BRITISH STANDARD

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+A1:2009

Food processing machinery — Mixers with horizontal shafts — Safety and hygiene requirements

ICS 67.260

BSI
British Standards

National foreword

This British Standard is the UK implementation of EN 13389:2005+A1:2009. It supersedes BS EN 13389:2005 which is withdrawn.

The start and finish of text introduced or altered by amendment is indicated in the text by tags. Tags indicating changes to CEN text carry the number of the CEN amendment. For example, text altered by CEN amendment A1 is indicated by [A1] [A1].

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English Version

Food processing machinery - Mixers with horizontal shafts - Safety and hygiene requirements

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Nahrungsmittelmaschinen - Mischmaschinen mit waagerechten Wellen - Sicherheits- und Hygieneanforderungen

This European Standard was approved by CEN on 1 August 2005 and includes Amendment 1 approved by CEN on 1 November 2009.

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Foreword

This document (EN 13389:2005+A1:2009) 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of an identical text or by endorsement, at the latest by June 2010, and conflicting national standards shall be withdrawn at the latest by June 2010.

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 includes Amendment 1 approved by CEN on 1 November 2009.

This document supersedes EN 13389:2005.

The start and finish of text introduced or altered by amendment is indicated in the text by tags ⟨A1⟩ ⟨A1⟩.

This European Standard 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(s).

⟨A1⟩ For relationship with EU Directive(s), see informative Annexes ZA and ZB, which are integral parts of this document. ⟨A1⟩

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, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and the United Kingdom.

Introduction

This European Standard is a type C standard as stated in [A1] EN ISO 12100 [A1].

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

When provisions of this type C standard are different from those 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

〈A1〉 This European Standard specifies requirements for the design, transport, installation, operation and maintenance of batch production fixed or tilting horizontal bowl type mixers with one or two rotating shafts with or without movable blades. These mixers are used to mix, knead and homogenise food for animal or human consumption in powder, paste or liquid form. The mixers can be floor mounted or transportable (with or without castors). They are intended to be used when stationary. 〈A1〉

These machines are used in feed mills and factories which produce, work on or process foodstuff, for example biscuits, bread, chocolate, cereal products.

This European Standard does not deal with the use of the machine in potentially explosive atmospheres.

〈A1〉 This European Standard deals with the significant hazards, hazardous situations and events relevant to mixers with horizontal shafts, when they are used as intended and under conditions of misuse which are reasonably foreseeable by the manufacturer (see Clause 4). 〈A1〉

This European Standard also specifies food hygiene requirements.

The feeding equipment, the dosing equipment, and the requirements of equipment for the supply of inert gases, and for heating and cooling, are excluded from the scope of this European Standard.

The hazards due to the unloading equipment (container, discharge belt, etc.) are not dealt with in this European Standard.

When drafting this European Standard, it has been assumed that the machines are not intended to be cleaned with a water jet.

This European Standard is not applicable to mixers with horizontal shafts which are manufactured before the date of publication of this European Standard by CEN.

2 Normative references

The following referenced documents are indispensable for the application of this European Standard. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 294:1992, *Safety of machinery — Safety distance to prevent danger zones being reached by the upper limbs.*

〈A1〉 *deleted text* 〈A1〉

EN 574:1996, *Safety of machinery — Two-hand control devices — Functional aspects — Principles for design.*

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

〈A1〉 *deleted text* 〈A1〉

EN 999, *Safety of machinery — The positioning of protective equipment in respect of approach speeds of parts of the human body.*

EN 1088:1995, *Safety of machinery — Interlocking devices associated with guards — Principles for design and selection.*

EN 1127-1, *Explosive atmospheres — Explosion prevention and protection — Part 1: Basic concepts and methodology.*

EN 1672-2:2005, *Food processing machinery — Basic concepts — Part 2: Hygiene requirements.*

EN 13478, *Safety of machinery — Fire prevention and protection.*

〈A1〉 EN 60204-1:2006, *Safety of machinery — Electrical equipment of machines — Part 1: General requirements (IEC 60204:2005, modified)* 〈A1〉

EN 60529, *Degrees of protection provided by enclosures (IP code) (IEC 60529:1989).*

EN ISO 3744:1995, *Acoustics — Determination of sound power levels of noise sources using sound pressure — Engineering method in an essentially free field over a reflecting plane (ISO 3744:1994).*

EN ISO 4287, *Geometrical Product Specifications (GPS) — Surface texture: Profile method — Terms, definitions and surface texture parameters (ISO 4287:1997).*

EN ISO 4871, *Acoustics — Declaration and verification of noise emission values of machinery and equipment (ISO 4871:1996*).

EN ISO 11201, *Acoustics — Noise emitted by machinery and equipment — Measurement of emission sound pressure levels at a work station and at other specified positions — Engineering method in an essentially free field over a reflecting plane (ISO 11201/AC1:1995*).

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

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

EN ISO 12100-1:2003*, Safety of machinery — Basic concepts, general principles for design — Part 1: Basic terminology, methodology (ISO 12100-1:2003).*

EN ISO 12100-2:2003*, Safety of machinery — Basic concepts, general principles for design — Part 2: Technical principles (ISO 12100-2:2003).*

〈A1〉 EN ISO 13732-1, *Ergonomics of the thermal environment — Methods for the assessment of human responses to contact with surfaces — Part 1: Hot surfaces (ISO 13732-1:2006)* 〈A1〉

EN ISO 13732-3, *Ergonomics of the thermal environment - Touching of cold surfaces - Part 3: Ergonomics data and guidance for application (ISO/DIS 13732-3:2002).*

〈A1〉 EN ISO 13849-1:2008, *Safety of machinery — Safety related parts of control systems — Part 1: General principles for design (ISO 13849-1:2006)*"

EN ISO 13850:2008, *Safety of machinery — Emergency stop — Principles for design (ISO 13850:2006)* 〈A1〉

3 Terms, definitions, mode of operation and description

3.1 Terms and definitions

For the purposes of this European Standard, the terms and definitions given in EN ISO 12100-1:2003 and the following apply.

3.1.1
fixed bowl mixer
mixer with a bowl which is fixed during filling, mixing and discharge

3.1.2
tilting bowl mixer
mixer with a bowl that tilts to allow filling and/or discharging of the mixer

3.1.3
mixing element
blade, plough, Z blade or other device attached to the main horizontal shafts used to mix the product

3.1.4
movable blade(s)
knife (knifes) fixed inside the bowl

3.1.5
side cutter
mixing device independently driven from the main drive shaft(s)

3.2 Mode of operation and normal operational use

The range of machines covered by this European Standard are designed to batch mix powdered, paste and liquid products, the primary ingredient usually being flour.

When the mixing bowl is in its loading position, the machine receives the dry or wet ingredients, weighted or metered. This operation is controlled by either the operator of the machine or automatically.

The machine mixes and/or melts ingredients during a time or with an energy based measurement.

When the mixing cycle is over, the product is unloaded into a mobile container, or into a fixed hopper or onto a discharge belt, e. g. by tilting the mixing bowl.

The machine may be manually operated or completely automatic. The bowl may be heated or cooled.

3.3 Description

Typical mixers with horizontal shafts are shown in Figures 1a and 1b, with the following main elements:

a) rigid machine frame;

b) mixing bowl;

c) rotating mixing shafts;

d) main drive motor and gearbox;

e) bowl tilting mechanism;

f) electrical controls;

g) delivery device: discharge hopper, discharge belt or mobile container;

h) movable blades if any.

