rules of action during cleaning and disinfecting operations and wearing of personal protective equipment,

vii) use of hoods over external electrical operating components when the machines are cleaned with pressurized water, and how the operating components underneath the hood shall be cleaned which are covered from the hood during cleaning,

viii) installation and removal of the piston, feeder, plough and infeed auger before beginning cleaning work,

ix) 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 (see 5.3.4.11.1.2),

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

6) The specifications of the spare parts to be used, when these affect the health and safety of operators,

7) Circuit diagrams.

g) Information relating to operator training.

Operators should be trained in the dangers associated with the use, cleaning, transportation and installation of Filling machines and auxiliary machines and with the precautions to be observed. Information shall be given which specifies the elements of training required for normal operating, cleaning, transportation and installation of the machines and the standard of training required.

h) Information for the combinations of the machine and other machines and/or devices/modules.

Each combination shall be described and also the status of the combination. The status means is the new combination also a machine or only a Group of machines working together.

Also the rating information of these combinations shall be described, especially the rating information described on the rating plate.

This information shall not be a part of the instruction handbook, they can also be published on the internet. This can be necessary if the manufacturer approves more and more combinations after the machine (and therefore the instruction handbook) was on the market.

7.3 Marking

7.3.1 Marking of machinery

Filling machines and auxiliary machines conforming to this document shall be marked permanently and legibly with the following information on their rating plate:

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

— designation of the machinery;

— designation of series or type;

— serial number;

— mandatory marking[1)];

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

— rating information, including supply voltage and frequency, power rating.

If the rating information for the machine includes some other machines or some devices/modules the information on the rating plate shall be the total rating of this combination of machines or machines in combination with devices/models (see also 7.2 h)).

7.3.2 Marking of devices or modules

Filling machines and auxiliary machines, defined as devices or modules, conforming to this document shall be marked permanently and legibly with the following information on their surface:

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

— designation of series or type;

— serial number;

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

— rating information if existing, including supply voltage and frequency, power rating.

7.3.3 Marking of interchangeable equipment

Interchangeable equipment, conforming to this document shall be permanently and legibly marked with at least with the following information on their surface:

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

— serial number if necessary for identification.

---

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

7.4 Intended use

During the production of this document the following assumptions were made:

— Filling machines are installed in a sufficiently lighted place.

— They are used only by designated and skilled operators.

— Filling machines are not foreseen to be cleaned with highly pressurized water (more than 20 bar).

Annex A
(normative)

Noise test code for filling machines and auxiliary machines (grade 2)

A.1 Determination of the emission sound pressure level

EN ISO 11201 shall be applied in order to determine the emission sound pressure level at the normal operator position, without the operator being present and at a distance of:

— 1 m from the discharge outlet port of the filling machines or auxiliary machines and

— at a height of 1,6 m above the floor. The microphone placed at this position shall be directed towards the machine.

If it is required according to 7.2 to determine the sound power level of a filling or auxiliary machine EN ISO 3744 should be applied.

A.2 Installation and mounting conditions

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

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

The machine to be tested shall be installed on a reflecting (acoustically hard) testing table, as described in EN ISO 11201:2010, Annex B, or on a reflecting floor for machines on feet.

An elastic fixing layer shall be provided between the machine and the carrying surface so that the transmission of vibrations onto the support as well as the reaction to the noise source is minimized. The machine should stand on this horizontal surface and shall 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 empty at its maximum speed.

A.4 Measurement

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

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

The measurement shall be carried out over a complete 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 11201:2010, Clause 12.

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

A.6 Information to be reported

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

As a minimum, the following information shall be included:

— reference to the basic noise emission standard EN ISO 11201,

— description of the mounting and operating conditions used,

— location for the determination of the emission sound pressure level at the workstation,

— the noise emission value obtained.

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

A.7 Declaration and verification of the noise emission values

The declaration of the noise emission values shall be made as a dual number noise emission declaration according to EN ISO 4871. Therefore the A-weighted emission sound pressure level LpA at the workstation and the uncertainty KpA shall be declared. KpA is assumed to have a value of about 2,5 dB.

The manufacturer shall indicate the noise emission values in accordance with 7.2.

