BS EN 453:2014

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Food processing machinery — Dough mixers — Safety and hygiene requirements

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National foreword

This British Standard is the UK implementation of EN 453:2014. It supersedes BS EN 453:2000+A1:2009 which is withdrawn.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.

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

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Nahrungsmittelmaschinen - Teigknetmaschinen - Sicherheits- und Hygieneanforderungen

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

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Foreword

This document (EN 453:2014) has been prepared by Technical Committee CEN/TC 153 “Machinery intended for use with foodstuffs and feed”, the secretariat of which is held by DIN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by April 2015 and conflicting national standards shall be withdrawn at the latest by April 2015.

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 453:2000+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 453:2000+A1:2009 are listed below:

— solid guard to protect against dust emission was added;

— 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 dough mixers with rotating bowls of capacity greater than or equal to 5 L[1)] and less than or equal to 500 L.

These dough mixers are used separately or in a line in the food industry and shops (pastry-making, bakeries, confectionery, etc.) for manufacturing of dough by mixing flour, water and other ingredients. These machines can be fed by hand or mechanically.

These machines are sometimes used in other industries (e.g. pharmaceutical industry, chemical industry, printing), but hazards related to these uses are not dealt with in this standard.

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 dough 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:

— planetary mixers (see EN 454);

— continuously fed machines;

— mixers with stationary vertical bowls;

— experimental and testing machines under development by the manufacturer;

— domestic appliances;

— automatic loading and unloading devices.

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*

EN 1672-2:2005+A1:2009, *Food processing machinery — Basic concepts — Part 2: Hygiene requirements*

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

EN 60529, *Degrees of protection provided by enclosures (IP Code) (IEC 60529)*

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

EN 61000-6-1, *Electromagnetic compatibility (EMC) — Part 6-1: Generic standards — Immunity for residential, commercial and light-industrial environments (IEC 61000-6-1)*

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

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

EN ISO 13857:2008, *Safety of machinery — Safety distances to prevent hazard zones being reached by upper and lower limbs (ISO 13857:2008)*

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

3 Terms, definitions and description

3.1 Terms and definitions

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

3.2 Description

A dough mixer usually consists of:

— a frame, supporting or containing the drive mechanism and control devices;

— a bowl to contain the ingredients to be mixed. This bowl is driven either mechanically or through the action of the kneading tool on the dough, may be removable, and may tilt;

— one or more kneading tools on a vertical or inclined fixed axis or two special arms mixing the dough. In some cases these devices can be raised to allow bowl or food removal.