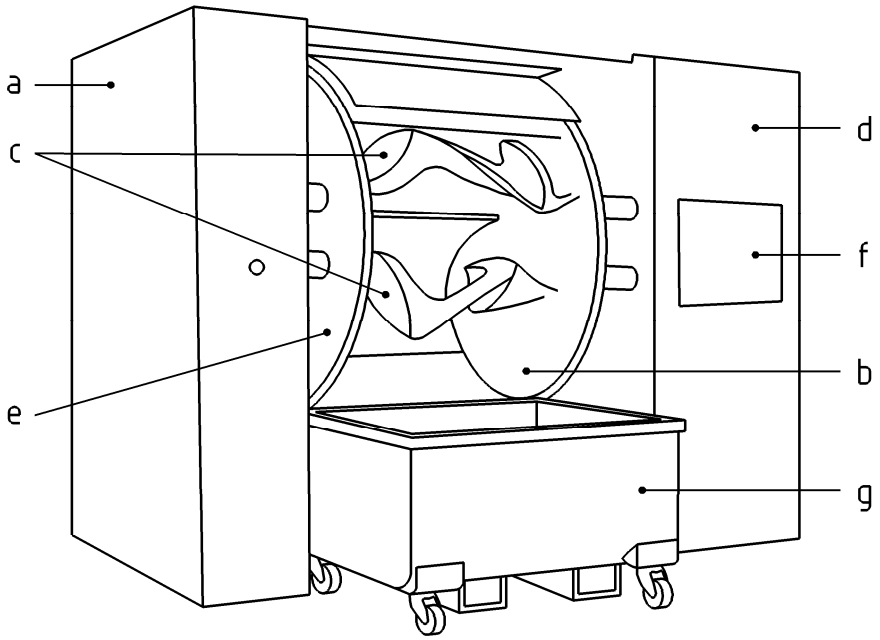


Figure 1a — "Z blade and tilting bowl" machine

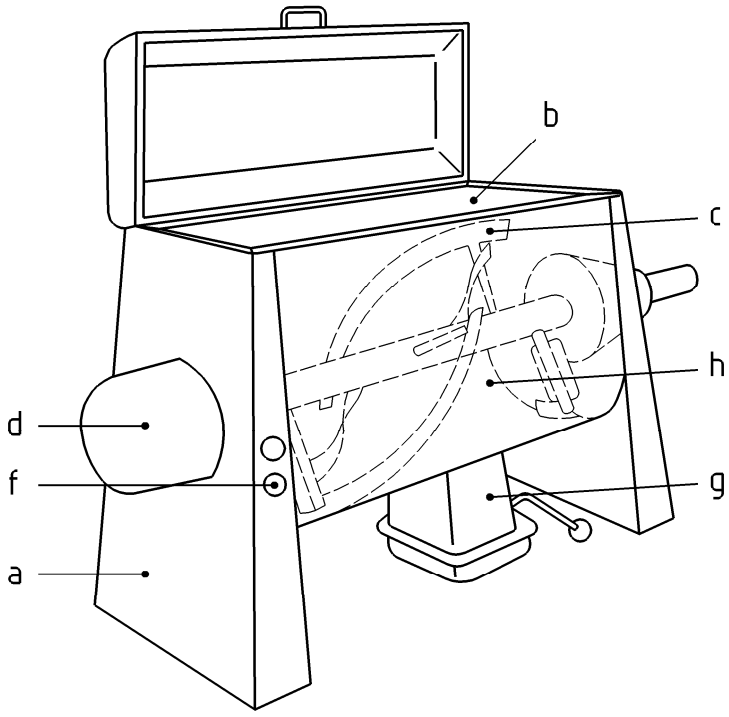


Figure 1b — "Fixed bowl" machine

Figure 1 — Mixers with horizontal shafts

4 List of significant hazards

4.1 General

This clause contains all the significant hazards, hazardous situations and events, as far as they are dealt with in this European Standard, identified by risk assessment as significant for this type of machinery and which require action to eliminate or reduce the risk.

Before using this European Standard it is important to carry out a risk assessment of the mixer with horizontal shafts to check that it has the hazards identified in this clause.

4.2 Mechanical hazards

The significant mechanical hazards are:

a) trapping points between the blades and the bowl;

b) trapping points between the bowl and machine frame during tilting of the bowl on tilting bowl machines;

c) trapping points between the mixer bowl and cover;

d) drive mechanisms;

e) loss of stability.

The example shown in Figure 2 illustrates 6 danger zones associated with these hazards:

Zone 1: Access to the rotating tools through the feed opening:

hazards of trapping and shearing, between blades and bowl, to the whole or any part of the body;

Zone 2: Access to the rotating tools through the discharge:

hazards of trapping and shearing, between blades and bowl, to the whole or any part of the body;

Zone 3: Access to trapping point between the bowl and machine frame on machines with tilting bowls:

hazard of trapping and shearing, between the bowl and machine frame during the tilting operation;

to upper parts of the body;

Zone 4: Access to trapping points between the mixer bowl and cover:

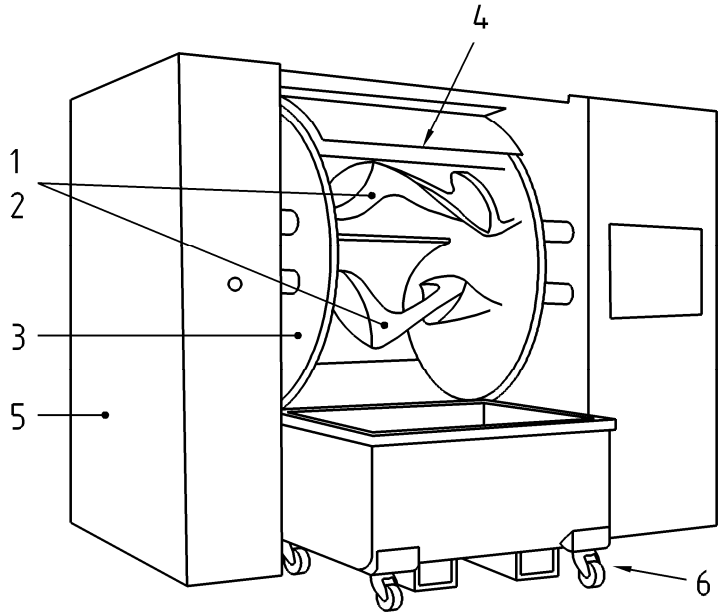
hazard of trapping and shearing, between the bowl and cover, to upper parts of the body;

Zone 5: Access to the drive mechanism for the rotating shafts or the tilting bowl:

hazard of shearing and trapping to any part of the body;

Zone 6: Loss of stability of machine - access to areas adjacent to the machine:

hazard of trapping and crushing of whole or part of body if machine overturns.



Key

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

Figure 2 — Danger zones

4.3 Electrical hazards

Hazard of electric shock from direct or indirect contact with live components.

Hazard of external influences on electrical equipment (e. g. cleaning with water).

4.4 Thermal hazards

Where the mixing bowl has a double wall for heating or cooling during mixing, there is a hazard of burning when touching hot or cold surfaces of the jacket.

4.5 Hazards generated by noise

Mixers with horizontal shafts can generate an airborne noise being able to involve a deterioration of hearing or accidents due to the interferences with the oral communication and the perception of the acoustical signals.

4.6 Hazards resulting from the inhalation of harmful mists and dusts

Loading the products exposes operators to dust including flour and ingredients which may be harmful to their health, causing rhinitis (running noses), watering eyes and possibly occupational asthma (see also 4.7 below).

4.7 Fire or explosion hazard

When loading, mixing or discharging finely divided, dusty materials, a hazard of dust explosion exists when dust/air mixtures are present between the lower and upper explosive limits.

4.8 Hazard generated by neglecting hygienic design principles

The neglect of hygienic principles can create unacceptable modification of foodstuff and therefore a risk to human health of the operator and consumer, i.e. through physical, chemical or microbial pollution.

4.9 Hazards generated by neglecting ergonomic principles

During operation, cleaning and maintenance, there is a risk of injury to the body resulting from awkward body postures.

Movement or filling of the bowl especially at heights can create a risk of injury to the body from lifting, pushing and pulling of heavy loads.

5 Safety and hygiene requirements and/or protective measures

5.1 General

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

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

〉A1〈 For hazards which are to be reduced by the application of the type B-standards such as EN 294, EN 574, EN 614-1, EN 953, EN 999, EN 1088, EN 1127-1, EN 13478, EN 60204-1, EN 60529, EN ISO 12100, EN ISO 13732-1 and EN ISO 13849-1, the manufacturer shall carry out a risk assessment to establish the requirements of the type B-standard. This specific risk assessment shall be part of the general risk assessment of the machine. 〉A1〈

5.2 Mechanical hazards

5.2.1 General

〉A1〈 Unless otherwise specified, interlocking guards shall be at least interlocking without guard locking as defined in EN 1088:1995, 4.2.1 and they shall comply with EN 1088:1995, Clauses 5 and 6.

The safety related parts of the control systems shall meet at least a performance level c defined in accordance with EN ISO 13849-1:2008.

The guards shall comply with EN 953.

When fixed guards, or parts of the machine acting as such, are not permanently fixed e. g. by welding, their fixing systems shall remain attached to the guards or to the machinery when the guards are removed. 〉A1〈

5.2.2 Machines with fixed bowl

5.2.2.1 Zone 1 – Access to the rotating mixing element through the in-feed opening

Access to the area where the mixing element moves shall be prevented by a solid, movable, interlocking guard with guard control locking (see clause 4.2.2 of EN 1088:1995).

Openings and/or feed chutes in the lid or bowl shall be in accordance with 4.5 in EN 294:1992. For small openings Table 4 of EN 294:1992 shall be used.

5.2.2.2 Zone 2 – Access to the rotating mixing element during discharge

Access to the area where the mixing element moves shall be prevented in one of the following ways.

5.2.2.2.1 Fixed chute or hopper

A rigid chute or hopper fixed to the machine discharge for collecting product complying with the safety distances in EN 294:1992 Table 4.

5.2.2.2.2 Use of a “hold to run control” or “two hand control”

A “hold to run control device” in accordance with 3.26.3 in EN ISO 12100-1:2003 or a two hand control device in accordance with type IIIA in EN 574:1996 may be used to prevent access during discharge**.**

Where these types of safeguard are employed, the following features are necessary:

a) control shall be sited in a fixed position and at a safe distance from the mixer discharge so that it is not possible to operate the device and reach into the mixing element through the discharge. When the control is released the mixing element shall stop within 2 seconds when the machine is empty;

b) operator shall have a clear view of all sides of the mixer so that if another person were to approach the danger zone they could be easily detected;

c) rotary movement of the shafts during discharge shall only be carried out at minimum speed necessary to discharge the product.

5.2.2.2.3 Fixed and/or interlocked distance guarding

Access to the mixing element through the discharge shall be prevented, for example, by the use of fixed or interlocked distance guarding. The guards shall prevent access from all sides of the machine.

