

BS EN 454:2014



BSI Standards Publication

# Food processing machinery — Planetary mixers — Safety and hygiene requirements

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### **National foreword**

This British Standard is the UK implementation of EN 454:2014. It supersedes BS EN 454:2000+A1:2009 which is withdrawn.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.

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Date	Text affected
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English Version

**Food processing machinery - Planetary mixers - Safety and hygiene requirements**Machines pour les produits - Batteurs-mélangeurs -  
Prescriptions relatives à la sécurité et l'hygièneNahrungsmittelmaschinen - Planetenrühr- und -  
knetmaschinen - Sicherheits- und Hygieneanforderungen

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## Foreword

This document (EN 454:2014) 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of an identical text or by endorsement, at the latest by May 2015 and conflicting national standards shall be withdrawn at the latest by May 2015.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 454:2000+A1:2009.

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 454:2000+A1:2009 are listed below:

- modification of the numbers of classes of machines (2 instead of 3);
- solid guard to protect against dust emission was added;
- safety dimensions for the guard was précised;
- control of the position of the bowl in working position for the Class 1;
- table of verification of safety and hygiene requirements was completely revised.

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

## **Introduction**

This document is a type C standard as stated in EN ISO 12100.

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

**1.1** This European Standard specifies safety and hygiene requirements for the design and manufacture of fixed bowl planetary mixers with a tool having a planetary movement by using two parallel axes. The capacity of the bowl is greater than or equal to 5 L<sup>1)</sup> and less than or equal to 200 L.

These planetary mixers are used separately in the food industry and shops (catering, bakery, pizza, pastry and confectionary industry) for mixing, kneading and emulsifying/whipping food products (e.g. cocoa, flour, sugar, oils and fat, eggs, and other ingredients). These machines are fed by hand and sometimes during operation without stopping the machine.

Processing is carried out in cycles of variable duration. It can be either manually or automatically controlled, in individual cycles or on a cycle repeat basis, etc.

This European Standard deals with all significant hazards, hazardous situations and events relevant to the transport, installation, adjustment, operation, cleaning, maintenance, dismantling, disassembling and scrapping of planetary mixers, when they are used as intended and under the conditions of misuse which are reasonably foreseeable by the manufacturer (see Clause 4).

**1.2** This European Standard does not deal with the following machines:

- catering attachment for planetary mixers (see EN 12851);
- continuously fed machines;
- dough mixers (see EN 453);
- whipping mixers which contain no parallel axes;
- stirring machines;
- experimental and testing machines under development by the manufacturers;
- machines used in other industry, for example: meat industry, candy industry, pharmaceutical industry, chemical industry;
- domestic appliances.

**1.3** This European Standard is not applicable to machines which are manufactured before its date of publication as a European standard.

## 2 Normative references

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

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

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1) Below 5 L, EN 60335-1 and the EN 60335-2 series are applicable.

- EN 1672-2:2005+A1:2009, *Food processing machinery — Basic concepts — Part 2: Hygiene requirements*
- EN 12851, *Food processing machinery — Catering attachments for machines having an auxiliary drive hub — Safety and hygiene requirements*
- EN 60204-1:2006, *Safety of machinery — Electrical equipment of machines — Part 1: General requirements (IEC 60204:2005, modified)*
- EN 60529, *Degrees of protection provided by enclosures (IP Code)*
- EN 61000-6-1, *Electromagnetic compatibility (EMC) — Part 6-1: Generic standards — Immunity for residential, commercial and light-industrial environments*
- EN ISO 3743-1, *Acoustics — Determination of sound power levels and sound energy levels of noise sources using sound pressure — Engineering methods for small movable sources in reverberant fields — Part 1: Comparison method for a hard-walled test room (ISO 3743-1)*
- 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 4287, *Geometrical product specifications (GPS) — Surface texture: Profile method — Terms, definitions and surface texture parameters (ISO 4287)*
- EN ISO 4871, *Acoustics — Declaration and verification of noise emission values of machinery and equipment (ISO 4871)*
- EN ISO 11201:2010, *Acoustics — Noise emitted by machinery and equipment — Determination of emission sound pressure levels at a work station and at other specified positions in an essentially free field over a reflecting plane with negligible environmental corrections (ISO 11201:2010)*
- EN ISO 12100:2010, *Safety of machinery — General principles for design — Risk assessment and risk reduction (ISO 12100:2010)*
- 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)*
- EN ISO 13849-1, *Safety of machinery - Safety-related parts of control systems - Part 1: General principles for design (ISO 13849-1)*
- EN ISO 14119:2013, *Safety of machinery - Interlocking devices associated with guards - Principles for design and selection (ISO 14119:2013)*

### **3 Terms, definitions, description and classification**

#### **3.1 Terms and definitions**

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

##### **3.1.1**

###### **tool**

mobile and removable equipment having a planetary movement which is used for mixing, kneading and emulsifying

Note 1 to entry: The tool can have different shapes.

Note 2 to entry: The scraper is considered as a tool in this document.

### 3.1.2

#### **planetary movement**

rotation of a tool both on itself and around the inside of a bowl by using two parallel axes

### 3.1.3

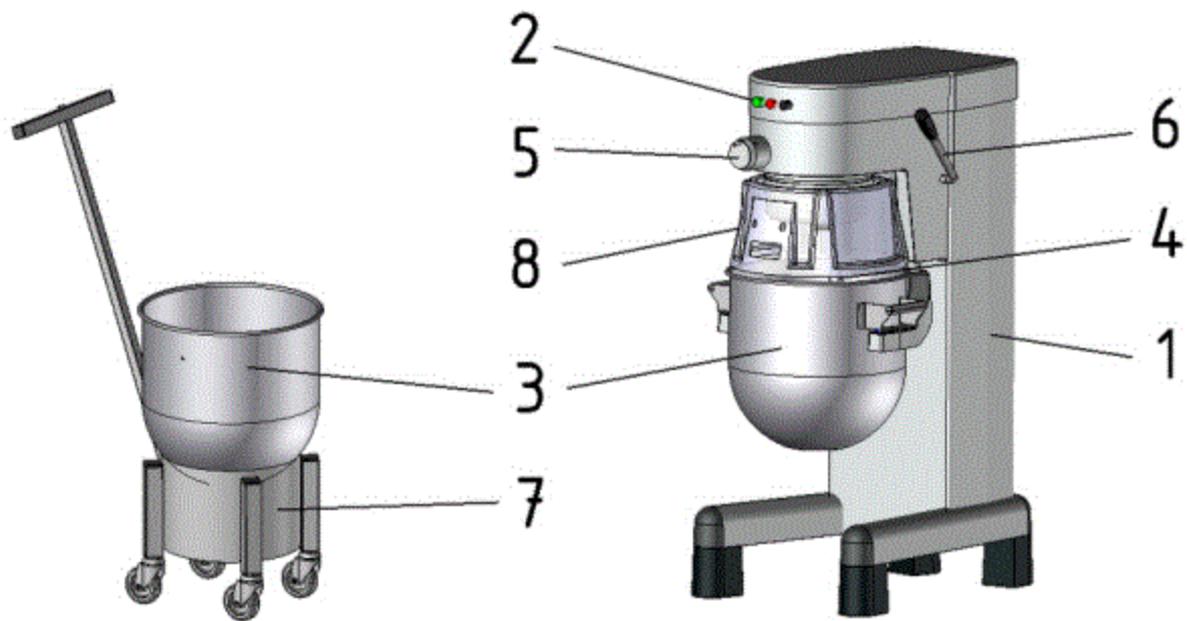
#### **working position**

stable position both for the bowl and the tool and in which the bowl is locked in the upper position and the tool, locked on its shaft, is nearest to the bottom of the inside of the bowl

## 3.2 Description

A planetary mixer (see Figure 1) usually consists of a frame supporting:

- a casing (1), containing the tool(s) drive mechanism;
- control devices (2);
- a bowl (3) equipped with a grid or a solid cover, in which ingredients are processed;
- interchangeable tool (4) designed to process ingredients; their rotation speed may be either constant or variable;
- an optional auxiliary drive hub (5) for catering attachments (see EN 12851);
- a device (6) for vertically moving the bowl or the head of the mixer to allow tool removal, or tilting of the head to remove the tool;
- a device (7) for handling the bowl (optional), for example a trolley;
- an interlocked guard (8);
- bowl heating device (optional, not included in Figure 1);
- bowl cooling device (optional, not included in Figure 1);
- bowl gravity discharge (optional, not included in Figure 1).



**Key**

- 1 casing
- 2 control devices
- 3 bowl
- 4 tool
- 5 auxiliary drive hub
- 6 handle
- 7 trolley
- 8 interlocked guard (solid cover)

**Figure 1 — Main parts of a planetary mixer**

### 3.3 Classification

Planetary mixers are classified into the following two categories according to their bowl volume:

- class 1: bowls having a volume equal to or greater than 5 L and less than 10 L;
- class 2: bowls having a volume equal to or greater than 10 L and less than or equal to 200 L,

where the bowl volume is the maximum volume of water in litres that the bowl can contain.

When a mixer is supplied with several bowls of different capacities, the mixer classification is determined by the size of the bowl with the greatest volume.