The A-weighted emission sound pressure level shall be rounded to the nearest whole Decibel.

The noise emission declaration shall explicitly state that the A-weighted emission sound pressure level has been determined according to the specification of this noise test code as well as to the basic standard EN ISO 11201.

If this is not the case, it shall be explicitly mentioned which deviation with regard to EN ISO 11201 exists.

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

Annex B
(normative)

Design principles to ensure the cleanability of filling machines and auxiliary machines

B.1 Definitions

B.1.1 General

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

B.1.2 Food area

Area comprising surfaces which will come into contact with foodstuff; the food area also comprises those surfaces with the foodstuff may come into contact under normal operating conditions and returns into the main product stream (see Figure 29 and Figure 30).

B.1.3 Splash area

Area comprising surfaces on which part of the foodstuff may splash or flow along under normal operating conditions and does not return into the main product stream (see Figure 29 and Figure 30).

B.1.4 Non-food area

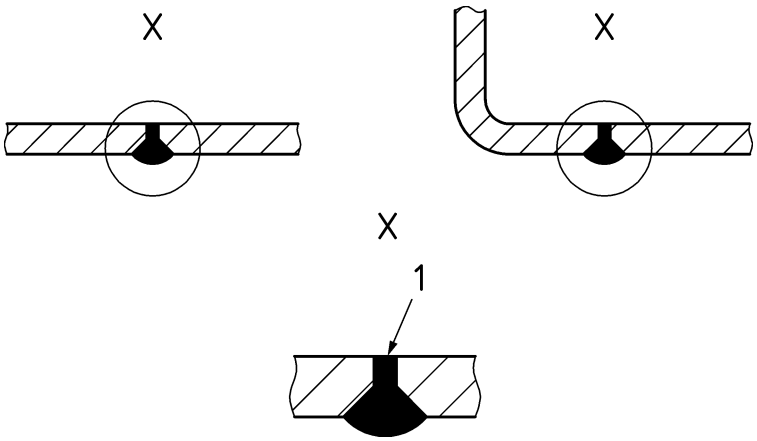
All other areas not specified above (see Figure 29 and Figure 30).

B.1.5 Joined surfaces

Surfaces are joined such that product particles cannot be trapped, can be easily removed and do not cause a contamination hazard (see Figure B.1).

B.1.6 Easy to clean

Designed and constructed such that it is possible to remove dirt with a simple cleaning method, e.g. cleaning agent and pressurized water.



Key

1 smooth 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 the following requirements:

B.3.2 Food area

B.3.2.1 Surfaces

The surfaces in the food area shall be smooth and free of 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 product manufacturing necessities. The rolls shall be easy to clean.