The guard dimensions shall comply with the safety distances in Table 2 of EN 294:1992. The guards shall be constructed in accordance with the requirements of EN 953. The guards shall be designed so that there is a clear view into the area behind the guards e.g. they may be constructed from mesh. Openings in the guards shall be in accordance with Table 4 of EN 294:1992.

It shall not be possible to run the mixing element when any guards are open and opening any guard shall cause the mixing element to come to a halt within 2 seconds when the machine is empty. If this is not possible the guards shall be interlocked and fitted with a guard locking that is released only when the mixing element has stopped.

5.2.2.3 Zone 3 – Trapping point between the bowl and machine frame

This hazard is not relevant for machines with fixed bowls.

5.2.2.4 Zone 4 – Access to trapping points between the mixer bowl and cover

The design of the manually operated covers shall ensure that the force exerted by the cover onto the bowl is less than 150N e.g. by counterbalancing.

In case of powered cover movement one of the following solutions shall be adopted:

— use of a “hold to run control” or “two hand control” in accordance with the principles described in 5.2.2.2.2; or

— use of fixed and/or interlocked distance guarding in accordance with the principles described in 5.2.2.2.3.

5.2.2.5 Zone 5 – Access to drive mechanisms

All moving transmission parts shall be safeguarded by fixed or interlocked guards (see 5.3.2.2 and 5.3.2.3 in EN ISO 12100-2:2003) (in accordance with EN 953).

5.2.2.6 Zone 6 – Loss of stability

5.2.2.6.1 Machines shall be designed to be stable and shall comply with 5.2.2.6.2 or 5.2.2.6.3 as applicable.

For machines designed to be fixed to the floor, the instruction handbook shall indicate the values of forces at the fixing points and the dimensions of the anchor points provided.

5.2.2.6.2 Free standing machines without castors shall not fall or tip over when tilted 10° from the horizontal plane in the most unfavourable direction and containing the most unfavourable load.

5.2.2.6.3 Free standing machines with castors shall have at least two castors (or sets of castors) fitted with a locking device to prevent rolling and turning, and shall comply with the provisions of 5.2.2.6.2.

5.2.3 Machines with tilting bowl

5.2.3.1 Zone 1 – Access to the rotating mixing element through the infeed opening

See 5.2.2.1 above.

5.2.3.2 Zone 2 – Access to the rotating mixing element during discharge

5.2.3.2.1 General

For tilting machines it may be necessary to run the mixing element during discharge.

Access to the area where the mixing element moves shall be prevented in one of the following ways:

5.2.3.2.2 Use of a “hold to run control” or “ two hand control”

See 5.2.2.2.2 above.

5.2.3.2.3 Use of fixed and interlocked distance guarding

See 5.2.2.2.3 above.

5.2.3.3 Zone 3 – Trapping points between the bowl and machine frame

Access to the trapping points between bowl and the machine frame during tilting shall be prevented in one of the following ways.

5.2.3.3.1 Use of a “hold to run control” or “two hand control”

A “hold to run control device” in accordance with 3.26.3 in EN ISO 12100-1:2003 or a “two hand control device” in accordance with type III A in EN 574:1996 and positioned in accordance with EN 999 may be used to prevent access during tilting of the bowl.

Where these types of safeguard are employed, the following features are necessary:

a) control shall be sited in a fixed position and at a safe distance from any trapping points so that it is not possible at the same time to operate the device and reach the trapping points. When the control is released the tilting movement shall stop within 2 seconds.

b) operator shall have a clear view of all sides of the mixer so that if another person were to approach the danger zone they could be easily detected.

A “hold to run control” shall not be used if it cannot be situated at a safe distance from the mixer. In this case, a “two hand control device” in accordance with type III A in EN 574:1996 and positioned in accordance with EN 999 shall be used and conform to the conditions a) and b) above.

5.2.3.3.2 Fixed and/or interlocked distance guarding

The requirements of 5.2.2.2.3 shall apply throughout the range of positions of the tilting bowl.

It should not be possible to tilt the bowl when any guards are open and opening any guard shall bring the tilting movement to a halt within 2 seconds measured with an empty machine.

5.2.3.4 Zone 4 – Access to trapping points between the mixer bowl and cover

See requirements for trapping points between bowl and frame in 5.2.2.4 above.

5.2.3.5 Zone 5 – Access to drive mechanisms

See 5.2.2.5 above.

5.2.3.6 Zone 6 – Loss of stability

See 5.2.2.6 above.

5.2.4 Other precautions relevant to mechanical hazards

5.2.4.1 Additional tools, e.g. side cutters, shall be safeguarded in the same way as for the mixing element.

5.2.4.2 For the rescue or release of persons trapped within the guarded area measures according to 5.5.3 of EN ISO 12100-2:2003 shall be provided.

5.3 Electrical hazards

5.3.1 General

The electrical equipment shall comply with EN 60204-1, with the following precision.

5.3.2 Safety requirements relating to electromagnetic phenomena

The 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.

5.3.3 Protection against electric shock ⟩A1⟨ *deleted text* ⟩A1⟨

The electrical equipment shall comply with ⟩A1⟨ Clause 6 of EN 60204-1:2006 ⟩A1⟨.

For movable machines the instruction handbook shall contain recommended practice, such as, disconnecting the machine from the electrical supply before moving it, and the need to avoid damaging the supply cable during movement.

5.3.4 Power circuits ⟩A1⟨ *deleted text* ⟩A1⟨

Devices for detection and interruption of over-current shall be applied to each live conductor in compliance with ⟩A1⟨ 7.2.3 of EN 60204-1:2006 ⟩A1⟨. In case of single phase machines, no such device is required for earthed neutral conductor.

[A1]

5.3.5 Protection against earth faults in control circuits

For machinery supplied from a single-phase conductor and an earthed neutral conductor, there is no requirement for double pole interruption of the control circuit. The single pole interruption shall be in the phase conductor (see 9.4.3.1 of EN 60204-1:2006). [A1]

[A1]

5.3.6 Emergency stop

An emergency stop control (see 10.7 of EN 60204-1:2006) of category 0 or 1, in accordance with 4.1.4 of EN ISO 13850:2008, shall be fixed at least at the front and the rear sides of the machine frame. [A1]

5.3.7 Start function [A1] *deleted text* [A1]

Start devices shall be designed to reduce the risk of inadvertent operation by conforming to [A1] 10.6 of EN 60204-1:2006 [A1].

5.3.8 Unexpected start-up [A1] *deleted text* [A1]

The hazards from mechanical parts unexpectedly restarting by restoration of energy supply after an interruption shall be provided by conforming to [A1] 7.5 of EN 60204-1:2006 [A1].

[A1]

5.3.9 Motor enclosures

Where a motor has a degree of protection lower than IP23 (see EN 60529:1991) it shall be mounted inside an enclosure (see 14.2 of EN 60204-1:2006) that guarantees a minimum degree of protection of IP23 (see EN 60529:1991).

The whole machine frame shall have a degree of protection IP24 (see EN 60529). [A1]

5.3.10 Electrical requirements of controls

Control actuating devices, signals and display elements shall have a degree of protection IP 54 (see EN 60529).

5.4 Thermal hazards

Where bowls are heated, the temperatures of touchable surfaces in the working area shall conform to [A1] EN ISO 13732-1 [A1]. The contact period for surfaces intended to be touched during operation of the mixer shall be assumed to be not less than 3 s.

Where bowls are cooled, the requirements for the touchable surfaces of EN ISO 13732-3 apply.

5.5 Noise control

Mixers with horizontal shafts shall be designed and constructed so that the risk due to the airborne noise emission is reduced to the lowest levels, by applying in particular measures at source to control the noise (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.

5.6 Inhalation of harmful mists and dusts

To prevent the emission of harmful mists and dusts mixing machines shall be constructed as closed machines. Necessary openings for loading, unloading, adding ingredients etc., shall be equipped with solid lids.

If it is not possible to prevent emission of harmful mist and dust (see ▌A1⟩ EN 626-1 ⟨A1▌) the machine shall have provision for the connection of extraction equipment .The manufacturer shall give details of the extraction rate and connection means in the instruction handbook.

5.7 Fire and dust explosion

If the process and the processed materials present significant fire and/or explosion hazards the machine shall comply with EN 1127-1 and/or EN 13478.

In general, the following measures shall be considered:

Measures shall be taken to avoid creating effective ignition sources such as by limiting temperatures, or by choice of materials where contact may give rise to a mechanically generated spark or high surface temperature from friction. If the avoidance of effective ignition sources is not possible, additional measures such as inerting or constructional explosion protection shall be employed[1].

When the mixer contains internal devices that are capable only of slow movement (circumferential speed $v < 1\ m/s^{-1}$), precautions against mechanically generated spark and friction are not necessary.

When the mixer contains internal devices that are capable of moving relatively rapidly and/or have moderately high power requirements or the mixer involves temperatures that may be an effective ignition source, inerting or constructional measures for explosion protection shall be provided, unless the machine is intended to operate with all the following characteristics:

— machine has a high degree of filling (> 70 %) to limit the occurrence of hazardous explosive dust/air mixtures;

— during the charging and discharging processes, the mixer is operated at reduced mixing speeds ($v < 1\ m/s^{-1}$) and no choppers or disintegrators are used;

— sufficient clearance is present between reciprocating and rotating parts so that no contact can occur under any expected operating conditions;

— contaminating foreign objects that could become effective ignition sources are removed;

— no products are used that have a tendency to ignite spontaneously under the expected operating conditions, e. g. thermal and mechanical stresses;

— hazardous product residues are avoided by constructional measures or suitable cleaning measures.