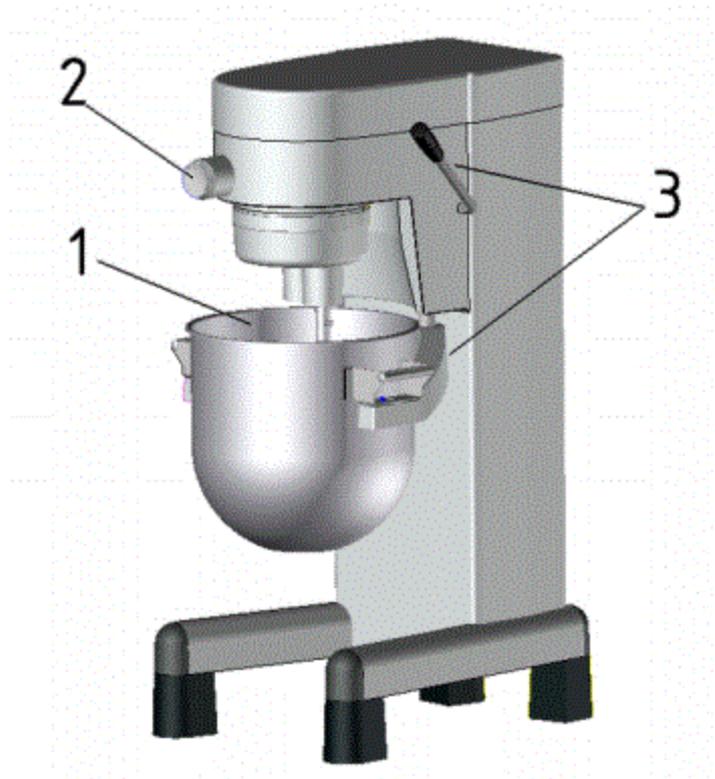
## 4 List of significant hazards

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).

Figure 2 shows the danger zones.

**Table 1**

Hazards, hazardous situations and hazardous events	Location or cause	Clause/subclause in this European Standard
<b>Mechanical hazards (see Figure 2)</b>		
— trapping hazard	zone 1: volume covered by the moving tool zone 3: space between bowl lifting system and frame	5.2
— trapping and shearing	zone 2: auxiliary drive hub (mechanical)	
<b>Electrical hazards</b>	Electric shock from direct or indirect contact with live components Electromagnetic disturbance	5.3 5.3
<b>IP degree</b>	Motor enclosure	5.4
<b>Stopping of the machine</b>	No access to the normal OFF of the machine	5.5
<b>Thermal hazards</b>	Device to maintain food at a constant temperature	5.6
<b>Gas accumulation hazard</b>	Gas burner	5.7
<b>Hazards generated by noise</b>	Hearing damage, accidents due to interference with speech communication and interference with the perception of acoustic signals	5.8
<b>Hazards generated by materials and substances</b>	inhalation of flour dust	5.9
<b>Hazards generated by neglecting hygienic design principles</b>	e.g. contamination by microbial growth or foreign materials	5.10
<b>Hazards generated by neglecting ergonomic principles</b>	During operation, cleaning and maintenance	5.11



**Key**

- zone 1: volume covered by the moving tool
- zone 2: auxiliary drive hub for attachments
- zone 3: space between bowl lifting system and frame

**Figure 2 — Danger zones of a planetary mixer (with guard removed)**

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

### **5.1 General**

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

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

Unless otherwise specified, the requirements given throughout Clause 5 apply both to Class 1 and Class 2.

### **5.2 Mechanical hazards**

#### **5.2.1 General**

Where reference is made to interlocking devices throughout Clause 5, they shall comply with EN ISO 14119.

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

The safety dimensions shall be in accordance with Table 2 and Figure 4.

**Table 2**

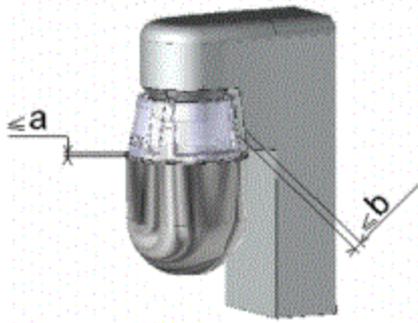
<b>Safety dimensions</b> (see Figure 4)	a	b	c	d
mm	8	15	25	25

The opening space between the bowl and the movable guard (see Figure 4a) and Figure 4b)) shall be less than or equal to 8 mm in the working position.

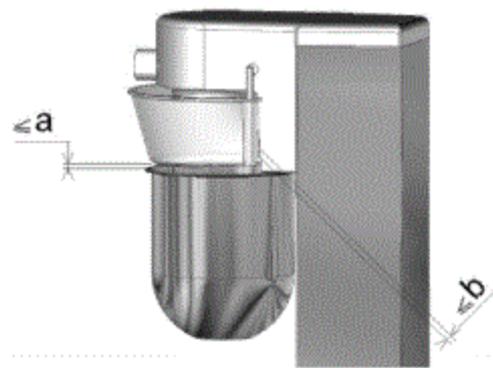
The distance between the rear edge of the protective device and the nearest point of the machine (see Figure 4a) and Figure 4b)) shall be less than or equal to 15 mm in the working position.

The opening space between the upper edge of the bowl and lower edge of the interlocked guard shall be less than or equal to 25 mm when the interlocking device is actuated (see Figure 4c) and Figure 4d)).

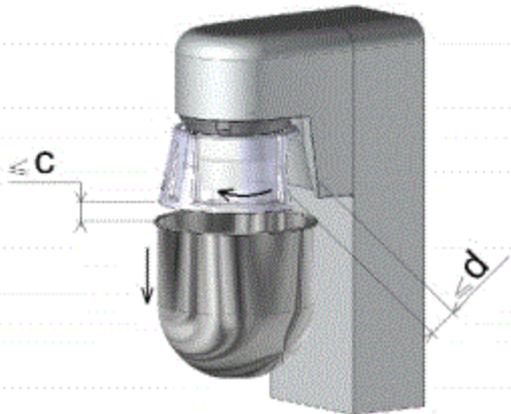
The opening space between the edge of the interlocked guard and the frame of the machine shall be less than or equal to 25 mm when the interlocking device is actuated (see Figure 4).



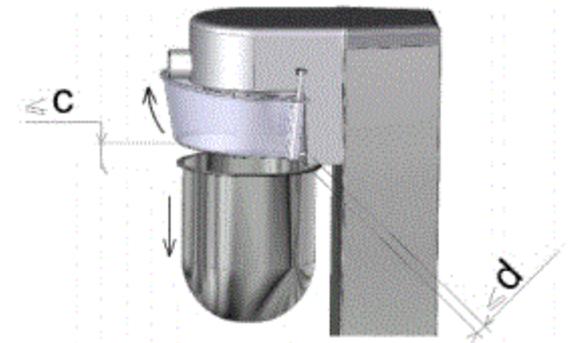
a) Interlocked guard with circular movement in working position



b) Interlocked guard with tilting movement in working position



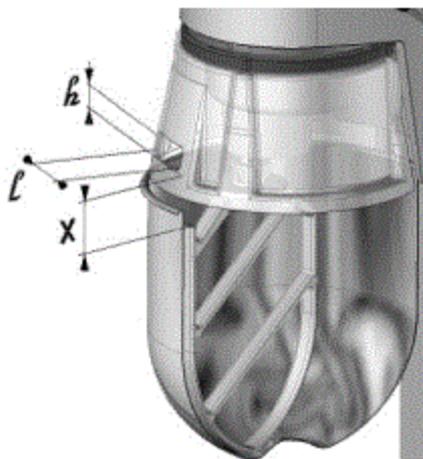
c) Interlocked guard with circular movement in actuated position



d) Interlocked guard with tilting movement in actuated position

**Figure 4 — Safety dimensions with different types of guards**

As it is necessary to gain access to the bowl, for example to add ingredients when the machine is in operation, guard dimensions opening shall comply with the values given in Table 3 and Figure 5 with the opening oriented vertically or horizontally. The opening can be enlarged by combining several openings which are separated by bars where the dimensions of each opening comply with the values of Table 3.



**Key**

- $x$  distance between the lower edge of the opening and the upper edge of the tool
- $l$  width of the opening
- $h$  height of the opening

**Figure 5 — Planetary mixer with a solid cover**

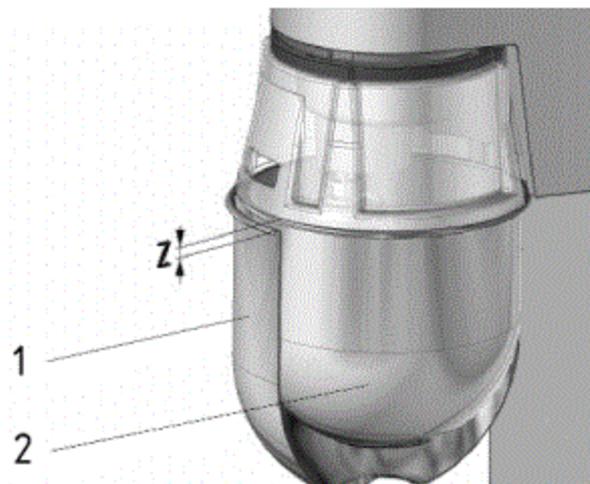
**Table 3**

Dimensions in millimetres

$x$	< 50	50 to 120	> 120
$l$	≤ 120	≤ 120	≤ 120
$h$	≤ 20	≤ 30	≤ 50

**5.2.2.2 Mixers with several bowls**

Where a mixer is supplied with several bowls, the requirements of 5.2.2.1 or 5.2.2.2 shall be met for the largest bowl, as applicable. In the working position, the opening space  $Z$  shall be less than or equal to 15 mm for each bowl supplied with the mixer (see Figure 6).



**Key**

- 1 largest bowl
- 2 smallest bowl
- Z space opening between upper edge of the bowl and lower edge of the guard

**Figure 6 — Mixer with several bowls**

**5.2.2.3 Access to the tool**

The tool drive mechanism shall not be capable of operation when the bowl is not in place and in the working position e.g. by a switch actuated by a cam located inside the frame.

**5.2.2.4 Stopping time**

Guard actuated stopping devices shall stop the tool without any ingredients present in the bowl in less than or equal to 4 s. If this not possible, opening of the guard shall be prevented until the tool has stopped moving. This can be achieved by providing an interlocking guard with guard locking (see EN ISO 12100:2010, 3.27.5).

**5.2.3 Zone 2 – Auxiliary drive hub (mechanical)**

The drive shaft on which attachments are fitted shall not project from the machine frame and shall be fitted with a cover which cannot be removed from the machine, e.g. hinged, so as to enclose the connection point.