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

Dimensions in millimetres

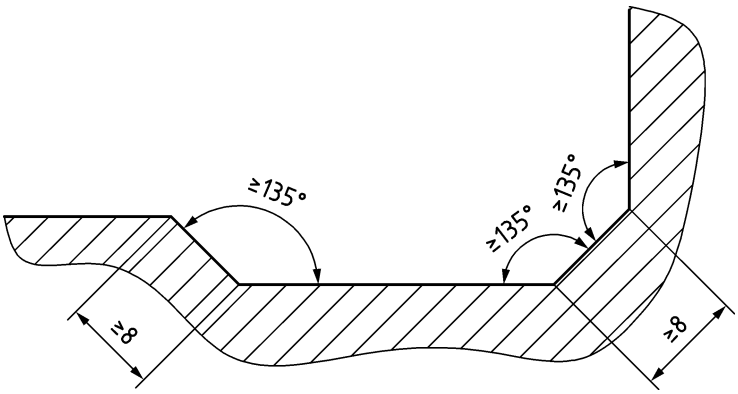


Figure B.3 — Corners in food area

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

Dimensions in millimetres

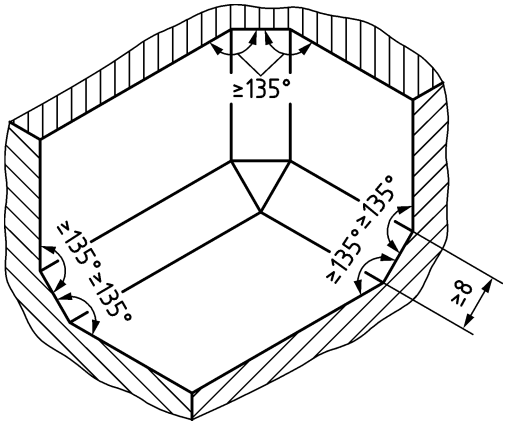


Figure B.4 — Intersecting surfaces in food area

B.3.2.3 Grooves

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

B.3.2.4 Joints and seams

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

B.3.2.5 Surface roughness

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

B.3.3 Splash area

B.3.3.1 General

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

B.3.3.2 Inside corners

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

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

Angles ≥ 110° without radii are admissible (see Figure B.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 go right through and have a diameter ≥ 16 mm. Gaps are permissible provided the gap is at least 16 mm in width, the depth is not more than 16 mm and the gap is open.

B.3.3.5 Joints and seams

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

B.3.3.6 Fastenings methods

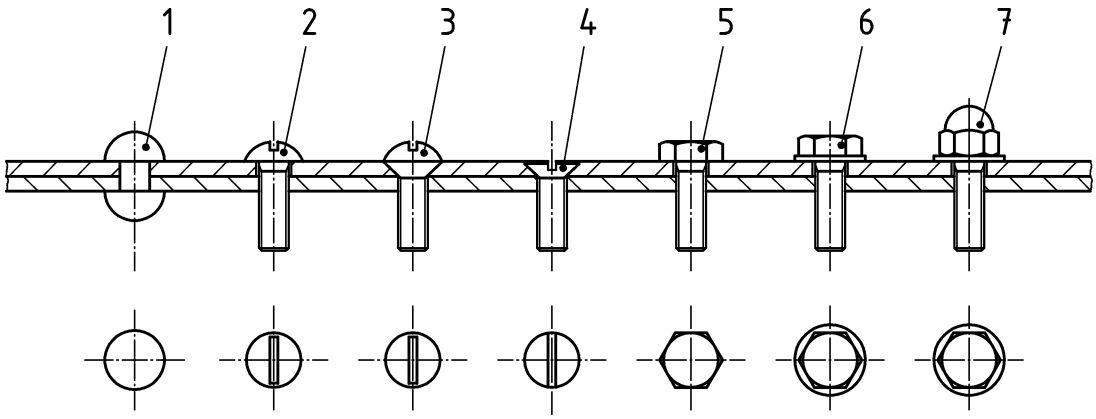
Screws and rivets with low profile heads and of the types shown in Figure B.5 may be used only when other fastening methods are impracticable and they are easy to clean (see Figure B.5).

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

Figure B.5 — Acceptable joining elements – Head profiles

B.3.3.7 Surface roughness

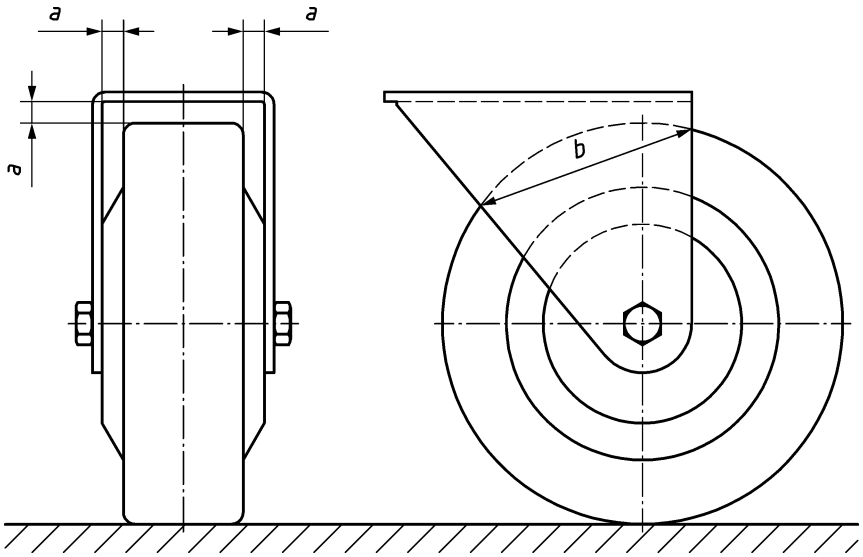
Surface roughness conditions shall comply with the requirements of B.3.2.5.