5.8 Hygiene requirements

5.8.1 General

Mixers with horizontal shafts shall be designed and manufactured in accordance with the requirements of EN 1672-2, and Annex B of this European Standard gives additional information.

[1] See ISSA (International Social Security Association), Section Safety of Machinery, Working Group 2 Dust explosion.

The instructions for use shall include recommendations for cleaning procedures and include advice on suitable (and, if appropriate) unsuitable cleaning materials as well as any means necessary to protect the operator, such as personal protective equipment.

The 3 zones defined in EN 1672-2 are shown in Figure 4 and are in general at least as follows; the precise boundary between the areas depends on the detailed design of the machine.

5.8.2 Food area

The food area is as follows:

— inside of the bowl and lid;

— inner surfaces of guards mounted on the bowl;

— mixing and kneading shafts and built-in components;

— inside of openings for loading and unloading or of the connecting pipes respectively.

5.8.3 Splash area

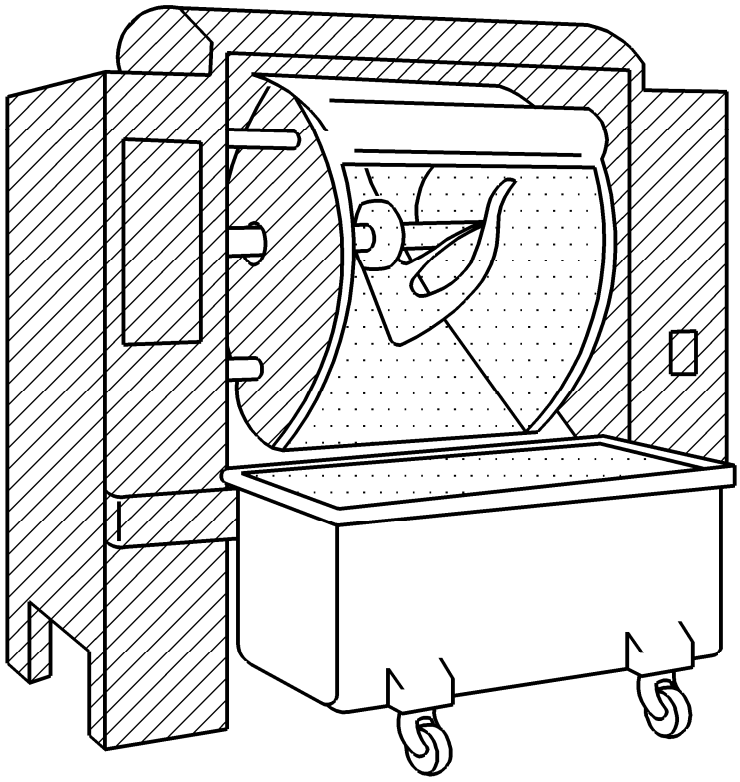
The splash area is as follows:

— outer front part of the bowl;

— parts of the frame which face the bowl.

5.8.4 Non food area

The rest of the machine.



Key

Food area

Splash area

Non food area

Figure 3 — Hygiene areas on mixer with horizontal shafts

5.9 Hazards generated by neglecting ergonomic principles

Ergonomic factors shall be taken into consideration (see EN 614-1).

Awkward body postures during maintenance and cleaning as well as when filling and emptying the bowl shall be avoided. This can be done through good ergonomic design and by using automatic loading and discharge equipment.

Heavy lifting shall be avoided by equipping the machine with attachments for lifting devices. Maximum weight for manual lifting in the best lifting position shall be 25 kg.

Pushing and pulling with excessive effort shall be avoided e.g. by use of low-friction castor wheels and provision of ergonomically well designed handles.

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 this European Standard. As far as the criteria for acceptance and the conditions during verification are self-evident, they can also be found in the Table 1.

Verification of the requirements can be made by means of inspection, calculation or testing. These shall be applied to a machine in a fully commissioned condition but partial dismantling may be necessary for the purpose of some checks. Such partial dismantling shall not invalidate the result of verification.

Methods of verification are given in Table 1.

Table 1

Relevant clause	Method of verification
5.2.2.1	By verification of the function of the interlocking guard with guard locking and of the electric circuit diagram By measurement of the dimensions
5.2.2.2	By measurement of the dimensions By verification of the functions of the interlocking devices and of the electric circuit diagram By functional test of hold to run control device
5.2.2.3	Not relevant
5.2.2.4	By measurement of the forces
5.2.2.5	By visual inspection
5.2.2.6	For movable machines: by tilting test at 10°, visual examination For fixed machines: verification of the instruction handbook
5.2.3.1	By verification of the function of the interlocking guard with guard locking and of the electric circuit diagram By measurement of the dimensions
5.2.3.2	By measurement of the dimensions By verification of the functions of the interlocking devices and of the electric circuit diagram By functional test of hold to run control device
5.2.3.3	By visual inspection, measurement of dimensions and functional test of the hold to run control
5.2.3.4	By visual inspection, measurement of dimensions and functional test of the hold to run control
5.2.3.5	By visual inspection
5.2.3.6	By tilting test at 10° and verification of the instruction handbook
5.2.4	By visual inspection
⟨A1⟩ 5.3	Verification shall be in accordance with Clause 18 of EN 60204-1:2006 ⟨A1⟩
5.4	By measurement of the temperatures
5.5	In accordance with Annex A
5.6	By visual inspection and verification of the instruction handbook
5.7	By risk evaluation and visual inspection
5.8	In accordance with clause 6 of EN 1672-2:2005 and visual examination.
5.9	By measurement of the forces, by inspection of the visibility of the indicators, buttons, etc.

7 Information for use

7.1 General

Information for use shall meet the requirements of clause 6 of EN ISO 12100-2:2003. An instruction handbook shall be provided.

7.2 Instruction handbook

7.2.1 The instruction handbook shall meet the requirements and advice of 6.5 of EN ISO 12100-2:2003. It shall include at least the following information:

7.2.2 The instruction handbook shall include a training program for the operator.

The program shall include instruction that operators shall not:

a) reach into the mixer at any time without first isolating the main power supply;

b) attempt to carry out electrical or mechanical repairs to the mixer unless properly authorised;

c) remove guards from the mixer unless properly authorised;

d) interfere with the interlocking devices on the mixer;

e) handle the blades without using protective devices;

f) allow an untrained person to take charge of a mixer without supervision;

g) use unauthorised or improvised means of gaining access to parts of the mixer which are not normally accessible;

h) move the machine except after applying precautions described in the handbook to avoid electrical risks and tipping over risks.

7.2.3 The instruction handbook shall recommend that the user arrange a program of inspections to be carried out regularly to verify that all guards and cover are secure and properly in position and that all protective devices are functioning correctly.

NOTE The manufacturer should give the periods between inspections.

7.2.4 The instruction handbook shall provide:

— Minimum specifications for extraction equipment if required;

— Information on the measures against explosion;

— Value of forces at the fixing points and their dimensions, where the machine is fixed on the floor;

— Warning to the operator during maintenance on the hazard of residual voltage especially on capacitors;

— Information about prevention measures which have to be taken by the user including warning to use suitable flooring to prevent slipping;

— Instructions to isolate the machine in a safe condition in the event of repair or maintenance (isolation from energy supply of all nature, locking of the disconnecting device, neutralising residual energy, testing), the operations of the cylinders cleaning shall be made only when the electric supply is off;

— Methods of cleaning: see 7.4;

[A1]

— the limits that shall be respected and the measures to be taken for ensuring stability during use, transportation, assembly, dismantling when out of service, testing or foreseeable breakdowns;

— the operating method to be followed in the event of accident or breakdown; if a blockage is likely to occur, the operating method to be followed so as to enable the equipment to be safely unblocked;

— the specifications of the spare parts to be used, when these affect the health and safety of operators;

— if need be: the description of the adjustment and maintenance operations to be carried out by the user and the preventive maintenance measures to be observed;

— if need be: instructions designed to enable adjustment and maintenance to be carried out safely, including the protective measures to be taken during these operations;

— in the case of machinery capable of being plugged into an electricity supply: information warning the user that he shall be able to check that the plug remains visible from any of the points to which he has access;

— 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:

  — 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,

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

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

  Whenever sound emission values are indicated the uncertainties "*K*" surrounding these values shall be specified. The operating conditions of the machinery during measurement and the measuring methods used shall be described. [A1]

[A1] *deleted text* [A1]

7.3 Service manual

Machine manufacturers shall specify in the service manual a routine procedure for systematically testing, maintaining, repairing or renewing all safety features incorporated in the machine together with guidance as to the frequency of inspections/maintenance.

7.4 Cleaning

Instructions shall be provided for cleaning and rinsing: the cleaning products to be used, the recommended implements, the procedures and frequency, any necessary warning (for example, the cleaning shall be done once the machine is stopped, using water and soap with plastic scraper. Metallic implements are not recommended).