**5.2.4 Zone 3 – Space between bowl lifting system and frame**

**5.2.4.1** The guide and drive mechanism operating the vertical movement of the bowl shall not create any risks of trapping or pinching. This may be achieved by use of a fixed guard.

**5.2.4.2** When manually operated minimum distance between either the bowl or the frame and the lever for lifting and lowering the bowl shall be 50 mm in order to prevent injury when operating the lever.

**5.2.4.3** If the bowl lifting and lowering mechanism is motorized, crushing between the ascending bowl, bowl lifting system and machine frame and any guard shall be prevented. This may be by either:

- a pressure-sensitive edge or;
- a hold-to-run control to operate the bowl movement.

**5.2.4.4** For Class-2-machines, the bowl lifting and lowering mechanism shall be able to hold a vertical force equal to twice the weight of the bowl filled with water, when it is in its upper position.

### **5.2.5 Loss of stability**

**5.2.5.1** For machines to be fixed to the floor the instruction handbook shall indicate the values of forces at the fixing points.

**5.2.5.2** Free standing machines without castors shall be stable when tilted 10° from the horizontal plane in the most unfavourable direction.

**5.2.5.3** Free standing machines with castors shall have at least two castors (or sets of castors) fitted with a locking device and shall comply with the provisions of 5.2.5.2.

## **5.3 Electrical hazards**

### **5.3.1 General**

Electrical equipment – for example switches – that may be exposed to water, e.g. during cleaning, shall be protected to an appropriate IP-rating according to EN 60529 and EN 60204-1.

The electrical equipment shall comply with EN 60204-1, with the following requirements given in 5.3.2, 5.3.3, 5.3.4 and 5.3.5.

### **5.3.2 Safety requirements related 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 for the intended use of the machine (see EN 61000-6-1).

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**

The electrical equipment shall comply with EN 60204-1:2006, Clause 6.

### **5.3.4 Power circuits**

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

### **5.3.5 Protection against earth faults in control circuits**

For machinery supplied from a single-phase conductor and an earthed neutral conductor the single pole interruption shall be in the phase conductor (see EN 60204-1:2006, 9.4.3.1).

## **5.4 Motor enclosures**

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

## 5.5 Emergency stop

No emergency stop is required for planetary mixers but particular attention shall be given to the accessibility of the normal OFF-switch from the operator position.

## 5.6 Thermal hazards

On machines equipped with a device to maintain food at a constant temperature during processing bowl handles and grips shall be designed in such a way as to avoid burns according to EN ISO 13732-1.

## 5.7 Gas accumulation hazard

Open flame heating devices may be allowed. Means shall be provided to prevent escape of unburnt gas, e.g. a flame protection system. For requirements on gas burner control systems see EN 298.

## 5.8 Noise reduction

Planetary mixers shall be so designed and constructed that risks from airborne noise emission are reduced to the lowest level, as far as it can be reduced taking account of technical progress, by particularly applying measures at source to control noise (for example, see 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.

## 5.9 Flour dust hazard

Flour dust emissions from Class 2 planetary mixers working with flour shall be minimized using a solid interlocked guard (e.g. a cover without apertures). Where the manufacturer uses some other method to limit flour dust emissions it shall be at least as effective as a solid interlocked guard.

NOTE This standard does not deal with automatic feeding.

If the machine is intended for use with automatic feeding of dry ingredients, the manufacturer shall design measures to prevent flour dust emission during feeding without decreasing the level of safety.

A method for measuring flour dust is given for information in Annex B.

## 5.10 Hygiene requirements

Planetary mixers shall be designed and manufactured in accordance with EN 1672-2 and Annex C.

The 3 zones shown in Figure 7 are defined in EN 1672-2 and are in general at least as follows:

a) food area:

- 1) the inside of the bowl;
- 2) the tool and rotating holder of the tool;
- 3) the inside of solid bowl guards or the whole of guards with holes;
- 4) any trip bars.

b) splash area:

- 1) the outside of the bowl;

- 2) for solid guards, the outside surface of the guard;
  - 3) the front surface of the machine facing the bowl;
  - 4) the horizontal surface above the bowl.
- c) Non-food area:
- 1) The remaining areas of the machine that do not come into contact with the food.

NOTE The precise boundary between the areas depends on the detailed design of the machine.

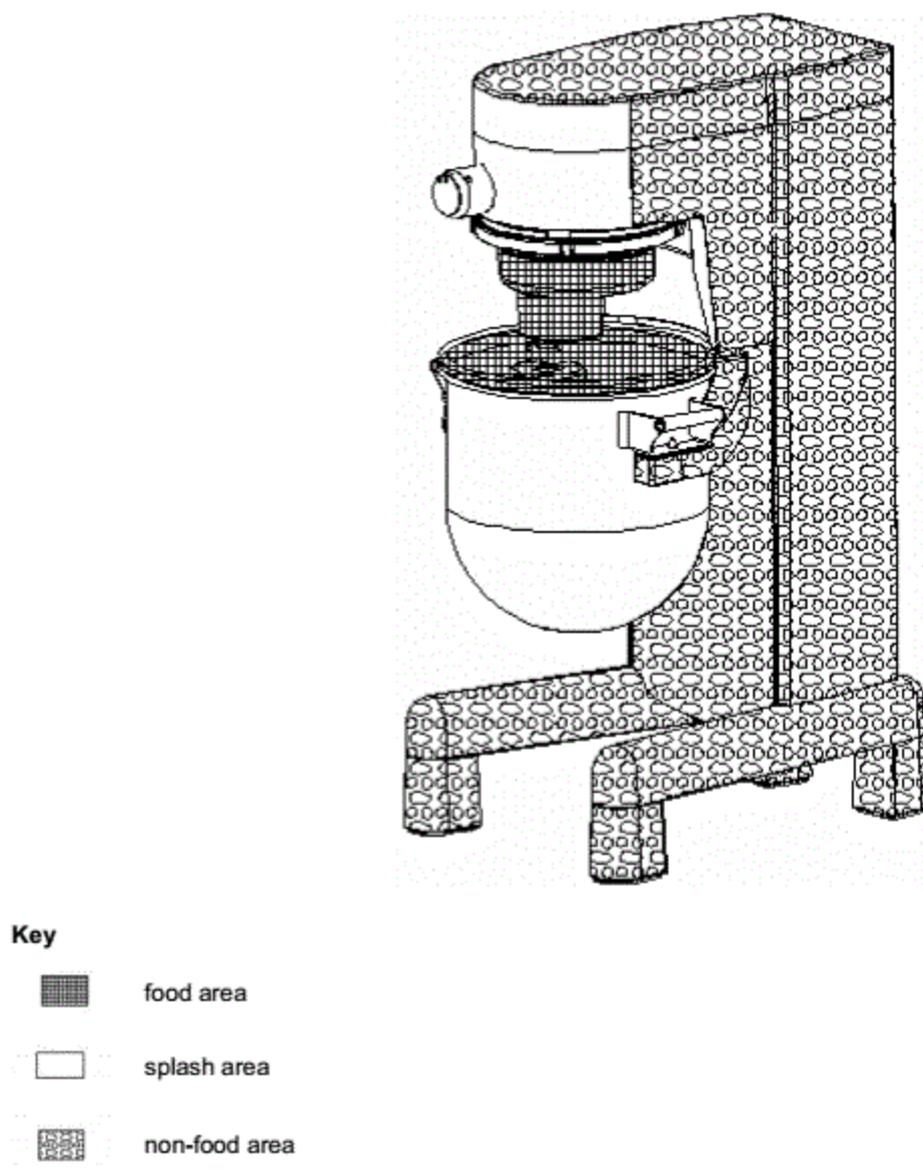


Figure 7 — Hygiene areas (with guards removed)

### 5.11 Hazards generated by neglecting ergonomic principles

Awkward body postures during maintenance and cleaning as well as filling and emptying the bowl and other operations shall be avoided.

Suitably positioned means to allow the use of lifting devices and/or transport carriages shall be provided for installation, removal and transport of any part of the planetary mixer weighing more than 25 kg.

If the mass of the filled removable bowl exceeds 25 kg, a handling device shall be fitted, for example wheels on the bowl or a separate trolley.

Pushing and pulling with great effort shall be avoided, e.g. by use of low-friction castor wheels on transport carriages or by the design of the bowl coupling mechanism.

If the bowl lifting and lowering mechanism is operated manually, the force required for this operation shall not exceed 250 N when the bowl is carrying the nominal load.

Control devices shall be placed within proper reach for the operator as stated in EN 614-1:2006+A1:2009, Annex A.

## **6 Verification of safety and hygiene requirements and/or measures**

This clause contains the methods of testing for the presence and adequacy of the safety requirements stated in Clause 5.

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 4.