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 castor.

Figure B.6 — Castors – Dimensions examples

Annex ZA
(informative)

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

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

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

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

Bibliography

[1] EN 415-3, *Safety of packaging machines — Part 3: Form, fill and seal machines*

[2] EN 894-1, *Safety of machinery — Ergonomics requirements for the design of displays and control actuators — Part 1: General principles for human interactions with displays and control actuators*

[3] EN 894-2, *Safety of machinery — Ergonomics requirements for the design of displays and control actuators — Part 2: Displays*

[4] EN 894-3, *Safety of machinery — Ergonomics requirements for the design of displays and control actuators — Part 3: Control actuators*

[5] EN 1037, *Safety of machinery — Prevention of unexpected start-up*

[6] EN 61310-1, *Safety of machinery — Indication, marking and actuation — Part 1: Requirements for visual, acoustic and tactile signals (IEC 61310-1)*

[7] EN 61310-2, *Safety of machinery — Indication, marking and actuation — Part 2: Requirements for marking (IEC 61310-2)*

[8] EN ISO 4413, *Hydraulic fluid power — General rules and safety requirements for systems and their components (ISO 4413)*

[9] EN ISO 11204, *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)*

This page deliberately left blank

British Standards Institution (BSI)

BSI is the national body responsible for preparing British Standards and other standards-related publications, information and services.

BSI is incorporated by Royal Charter. British Standards and other standardization products are published by BSI Standards Limited.

About us

We bring together business, industry, government, consumers, innovators and others to shape their combined experience and expertise into standards -based solutions.

The knowledge embodied in our standards has been carefully assembled in a dependable format and refined through our open consultation process. Organizations of all sizes and across all sectors choose standards to help them achieve their goals.

Information on standards

We can provide you with the knowledge that your organization needs to succeed. Find out more about British Standards by visiting our website at bsigroup.com/standards or contacting our Customer Services team or Knowledge Centre.

Buying standards

You can buy and download PDF versions of BSI publications, including British and adopted European and international standards, through our website at bsigroup.com/shop, where hard copies can also be purchased.

If you need international and foreign standards from other Standards Development Organizations, hard copies can be ordered from our Customer Services team.

Subscriptions

Our range of subscription services are designed to make using standards easier for you. For further information on our subscription products go to bsigroup.com/subscriptions.

With **British Standards Online (BSOL)** you'll have instant access to over 55,000 British and adopted European and international standards from your desktop. It's available 24/7 and is refreshed daily so you'll always be up to date.

You can keep in touch with standards developments and receive substantial discounts on the purchase price of standards, both in single copy and subscription format, by becoming a **BSI Subscribing Member**.

PLUS is an updating service exclusive to BSI Subscribing Members. You will automatically receive the latest hard copy of your standards when they're revised or replaced.

To find out more about becoming a BSI Subscribing Member and the benefits of membership, please visit bsigroup.com/shop.

With a **Multi-User Network Licence (MUNL)** you are able to host standards publications on your intranet. Licences can cover as few or as many users as you wish. With updates supplied as soon as they're available, you can be sure your documentation is current. For further information, email bsmusales@bsigroup.com.

BSI Group Headquarters

389 Chiswick High Road London W4 4AL UK

Revisions

Our British Standards and other publications are updated by amendment or revision.

We continually improve the quality of our products and services to benefit your business. If you find an inaccuracy or ambiguity within a British Standard or other BSI publication please inform the Knowledge Centre.

Copyright

Useful Contacts:

Customer Services
Tel: +44 845 086 9001
Email (orders): orders@bsigroup.com
Email (enquiries): cservices@bsigroup.com

Subscriptions
Tel: +44 845 086 9001
Email: subscriptions@bsigroup.com

Knowledge Centre
Tel: +44 20 8996 7004
Email: knowledgecentre@bsigroup.com

Copyright & Licensing
Tel: +44 20 8996 7070
Email: copyright@bsigroup.com

bsi.

...making excellence a habit.™