If hazardous detergents are used the personal protective equipment which has to be used shall be mentioned in the instruction handbook.

If there is a need to remove particles of product from inside the machine, the operator shall use tools designed for that job which shall be described in the instruction handbook.

7.5 Marking

The minimum markings shall include:

[A1]

— the business name and full address of the manufacturer and, where applicable, his authorised representative; [A1]

— mandatory marking[2];

[A1]

— the year of construction, that is the year in which the manufacturing process is completed; [A1]

— designation of series or type, if any;

— serial or identification number, if any;

— rating information (mandatory for electrotechnical products: voltage, frequency, power, etc);

[A1]

— designation of the machinery. [A1]

[2] [A1] 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. [A1]

Annex A
(normative)

Noise test code for mixers with horizontal shafts (Grade 2 of accuracy)

A.1 Terms and definitions

The terms and definitions shall be in accordance with EN ISO 12001.

A.2 Installation and mounting conditions

The test environment suitable for the measurement of the emission sound pressure level shall be a flat outdoor area (for example a car park) or an indoor space that provides an essentially free field over a reflecting plane. This test environment shall be in accordance with the requirements given in Annex A of EN ISO 3744:1995.

Care shall be taken to ensure that any electrical conduits, piping or air ducts which are connected to the machinery do not radiate significant amounts of sound energy thus influencing the determination of the noise emission values of the machine under test. This can be avoided by damping or partially encasing these equipment parts.

A.3 Operating conditions

During the determination of the emission sound pressure level, the operating conditions of the machine shall be as follows:

— machine shall be empty;

— it shall operate at its maximum speed.

A.4 Emission sound pressure level determination

The determination of the emission sound pressure level (A-weighted) shall be done in accordance with the EN ISO 11201.

The measurement time for sound pressure level measurements for the determination of the emission sound pressure level shall be 30 s.

The sound pressure level shall be determined with the microphone positioned at:

— (1,60 ± 0,02) m height above the floor;

— (1,00 ± 0,02) m in front of the machine (in the axis of the machine, in front of the control board).

First, the background noise shall be measured as A-weighted sound pressure level or in each of the frequency bands of interest. It shall be at least 6 dB (preferably more than 15 dB) below the level due to the machine under test.

In order to obtain the emission sound pressure level at the specified position, the background noise correction K_1 shall be applied. The determination and use of K_1 shall be made in accordance with EN ISO 11201.

NOTE Emission sound pressure levels using other frequency weightings or in octave or one-third octave frequency bands may additionally also be measured, as required for the purposes of the measurements.

A.5 Measurement uncertainties

A standard deviation of reproducibility from 0,5 dB to 2,5 dB is expected for the A-weighted emission sound pressure level determination (see EN ISO 11201).

A.6 Information to be recorded

The information to be recorded covers all of the technical requirements of this noise test code. Any deviations from the noise test code and/or from the basic noise emission standards used are to be recorded together with the technical justification for such deviations.

A.7 Information to be reported

The information to be included in the test report is 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:

a) identification of the manufacturing company, of the machine type, model, serial number and year of manufacture;

b) reference to the basic noise emission standard(s) used;

c) description of the mounting and operating conditions used;

d) microphone position for the determination of the emission sound pressure level at the workstation; and

e) noise emission values obtained.

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

A.8 Declaration and verification of noise emission values

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

[A1] It shall declare the emission sound pressure level L_{pA} and the respective uncertainty K_{pA} according to 7.2.4. [A1]

The uncertainty K_{pA} is expected to have a value of 2,5 dB.

The noise declaration shall state that the noise emission value has been obtained according to this noise test code and the basic European Standard EN ISO 11201. If this statement is not true, the noise declaration shall indicate clearly what the deviations are from this noise test code (Annex A of this European Standard) and/or from the basic European Standards.

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

Annex B
(normative)

Principle of design to ensure the cleanability of mixers with horizontal shafts

B.1 Definitions

For the purposes of this Annex, the following definitions apply.

B.1.1
easily cleanable
designed and constructed to permit the elimination of soil by a simple cleaning method (e.g. hand and sponge)

B.1.2
fitted surfaces
surfaces separated by a distance less than or equal to 0,5 mm

B.1.3
joined surfaces
surfaces between which no particle of product becomes trapped in small crevices, thus becoming difficult to dislodge and so introduce a contamination hazard

B.2 Materials of construction

〚A1〛

B.2.1 Type of materials

Materials of construction for food area shall comply with 5.2 of EN 1672-2:2005.

Some materials (e. g. plastics) shall be the subject to overall or specific migration tests.

NOTE European Directives give the list of materials in contact with food and foods intended for human consumption (see also CEN/TR 15623). Materials not mentioned in the European Directives are accepted as long as food compatibility is proven. 〈A1〛

B.2.2 Surface conditions

The surface finish of materials used on surfaces shall permit easy cleaning under satisfactory conditions. The roughness values (Rz) according to EN ISO 4287 shall comply with the values given in Tables B.1 and B.2.

〈A1〉 Table B.1 — Surface conditions for food area

Values in micrometres

Technique of construction	Roughness (R_z)
Drawn – rolled – spun	≤ 34
Moulded – cast	≤ 40
Machined	≤ 34
Injected — metals — plastics	 ≤ 34 ≤ 34
Coating — paint (test reservation) — plastics (test reservation) — glass — metal (test reservation)	 ≤ 22 ≤ 22 ≤ 22 ≤ 22

〈A1〉

〈A1〉 Table B.2 — Surface condition for splash area

Values in micrometres

Technique of construction	Roughness (R_z)
Drawn – rolled – spun	≤ 40
Moulded – cast	≤ 54
Machined	≤ 54
Injected — metal — plastics	 ≤ 54 ≤ 54
Coating — paint — plastics — glass — metal	 ≤ 40 ≤ 40 ≤ 40 ≤ 40

〈A1〉

B.3 Design

B.3.1 Connections of internal surfaces

Connections shall have the same roughness as the connected surfaces. These shall be designed to avoid any dead space, see EN 1672-2.

B.3.1.1 Connections of internal surfaces for food area

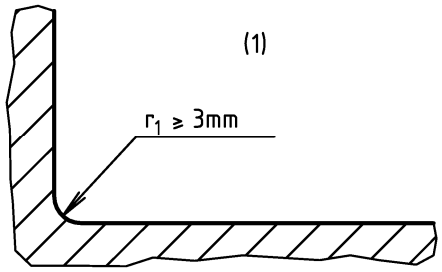
Two surfaces shall be connected such that:

— rounded edge has a radius greater than a curve of minimum radius (r_1) of 3 mm. This can be obtained by:

  — machining (cutting into material mass);

— bending the sheet metal (bending and forming);

— design (in moulds, foundry patterns, injection and blasting ...) (see Figure B.1).

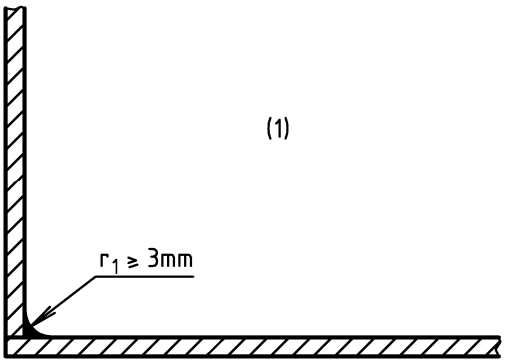


Key

1 Food area

Figure B.1

— or by ground and polished welded assembly (see Figure B.2).

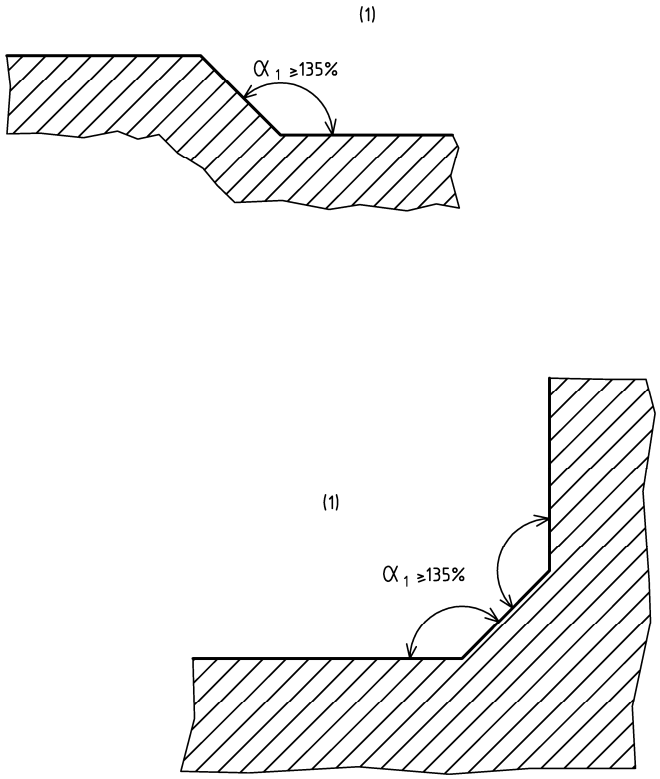


Key

1 Food area

Figure B.2

— for an internal angle (α_1) greater than or equal to 135°, there are no special requirements for the radius (see Figure B.3).