Table 4

Relevant clause	Safety and hygiene requirements	Method of verification
5.2.2	Solid interlocked guard	By functional test (type verification)
	other interlocked guard	By functional test (type verification)
	Different sizes of bowls	(type verification)
	Up and down movement	(type verification)
	Stopping time	By functional test and measurement (type verification)
5.2.3	Power connection	(type verification)
5.2.4	Space between bowl lifting system and frame	By inspection (type verification) By measurement (type verification) By functional test of the hold-to-run control and/or interlocking device and trip device if fitted (type verification)
5.2.5	Loss of stability	For free standing machines, when the machine is tilted 10°, it shall remain stable (type verification)
5.3	Electrical hazards	Verification shall be in accordance with EN 60204-1:2006, Clause 18 (individual test)
5.4	Motor enclosure	By inspection (type verification)
5.5	Emergency stop	By visual inspection (type verification)
5.6	Thermal hazards	By measurement
5.7	Gas accumulation hazard	By inspection
5.8	Noise reduction	By measurement according to Annex A (type verification)
5.9	Flour dust hazard	By inspection and measurement (type verification)
5.10	Hygiene	In accordance with EN 1672-2:2005+A1:2009, Clause 6 and Annex C (type verification)
5.11	Ergonomic principles	By measurement (height for the manual loading and unloading), by inspection of the visibility of the indications, operational control devices, etc. (type verification)

## 7 Information for use

### 7.1 General

Information for use shall meet 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) the provisions for handling, transportation, storage, installation, starting up;

- b) the provisions 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).

moreover, if cleaning with water jet is authorized, the manufacturer shall indicate the maximum pressure permitted;

for tilting table top machines, the tilting procedure shall be clearly specified;

- c) the normal quantity of processed products;
- d) information warning the user about the risk of dust. In particular, the machine instruction handbook shall include methods of loading to minimize dust emission, especially when loading manually dry ingredients;

for example:

- 1) careful handling of bagged products by minimizing the height above the bowl base from which they are poured;
  - 2) careful slitting of bags in the lower part of the bowl to allow dust free discharge of flour as far as possible;
  - 3) use of temporary bowl covers to minimize openings through which flour may escape;
- e) ingredients with known health risks should be listed, e.g. flour, and the need to consult suppliers hazard data sheets should be highlighted. The possible need to wear respiratory protective equipment during manual loading shall be indicated;
- f) the values of forces at fixing points if the machine is to be fixed;
- g) a warning to the operator during maintenance on the hazard of residual voltage especially from capacitors;
- h) the value of the overcurrent protective device in the case of machines covered by 5.3.4;
- i) the conditions in which the machinery meets the requirement of stability during use, transportation, assembly, dismantling when out of service, testing or foreseeable breakdowns;
- j) 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;
- k) the specifications of the spare parts to be used, when these affect the health and safety of operators;
- l) 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;
- m) instructions to isolate the machine in a safe condition in the event of interventions such as repair or maintenance (isolation from energy supply of all nature, locking of the disconnecting device, neutralising residual energy, testing);
- n) 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;
- o) the instruction handbook shall give the declared noise emission values of the machinery and give the reference to the noise test code in Annex A and to the basic noise emission standards on which the determination of these values is based;

- p) information for the user on the significant environmental characteristics and energy performance of the product;
- q) information for the user on how to install, use and maintain the product in order to minimize its impact on the environment and to ensure optimal life expectancy, as well as on how to return the product at end-of-life.

### 7.3 Marking

The minimum marking shall include:

- the business name and full address of the manufacturer and, where applicable, his authorized representative;
- designation of the machinery;
- mandatory marking<sup>2)</sup>;
- designation of series or type;
- serial number if any;
- rating information (mandatory for electrical products: voltage, frequency, power, ...);
- the year of construction, that is the year in which the manufacturing process is completed.

---

2) 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.

## **Annex A** (normative)

### **Noise test code for planetary mixers – Grade 2 of accuracy**

#### **A.1 Installation and mounting conditions**

The installation and mounting conditions are the same for the measurement of both sound power level and emission sound pressure level at the specified position and for declaration purposes.

The test environment for the measurement of the emission sound pressure level and the sound power level (if measured according to EN ISO 3744) shall be a flat outdoor area (for example a car park) or an indoor space that provides an essentially free field over reflecting plane.

The test environment shall comply with the requirements stated in EN ISO 11201:2010, 5.2.2, grade 2 when measuring the emission sound pressure level or EN ISO 3744:2010, 4.3, respectively, when measuring the sound power level in an essentially free field.

If the sound power level is measured according to EN ISO 3743-1 the test environment specifications given in Clause 4 of this standard apply.

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 machine under test. This can be avoided by damping or partially encasing these parts or even by determining their sound power contribution by sound intensity measurements.

#### **A.2 Operating conditions**

The operating conditions for the determination of both sound power level and emission sound pressure level at the work station shall be as follows:

- the machine shall be empty;
- it shall operate at its maximum speed.

#### **A.3 Measurements**

The measurement time for sound pressure level measurements for the determination of the emission of sound pressure level (see A.5) and of the sound power level (see A.6) shall be 30 s.

#### **A.4 Emission sound pressure level determination**

The determination of the A-weighted emission sound pressure level and if relevant the C-weighted peak sound pressure level shall be done in accordance with EN ISO 11201:2010, grade 2.

The measurement shall be done at:

- 1,55 m ± 0,075 m height above the floor;

- 1 m in front of the machine (in the axis of the machine in front of the control board).

Emission sound pressure level 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 Sound power level determination

The determination of the A-weighted sound power level shall be done using one of the following basic noise emission standards:

- EN ISO 3743-1 if the measurements are done in a test room with a volume greater than 40 m<sup>3</sup>, with surfaces that are hard and sound-reflective. For rooms of volume less than or equal to 100 m<sup>3</sup> only machines whose largest dimension is less than or equal to 1 m may be tested. For rooms of volume greater than 100 m<sup>3</sup> only machines of largest dimension less or equal to 2 m may be tested;
- EN ISO 3744 if the measurements are done in an essentially free field near one or more reflecting planes. The measurement surface shall be parallelepiped.

## A.6 Measurement uncertainties

The total measurement uncertainty of the noise emission values determined according to this standard is depending on the standard deviation  $\sigma_{R0}$  given by the applied noise emission measurement method and the uncertainty associated with the instability of the operating and mounting conditions  $\sigma_{omc}$ . The resulting total uncertainty is then calculated from:

$$\sigma_{tot} = \sqrt{\sigma_{R0}^2 + \sigma_{omc}^2}$$

The upper bound value of  $\sigma_{R0}$  is about 1,5 dB for the grade 2 measurement methods applied in this standard for the determination of the emission sound pressure level or the sound power level.

NOTE 1 For planetary mixers a rather constant noise emission with a value of 0,5 dB for  $\sigma_{omc}$  is expected for the proposed operating condition for measurement.

NOTE 2  $\sigma_{tot}$  is referred to  $\sigma_R$  in EN ISO 4871.

The expanded measurement uncertainty  $U$ , in decibels, shall be calculated from  $U = k \cdot \sigma_{tot}$ , with  $k$  the coverage factor.

It depends on the degree of confidence that is desired. For the purpose of comparing the result with a limit value, it is appropriate to apply the coverage factor for a one-sided normal distribution. In that case, the coverage factor  $k = 1,6$  corresponds to a 95 % confidence level. Further information is given in EN ISO 4871. Please note that the expanded measurement uncertainty  $U$  is referred to as  $K$  in EN ISO 4871.

## A.7 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.8 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 the user requires to verify the declared values.

As a minimum, the following information shall be included:

- identification of the manufacturing company, of the machine type, model, serial number and year of manufacture;
- reference to the basic noise emission standard(s) used;
- description of the mounting and operating conditions used;
- position for the determination of the emission sound pressure level at the workstation; and
- the noise emission values obtained plus their uncertainties.

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.9 Declaration and verification of 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.

It shall declare the noise emission values  $L$  ( $L_{pA}$  and  $L_{WA}$ ) and the respective uncertainty  $K$  ( $K_{pA}$  and  $K_{WA}$ ) according to Clause 7.

The noise declaration shall state that noise emission values have been obtained according to this standard and to the basic standards EN ISO 3743-1 or EN ISO 3744 and EN ISO 11201:2010, grade 2. If the statement is not true, the noise emission declaration shall indicate clearly what the deviations are from this noise test code (Annex A of this standard) and/or from the basic 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 noise emission values.

## Annex B (informative)

### Method of measuring dust

#### B.1 Purpose of the test

To determine the change over time in the emission of flour dust at the start of the kneading operation of dough.

#### B.2 Principle of the tests

The dust should be measured continuously with a real time measuring device calibrated for the flour concerned, e.g. by use of apparatus which measures dust via diffusion of light (Tyndall effect) in infrared. Sampling of the dust contained in the measuring chamber is done every second. The result is displayed in digital form in  $\text{mg}/\text{m}^3$ . It is thus possible to follow the change in emission of flour above the planetary mixer.

The test measures the respirable fraction (diameter  $< 8 \mu\text{m}$ ) of the dust.

#### B.3 Operating conditions

Testing should be carried out in a room of volume at least of  $100 \text{ m}^3$  and in draught free conditions.

Each test should be carried out with the nominal capacity of dough ingredients.

Location and orientation of the measuring appliance:

- on the edge of the bowl of the planetary mixer, where the solid cover has an opening or, if there is no solid cover, on the opposite bowl side from the kneading zone;
- axis of the measuring chamber oriented towards the centre of the planetary mixer mixing bowl;
- height of the apparatus: 0,30 m above the bowl and 0,20 m in front of the bowl;
- perpendicular to the axis of rotation of the bowl.

For each planetary mixer, measurements are then carried out during the kneading operating. The dust values are recorded every second during the tests. Temperature and relative humidity are quoted. The mean of five successive results is calculated and plotted on a graph of dust in  $\text{mg}/\text{m}^3$  against time elapsed in seconds.

The type of flour used should be reported.

## **Annex C** (normative)

### **Principles of design to ensure the cleanability of planetary mixers**

#### **C.1 Terms and definitions**

For the purpose of this annex, the terms and definitions of EN 1672-2:2005+A1:2009 and the following apply.

##### **C.1.1**

###### **easily cleanable**

designed and constructed to permit the elimination of soil by a simple cleaning method (e.g. manual cleaning)

##### **C.1.2**

###### **fitted surfaces**

surfaces separated by a distance less than or equal to 0,5 mm

##### **C.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

#### **C.2 Materials of construction**

##### **C.2.1 Type of materials**

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

Some materials (e.g. plastics) shall be 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.

##### **C.2.2 Surface conditions**

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

**Table C.1 — Surface condition for food area**

In micrometres

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

**Table C.2 — Surface condition for splash area**

In micrometres

Technique of construction	Roughness ( $R_z$ )
Drawn – rolled – spun	$\leq 40$
Moulded – cast	$\leq 54$
Machined	$\leq 54$
Injected - metal - plastics	$\leq 54 \leq 54$
Coating - paint - plastics - glass - metal	$\leq 40 \leq 40 \leq 40 \leq 40$

### C.3 Design

#### C.3.1 Connections of internal surfaces

##### C.3.1.1 General

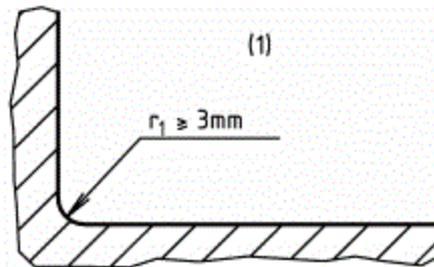
Connections shall have the same roughness as the connected surfaces. These shall be designed to avoid any dead space, see EN 1672-2.

##### C.3.1.2 Connections of internal surfaces for food area

Two surfaces shall be connected according to:

- a) rounded edge having a radius greater than a curve of minimum radius ( $r_1$ ) of 3 mm obtained by:
  - 1) machining (cutting into material mass);

- 2) bending the sheet metal (bending and forming);
- 3) design (in moulds, shells of foundry, injection and blasting ...) (see Figure C.1)

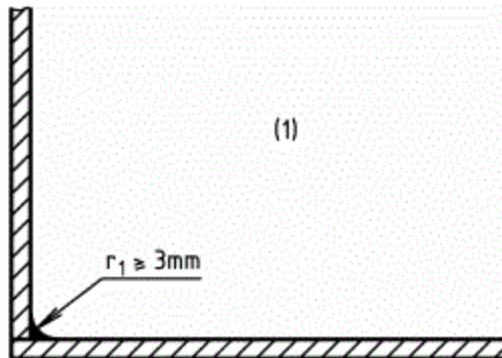


**Key**

- 1 food area

**Figure C.1 — Internal surfaces for food area (rounded)**

- 4) or by welded assembly with grinding and polishing (see Figure C.2)

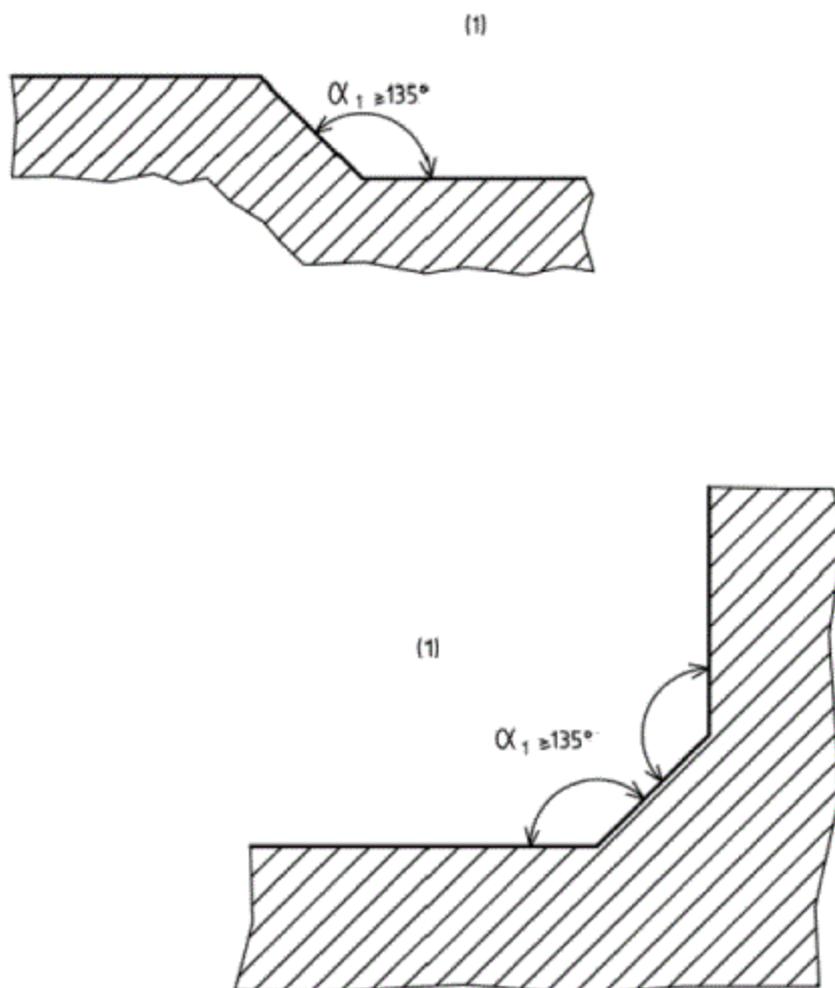


**Key**

- 1 food area

**Figure C.2 — Internal surfaces for food area (welded)**

- 5) for an internal angle ( $\alpha_1$ ) greater than or equal to  $135^\circ$  there are no special requirements for the radius (see Figure C.3).



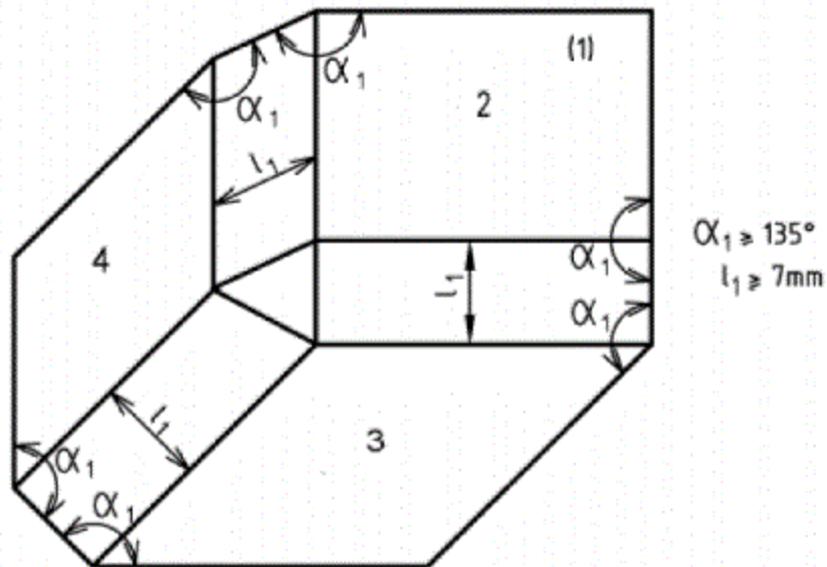
**Key**

1 food area

**Figure C.3 — Internal angle for food area greater than or equal to 135°**

Three surfaces shall be connected (see Figure C.4):

- by using rounded edges, 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° so that the dimension ( $l_1$ ) between two bends is then equal to or greater than 7 mm.



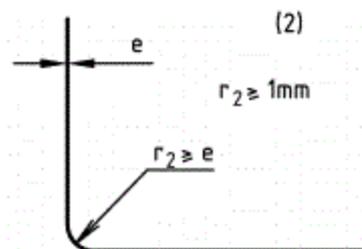
**Key**

- 1 food area
- 2, 3 and 4 plans

**Figure C.4 — Connections of three surfaces for food area**

**C.3.1.3 Connections of internal surfaces for splash area**

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

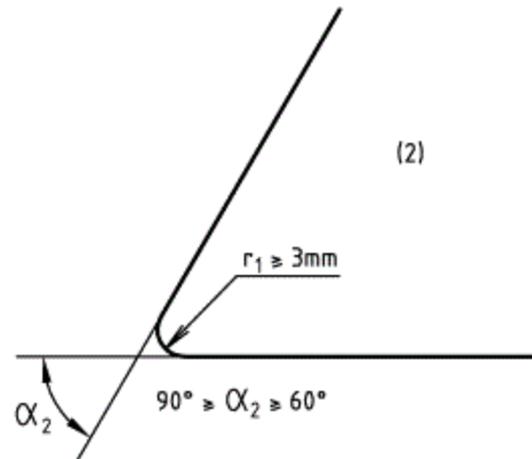


**Key**

- 2 splash area

**Figure C.5 — Internal angle for splash area greater than or equal to 90°**

If the internal angle ( $\alpha_2$ ) is between 60° and 90°, the radius ( $r_1$ ) shall be greater than or equal to 3 mm (see Figure C.6):

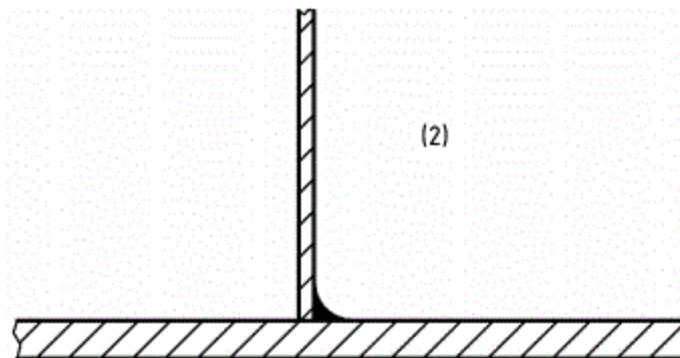


**Key**

2 splash area

**Figure C.6 — Internal angle for splash area between 60° and 90°**

When two perpendicular surfaces are welded together, the weld shall ensure tightness (see Figure C.7). A ground finish is acceptable.