Key

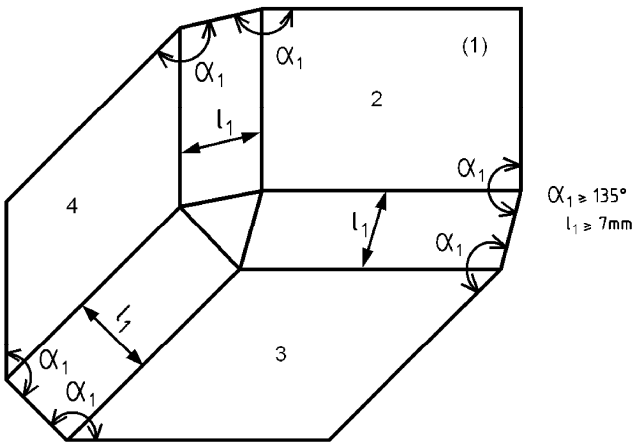
1 Food area

Figure B.3

Three surfaces shall be connected:

— by using rounded edges, with two rounded edges having a radius greater than or equal to 3 mm and the third having a radius greater than or equal to 7 mm;

— by angles of 135° (α_1) so that the dimension (l_1) between two bends is then equal to or greater than 7 mm (see Figure B.4).



Key

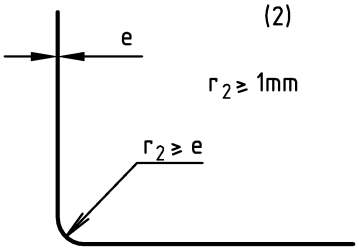
1 Food area

2, 3 and 4 plans

Figure B.4

B.3.1.2 Connections of internal surfaces for splash area

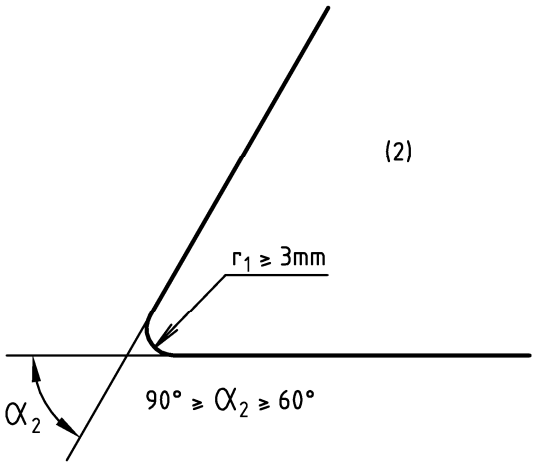
If two surfaces are perpendicular, the radius (r_2) shall be greater than 1 mm (see Figure B.5).



Key
2 Splash area

Figure B.5

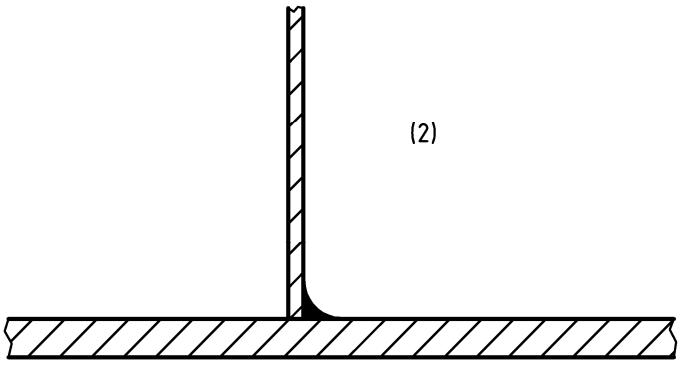
If the internal angle (α_2) is between 60° and 90°, the radius (r_1) shall be greater than or equal to 3 mm (see Figure B.5):



Key
(2) Splash area

Figure B.6

When two perpendicular surfaces are welded together, the weld shall be watertight (see Figure B.6). A ground finish is acceptable.



Key

2 Splash area

Figure B.7

B.3.1.3 Connections of internal surfaces for non food area

No particular requirement.

B.3.2 Surface assemblies and overlaps

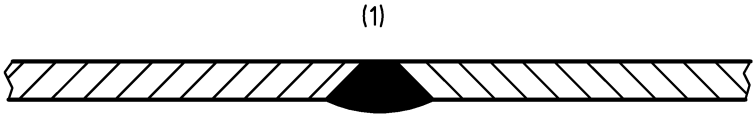
The sheet metal assembly methods shall take into account the expanding or contracting due to temperature variations.

B.3.2.1 Surface assemblies and overlaps for food area

B.3.2.1.1 Surface assembly

Assembled surfaces are considered to be joined either:

— by a continuous weld (see Figure B.8);

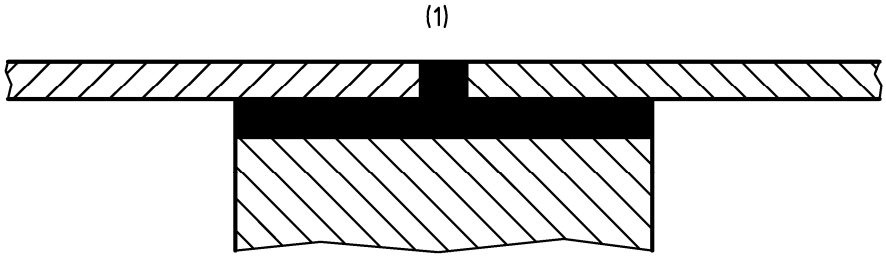


Key

1 Food area

Figure B.8

— or by a continuous sealed and flushed joint (see Figure B.9).



Key

1 Food area

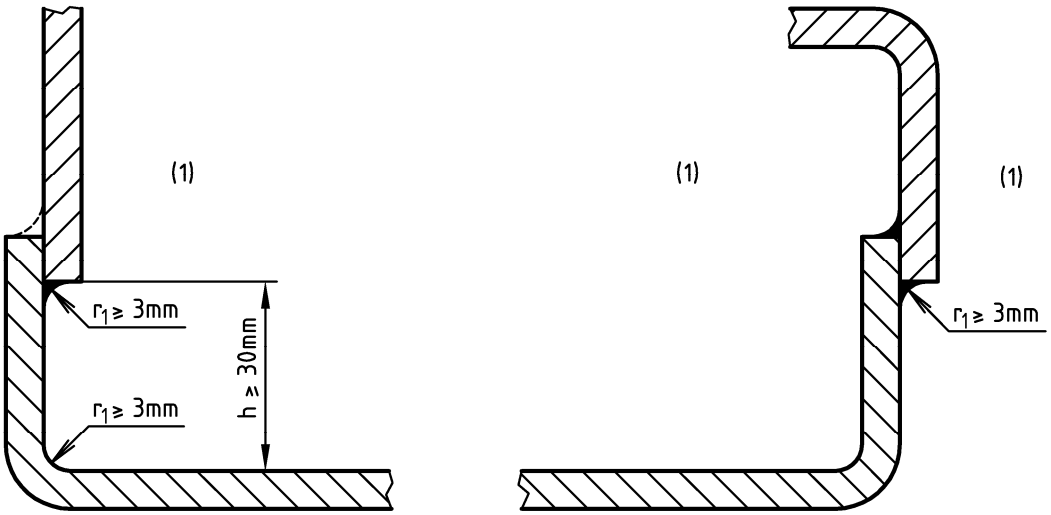
Figure B.9

B.3.2.1.2 Surface overlapping

In the event of unavoidable technical constraints (e. g. long sheet metal parts of varying thicknesses), assemblies may be made by the overlapping of sheet, in which case the assembled surfaces shall be joined to each other:

— either by a continuous weld;

The upper surfaces shall overlap the lower surfaces in the direction of liquid flow. The end of the overlapping and the corner shall be separated by a distance (*h*) more than or equal to 30 mm (see B.3.1.1 and Figure B11):

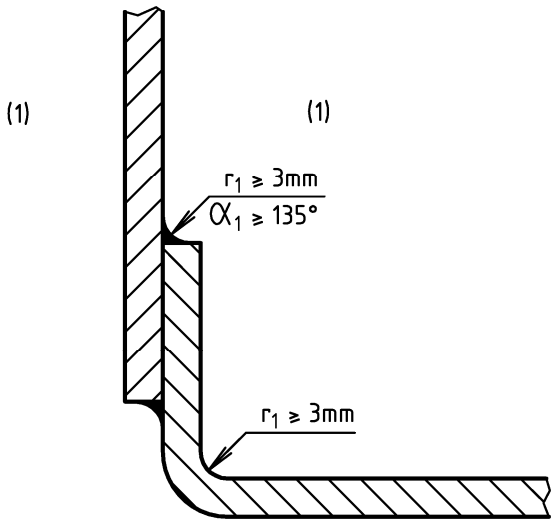


Key

1 Food area

Figure B.10

If this is impossible to construct, connections shall comply with the requirements concerning rounded areas in the food area (see B.10 and Figure B.11).