**Key**

2 splash area

**Figure C.7 — Internal surfaces for splash area (welded)**

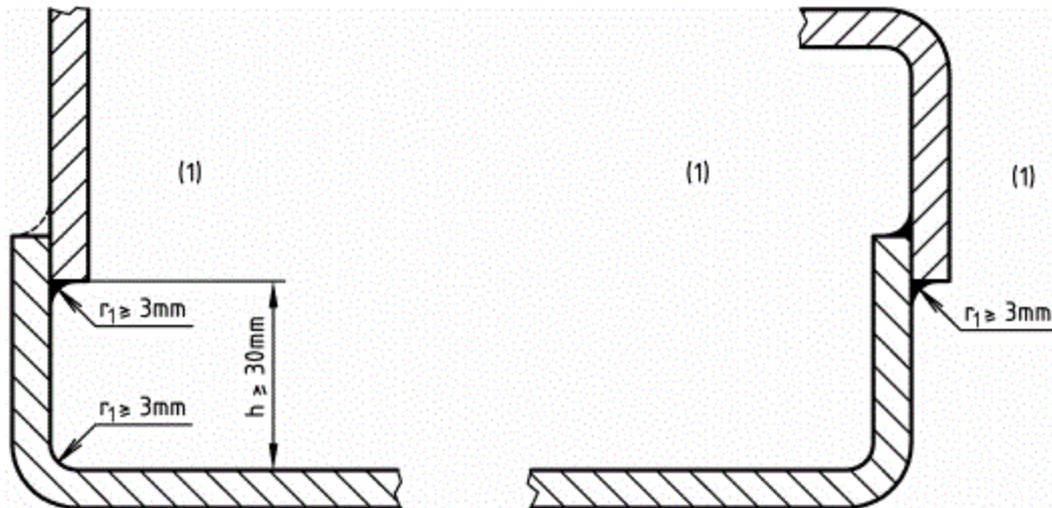
**C.3.1.4 Connections of internal surfaces for non-food area**

No particular requirement.

**C.3.2 Surface assemblies and overlaps**

**C.3.2.1 General**

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

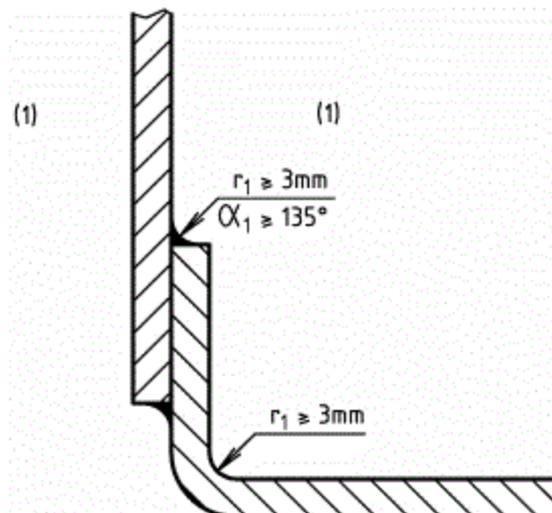


**Key**

1 food area

**Figure C.10 — Surface overlapping for food area (welded)**

If this is impossible to construct, connections shall be in compliance with the requirements concerning rounded areas in the food area (see C.3.1.1 and Figure C.11).



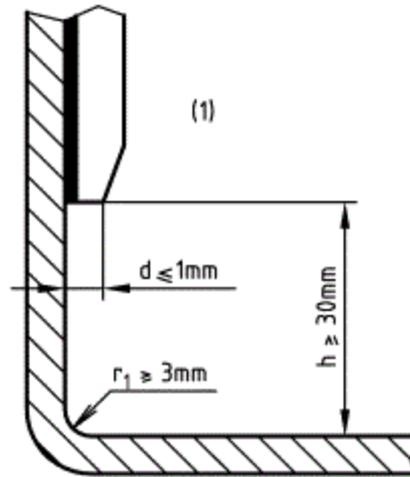
**Key**

1 food area

**Figure C.11 — Surface overlapping for food area (welded, exceptional)**

— 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 C.12).



**Key**

- 1 food area

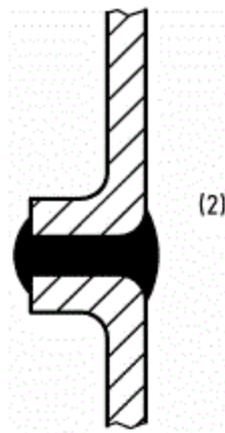
**Figure C.12 — Surface overlapping for food area (sealed)**

**C.3.2.3 Surface assemblies and overlaps for splash area**

The surfaces may be:

- a) either grouted:

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

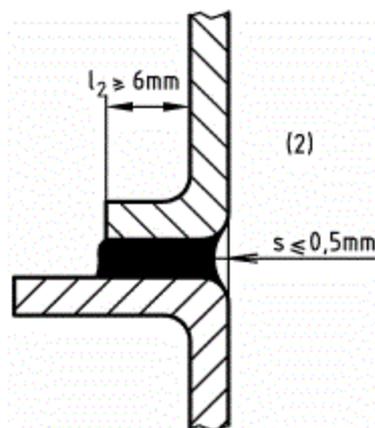


**Key**

- 2 splash area

**Figure C.13 — Surface assemblies for splash area (by means of a profile)**

- 2) by flush bonding (the folds of the part used for bonding shall have a flange length ( $l_2$ ) greater than 6 mm and the flash of the bond shall not have a shrinkage ( $s$ ) more than 0,5 mm, (see Figure C.14).

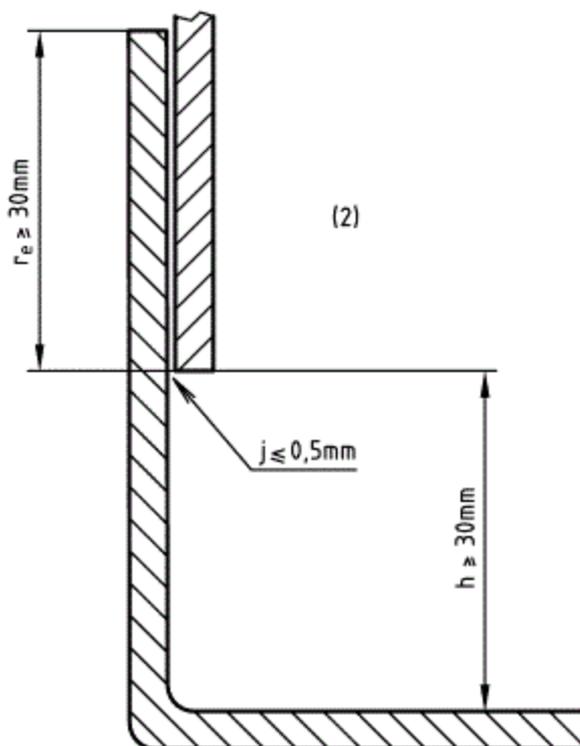


**Key**

2 splash area

**Figure C.14 — Surface assemblies for splash area (by flush bonding)**

- b) 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 a capillarity (see Figure C.15).



**Key**

2 splash area

**Figure C.15 — Surface overlapping for splash area**

### C.3.2.4 Surface assemblies and overlaps for non-food area

No particular requirements.

### C.3.3 Fasteners

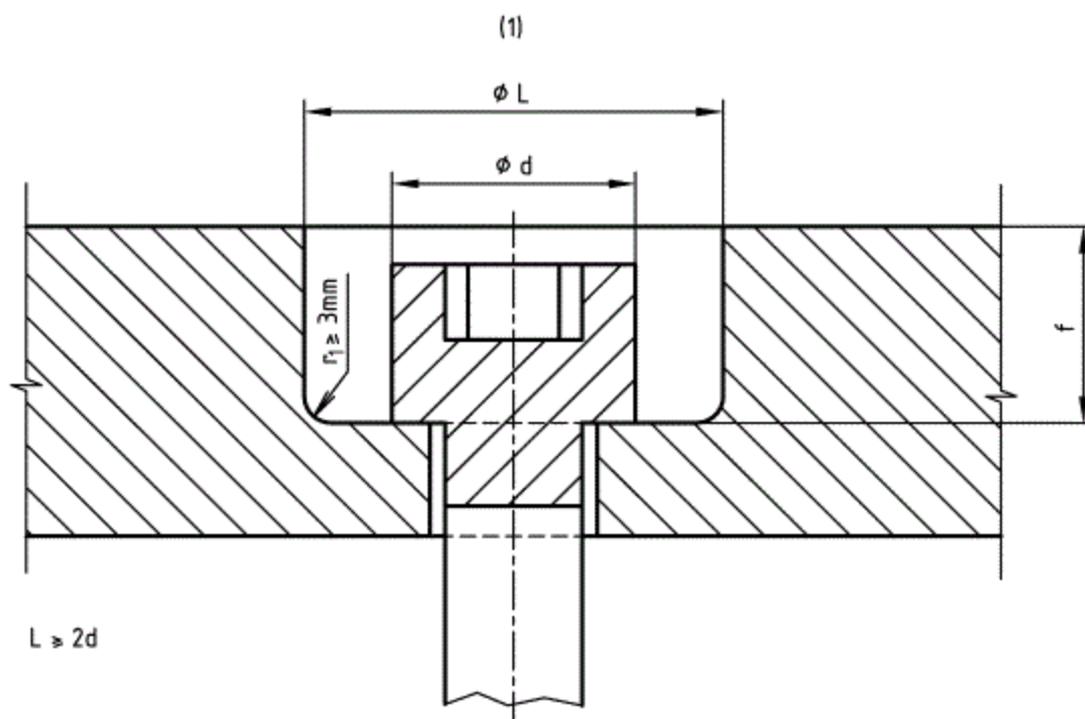
#### C.3.3.1 Fasteners for food area

See EN 1672-2:2005+A1:2009, 5.3.1.3.