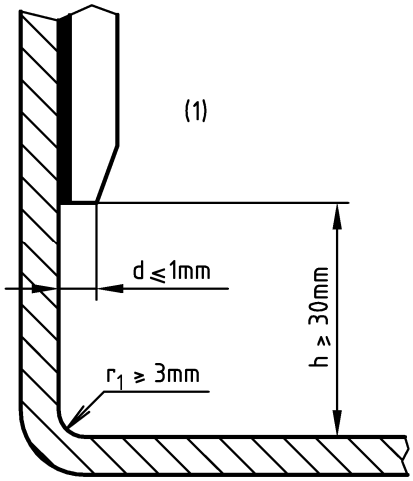


Key
1 Food area

Figure B.11

— or by continuous sealed and flush jointing.

When the overall thickness of the overlapping part and joint is more than 1 mm, the upper part shall be chamfered in order to reduce the thickness (*d*) to smaller than or equal to 1 mm. (see Figure B.12).



Key
1 Food area

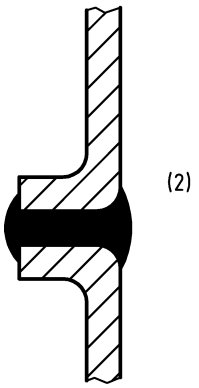
Figure B.12

B.3.2.2 Surface assemblies and overlaps for splash area

The surfaces may be:

— either grouted:

  — by means of a profile which cannot be pulled away and which is installed before assembly (see Figure B.13):

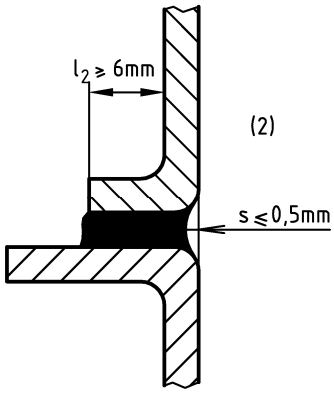


Key

2 Splash area

Figure B.13

— by flush bonding (the returns of the part used for bonding shall have a flange length (l_2) greater than 6 mm and the flush of the bond shall not have a shrinkage (s) more than 0,5 mm), see Figure B.14.

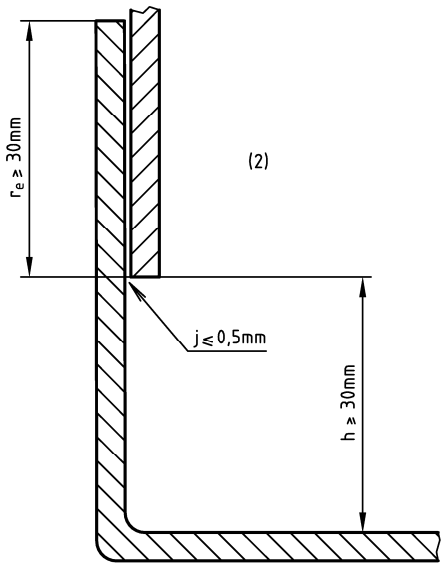


Key

2 Splash area

Figure B.14

— or assembled and fitted (maximum clearance (j) less than or equal to 0,5 mm) with the upper surfaces overlapping the lower surfaces in the direction of product flow. An overlapping distance (r_e) of at least 30 mm is essential to prevent liquid rising by capillary action (see Figure B.15).



Key
2 Splash area

Figure B.15

B.3.2.3 Surface assemblies and overlaps for non food area

No particular requirements.

B.3.3 Fasteners

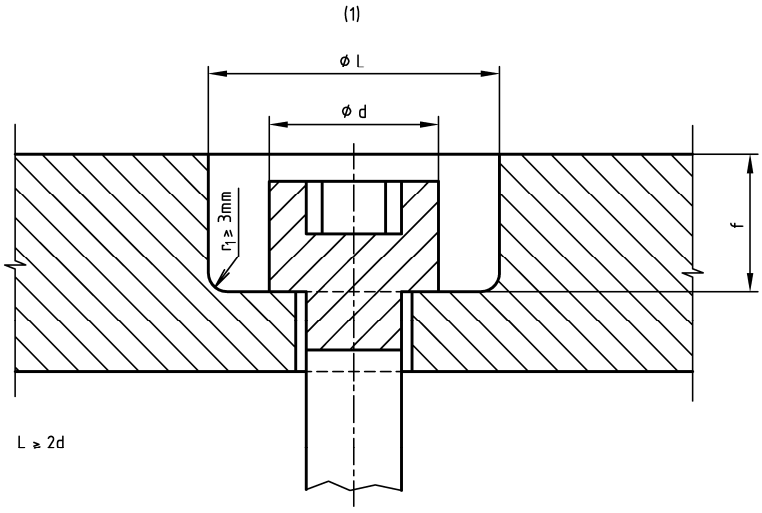
B.3.3.1 Fasteners for food area

See 5.3.1.3 in EN 1672-2:2005.

B.3.3.1.1 Spot-facing

If construction requires the use of hexagon socket head screws embedded in a spot-face:

— either the construction shall comply with the Figure B.16 and the manufacturer shall prescribe suitable cleaning facilities in the instruction handbook;



Key

1 Food area

Figure B.16

— or the manufacturer shall take the necessary steps to fill in the spot-face by sealed and lasting plugs complying with the requirements for the food area.

B.3.3.1.2 Pin drive systems

Pin drive systems shall only be authorized if they are solid and assembled as flush as possible. The manufacturer can establish an inspection procedure to ensure compliance with this requirement.

B.3.3.2 Fasteners for splash area

Easily cleanable fasteners shall be chosen from those in Figure B.17.

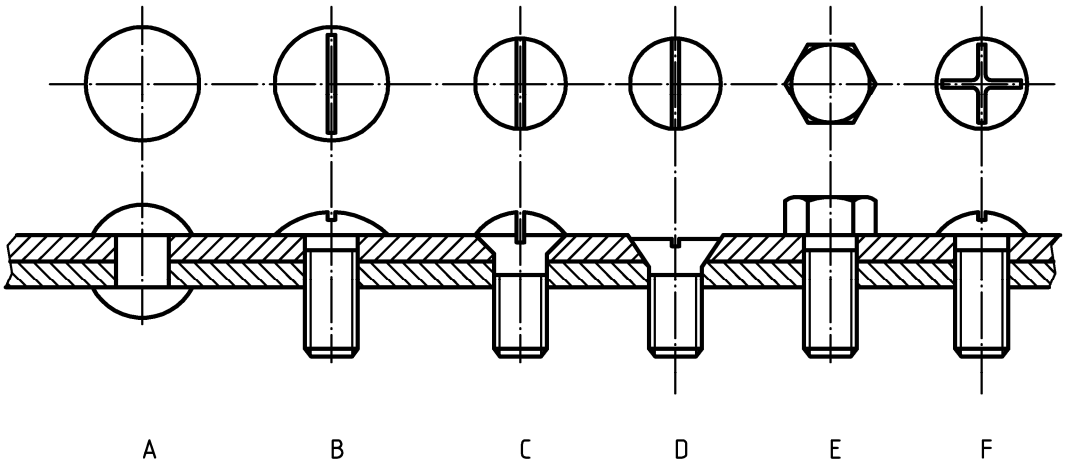


Figure B.17

If construction requires the use of hexagon socket screws embedded in a spot-face hole, the design shall comply with:

— either a method complying with the principle of Figure B.16 for the food area whereby the manufacturer can specify in the instruction handbook the cleaning facilities that are required (e. g. high pressure jet);

— or the manufacturer shall take all necessary measures to plug the spot-face with sealed plugs.

B.3.3.3 Fasteners for non-food area

No particular requirement.

B.3.4 Feet, support and bases for cleaning the machines underneath

B.3.4.1 Fixed machines with or without a base

Fixed machines with on without a base shall either be based on the floor with an interposed continuous and sealed joint, the instruction handbook shall specify the jointing method (see Figure B.18), or shall have their feet (*H*) higher than or equal to 150 mm.

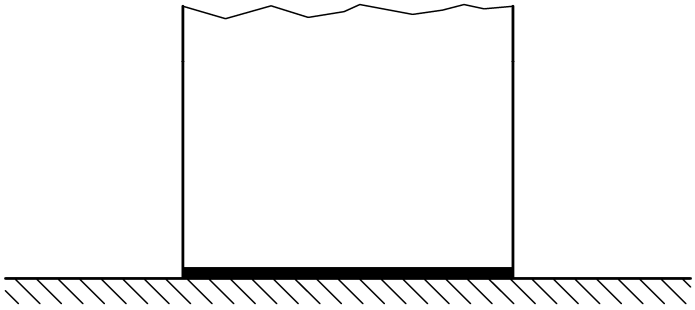


Figure B.18

However, if the depth (*L*) of the space to be cleaned is not deeper than 150 mm, the height *H* may be reduced to 100 mm as long as the various access possibilities are taken into account (see Figure B.19).

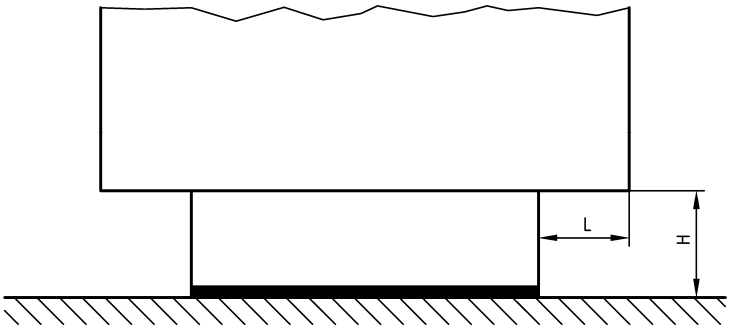


Figure B.19

If the foot surface is greater than 1 dm^2 the feet shall be considered to be a base (with interposed seal) (see Figure B.20).