##### C.3.3.1.1 Spot-facing

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

- either construction shall comply with Figure C.16 and the manufacturer in his instruction handbook can prescribe suitable cleaning facilities;



#### Key

- 1 food area

Figure C.16 — Spot-facing

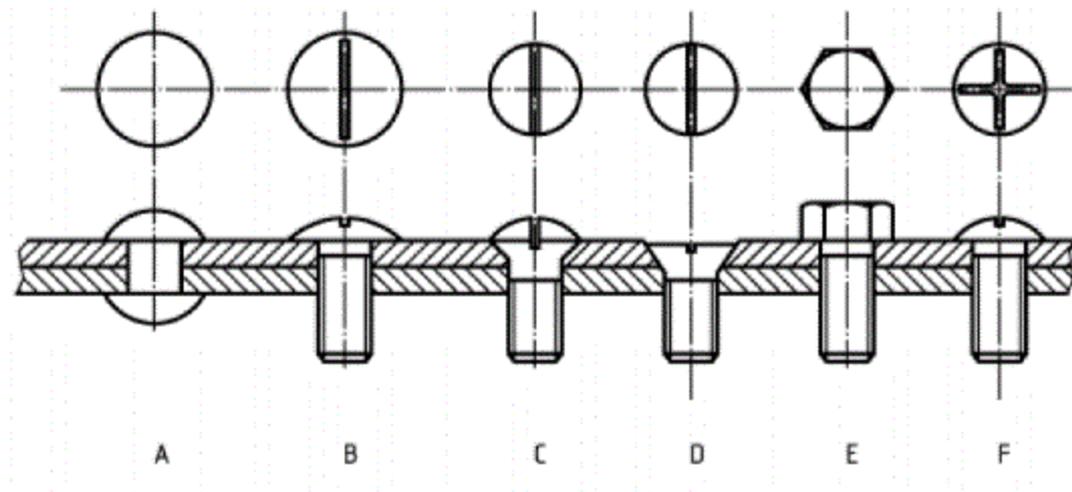
- or the manufacturer shall take the necessary steps to fill in the spot-face by sealed and lasting plugs corresponding to the requirements of the food area.

##### C.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.

### C.3.3.2 Fasteners for splash area

The fasteners easily to be cleaned shall be chosen amongst those on Figure C.17.



#### Key

- |                                   |                            |
|-----------------------------------|----------------------------|
| 1 round head                      | 5 hexagon head             |
| 2 slotted round head              | 6 hexagon head with collar |
| 3 slotted raised countersunk head | 7 hexagon domed head       |
| 4 slotted countersunk head        |                            |

**Figure C.17 — Fasteners for splash area**

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 C.16 for the food area whereby manufacturer can specify in his 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-facing with sealed plugs.

### C.3.3.3 Fasteners for non-food area

No particular requirement.

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

### C.3.4.1 Table-top machines

Table-top machines may be:

- portable (e.g. the force required is less than or equal to 250 N) by a single person once all the removable elements have been disassembled for cleaning: no requirements.
- tilting: There is no requirement if the force required for tilting is less than or equal to the maximum portable weight.

Dimensions in millimetres

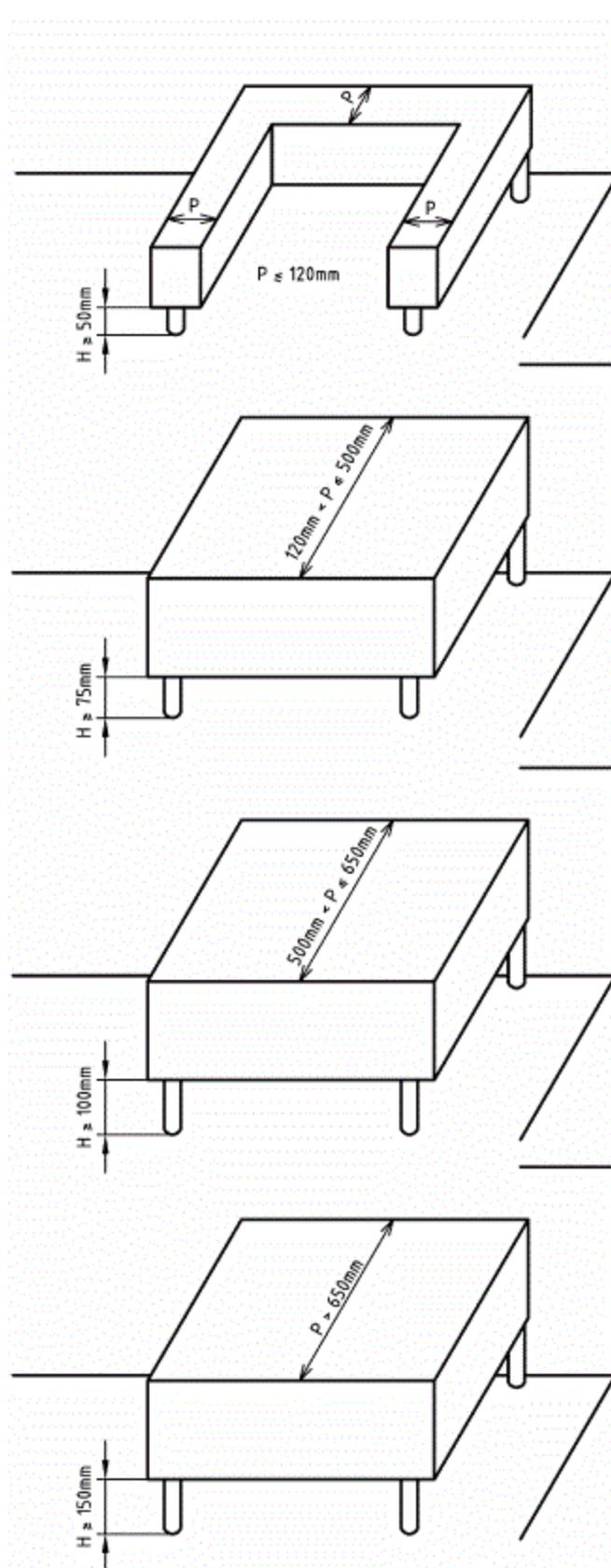


Figure C.18 — Machines with feet

- if the machine has no feet, it shall be placed on the working table with an interposed continuous and sealed joint.

The instruction handbook shall specify the jointing method.

### C.3.4.3 Machines on the floor

#### C.3.4.3.1 Fixed machines with or without a base

Fixed machines with or 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 C.19), or shall have their feet ( $H$ ) higher than or equal to 150 mm.

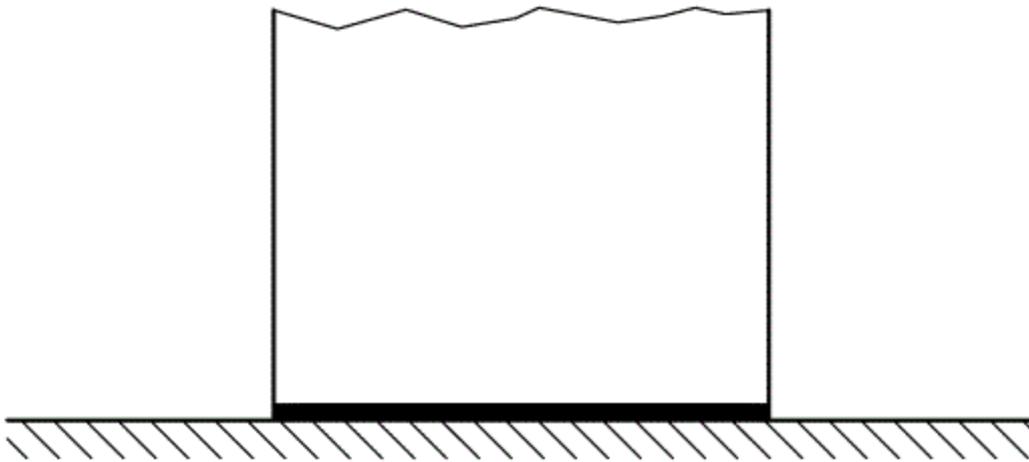


Figure C.19 — Machine standing on the floor

However, if the space ( $L$ ) 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 C.20).

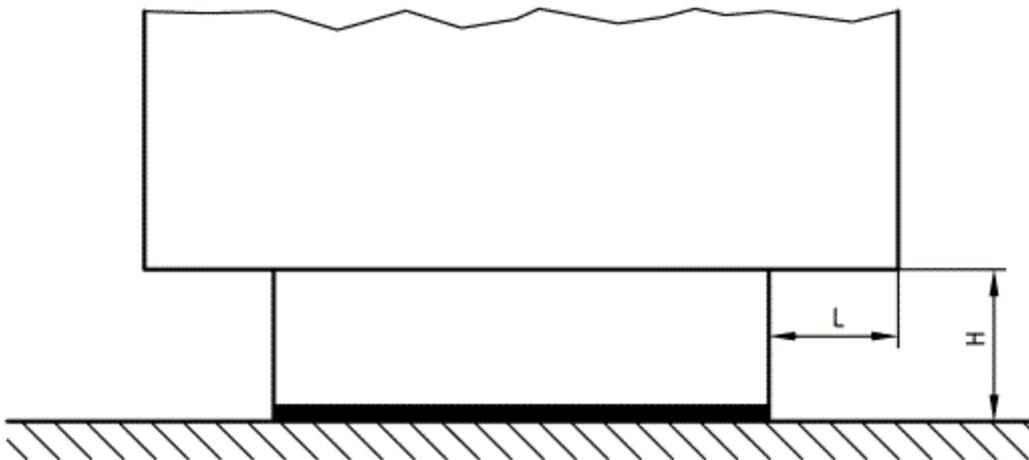


Figure C.20 — Machine with protrusion

If the foot surface is greater than  $1 \text{ dm}^2$ , the feet shall be considered to be a base (with interposed seal) (see Figure C.21).