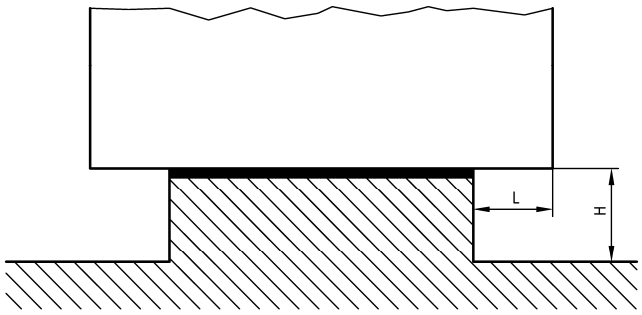


Figure B.20

B.3.4.1.1 Mobile containers

The castors shall be cleanable. An example is given in Figure B.21, where *b* is the greater width of the covering at the circumference of the wheel.

— if $b \leq 25$ mm, then $a \geq 3{,}5$ mm;

— if $b > 25$ mm, then $a \geq 6$ mm.

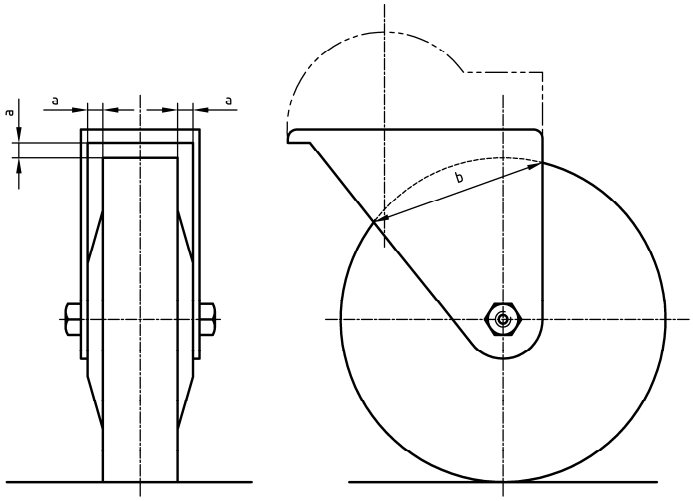


Figure B.21

B.3.5 Ventilation openings

B.3.5.1 Ventilation openings for non food area

Ventilation openings shall be located in the non-food area.

Their design shall prevent any infiltration or retention of fluid in the machine.

Whenever possible, for machines standing on the floor, a guard shall prohibit access to rodents in all technical areas of the machine and for this reason the smallest dimension of the opening shall be less than or equal to 5 mm.

B.3.5.2 Ventilation openings for splash area

In case of technical constraints, ventilation openings may be in the splash area. In such cases, they shall be designed to be cleanable.

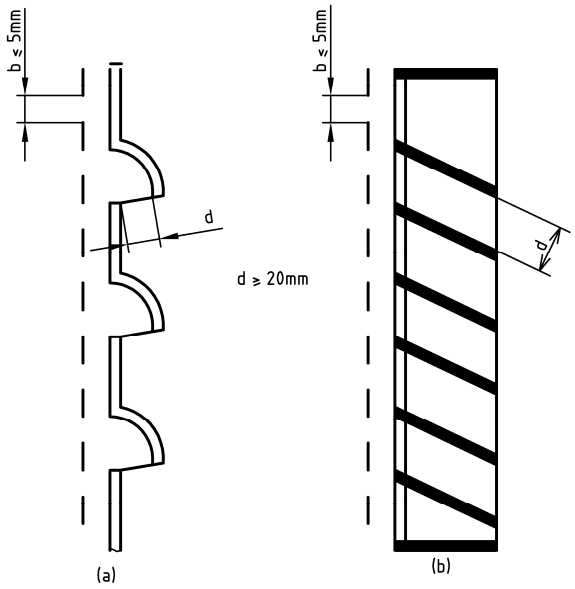


Figure B.22

Whenever possible, for machines standing on the floor, a guard shall prevent access to rodents in any technical areas of the machine.

The smallest dimension of the opening (*b*) shall be less than or equal to 5 mm (see Figure B.22).

B.3.6 Hinges

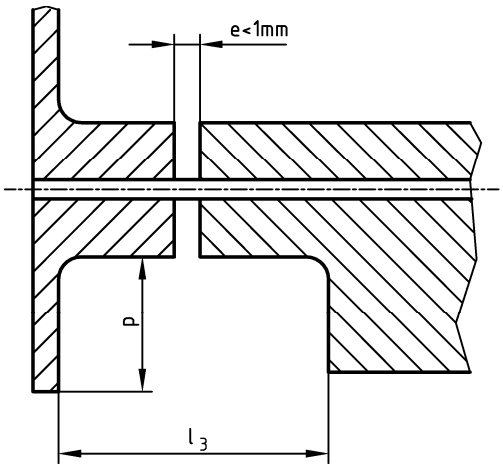
Whenever possible, the manufacturer shall eliminate swivel points from the food area.

If their presence in the food area is technically necessary, then:

— they shall be easily removed;

— if they cannot be removed, all surfaces shall be accessible.

Assembly with a fixed part shall be made by a joint designed to prevent any infiltration. Access to all these areas is acceptable when the passage width (l_3) is greater than or equal to two times the depth (*p*). In no case this width (l_3) shall be less than 10 mm (see Figure B.23).



Key

$l_3 \geq 2p$

$l_3 \geq 10$ mm

Figure B.23

B.3.7 Control panel

The control panel shall be located in the non-food area and shall also be cleanable.

B.3.7.1 Control panel in the non-food area

Normally, the control panel should be in the non-food area and should also be cleanable.

B.3.7.2 Control panel in the splash area

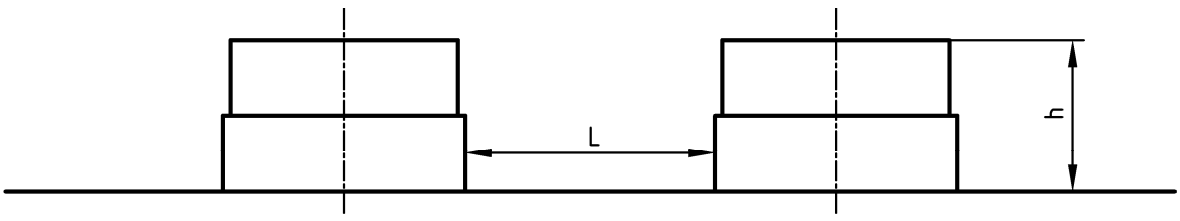
If it is not possible for technical reasons to place the control panel in the non-food area the various controls shall have easily cleanable surfaces.

The distance *L* between two elements shall be greater than or equal to:

— 20 mm (see Figure B.24);

— 12,5 mm if their height *h* is less than or equal to 8 mm (see Figure B.25).

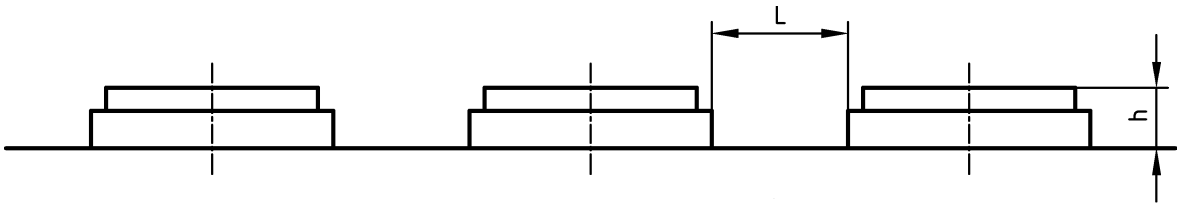
If the above requirements cannot be complied with, controls shall be protected by a cap (see Figure B.26).



Key

h > 8 mm
L ≥ 20 mm

Figure B.24



Key

h ≤ 8 mm
L ≥ 12,5 mm

Figure B.25

Figure B.26

Annex ZA
(informative)

Relationship between this European Standard and the Essential Requirements of EU Directive Machinery 98/37/EC, amended by 98/79/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 a means of conforming to Essential Requirements of the New Approach Directive Machinery 98/37/EC, amended by 98/79/EC.

Once this standard is cited in the Official Journal of the ⟩A1⟨ European Union ⟨A1⟩ under that Directive and has been implemented as a national standard in at least one Member State, compliance with the normative clauses of this European Standard confers, within the limits of the scope of this EUropean 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 European Standard.

Annex ZB
(informative)

A1 Relationship between this European Standard and the Essential Requirements of EU Directive 2006/42/CE

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

Once this standard is cited in the Official Journal of the European Communities 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. A1

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[3] CEN/TR 15623, *Food processing machinery — Route map — Materials for food area*

[4] EN ISO 14121-1, *Safety of machinery — Risk assessment — Part 1: Principles (ISO 14121-1:2007)* A1

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