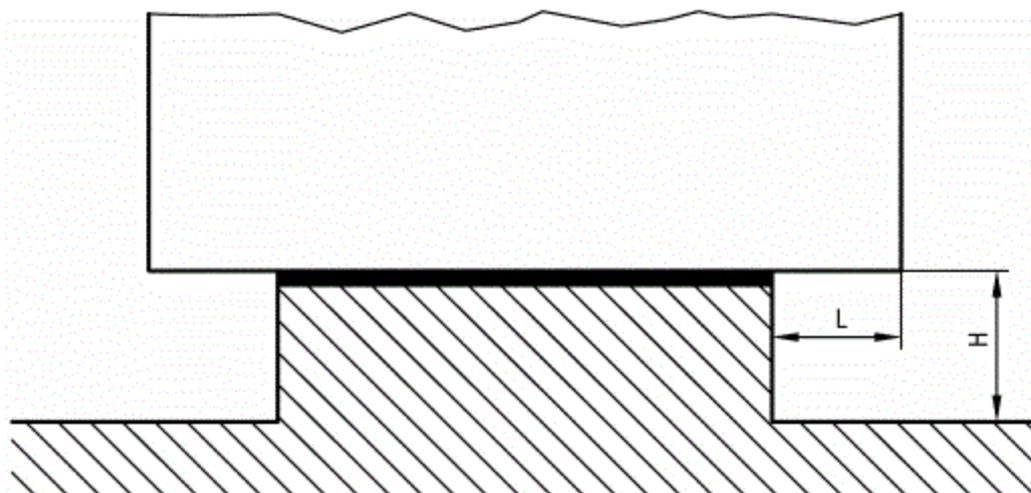
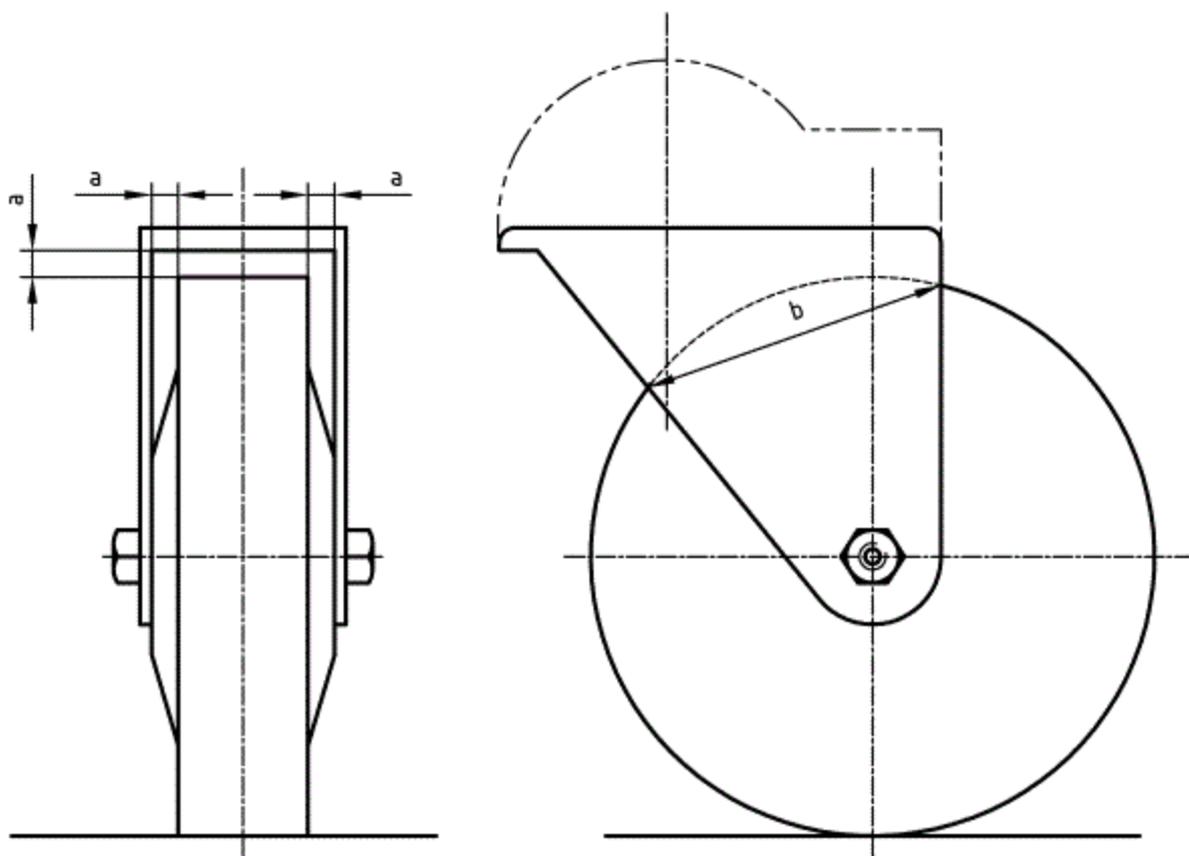


Figure C.21 — Machine with a base

#### C.3.4.3.2 Mobile machines

The castors shall be cleanable. An example is given in Figure C.22, 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 C.22 — Castors

### C.3.5 Ventilation openings

#### C.3.5.1 Ventilation openings for non-food area

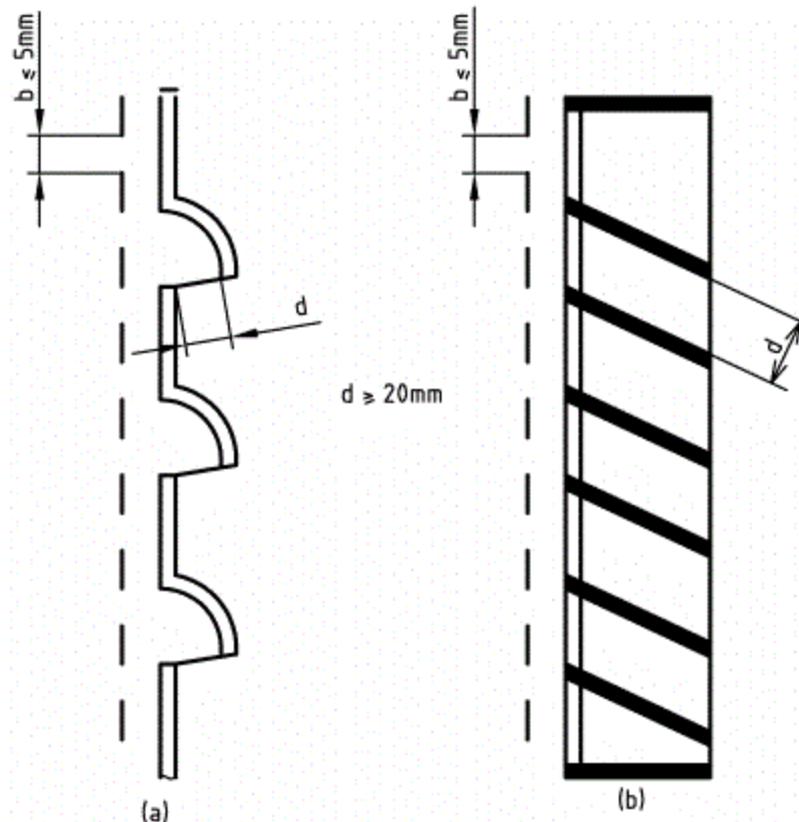
Ventilation openings shall be located in the non-food area.

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.

#### C.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 C.23 — Ventilation openings for splash area**

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 C.23).

### C.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 removable;
- 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 ( $\rho$ ). In no case this width ( $l_3$ ) shall be less than 10 mm (see Figure C.24).

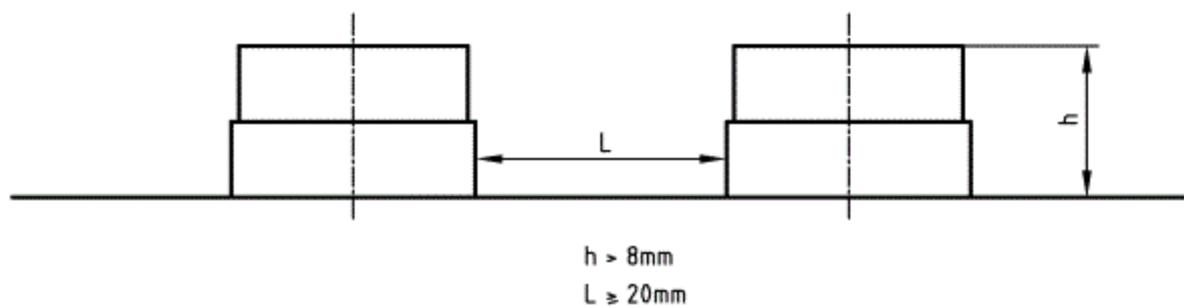


Figure C.25 — Control panel in the splash area with  $h > 8\text{ mm}$

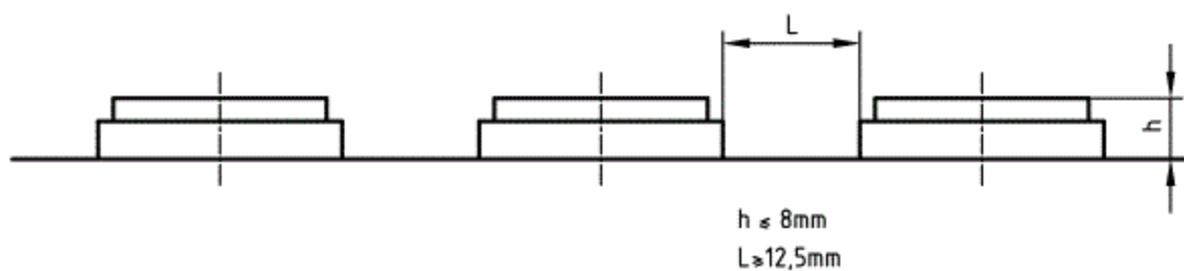


Figure C.26 — Control panel in the splash area with  $h \leq 8\text{ mm}$

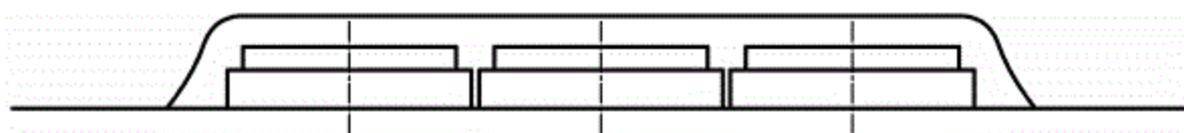


Figure C.27 — Control panel in the splash area with a covering

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

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

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- [5] EN 1005-2, *Safety of machinery — Human physical performance — Part 2: Manual handling of machinery and component parts of machinery*
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- [12] CEN/TR 15623, *Food processing machinery — Route map — Materials for food area*





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