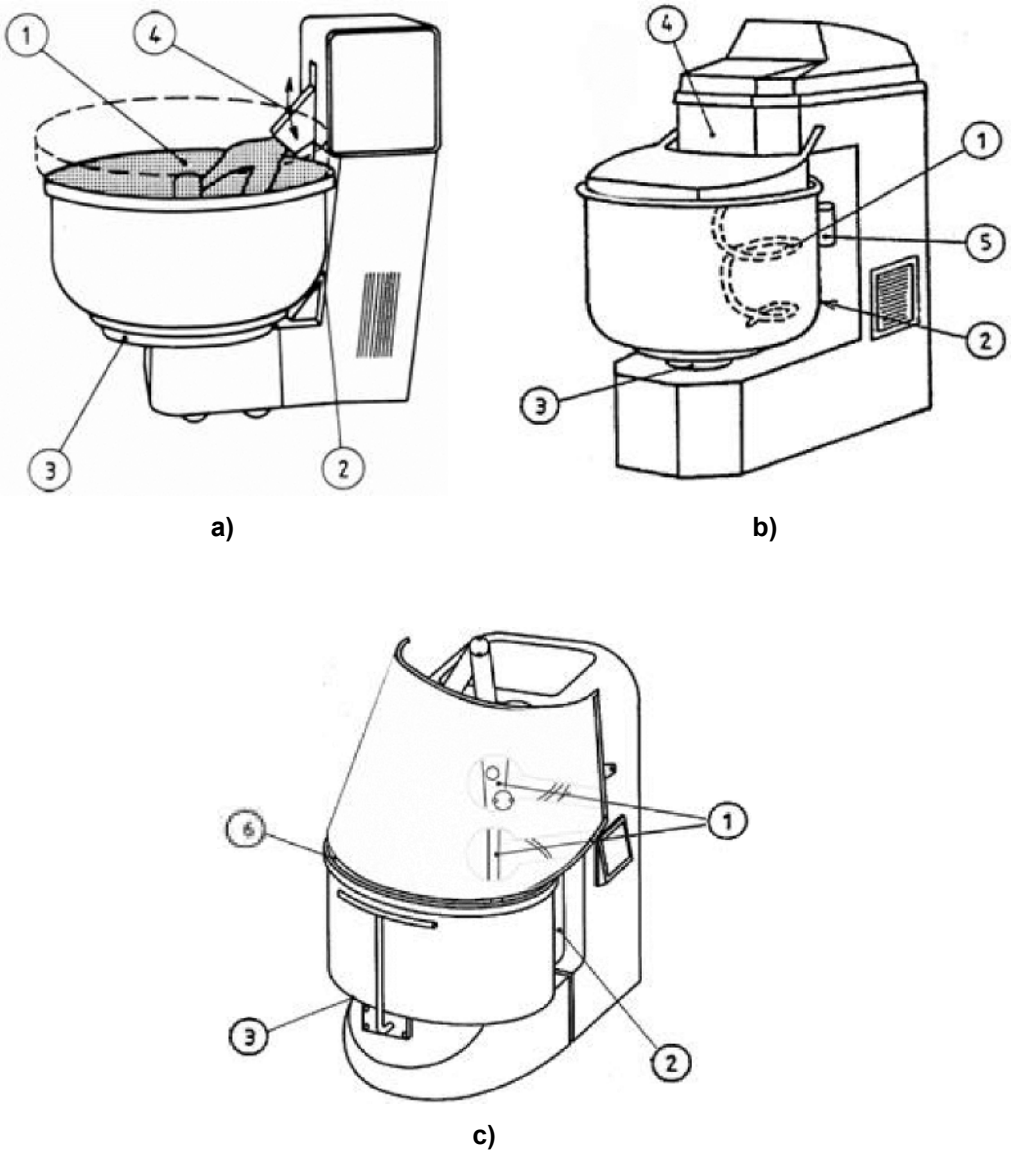
4 List of significant hazards

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).

The danger zones are given in Figure 1.

Table 1

Hazards, hazardous situations and hazardous events	Location or cause	Clause/subclause in this European Standard
Mechanical hazards (see Figure 3)		5.2
— crushing, shearing, trapping, and impact	Zone 1: Volume covered by the movement of the kneading tools	
— drawing-in hazard and crushing	Zone 2: Space between bowl and frame	
— trapping and shearing	Zone 3: Bowl driving mechanism	
— shearing, trapping, impact and crushing	Zone 4: Kneading tool-holder driving, positioning and adjusting mechanism	
— drawing in or trapping	Zone 5: Guide rollers and bowl	
— crushing	Zone 6: Powered guard and bowl	
Electrical hazards	Electric shock from direct or indirect contact with live components Electromagnetic disturbance	5.3 5.3
IP degree	Motor enclosure	5.4
Stopping of the machine	No access to the normal OFF of the machine	5.5
Hazards generated by noise	Hearing damage, accidents due to interference with speech communication and interference with the perception of acoustic signals	5.6 7.2
Hazards generated by materials and substances (inhalation of dust)	Flour dusters	5.7
Hazards generated by neglecting hygienic design principles	e.g. contamination by microbial growth or foreign materials	5.8
Hazards generated by neglecting ergonomic principles	During operation, cleaning and maintenance	5.9



Key

1	zone 1	volume covered by the movement of the kneading tools
2	zone 2	space between bowl and frame
3	zone 3	bowl driving mechanism
4	zone 4	kneading tool-holder driving, positioning and adjusting mechanism
5	zone 5	guide rollers and bowl
6	zone 6	powered guard and bowl

Figure 1 — Danger zones of a dough mixer

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.

5.2 Mechanical hazards

5.2.1 General

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

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.

5.2.2 Zone 1 – Volume covered by the movement of the kneading tools

NOTE Usual conditions of use involve taking samples, adding some ingredients, scraping or taking away dough from the inside of the bowl in order to be able to test its consistency or to measure its temperature. Accordingly, an opening is necessary on the top of the bowl. This means that for these machines it is not possible to comply with the safety distances given by EN ISO 13857. The strategy for selecting safety measures from EN ISO 12100 gives the following requirements and/or measures.

5.2.2.1 Access from above shall be prevented while the tool is moving. This may be achieved by a movable interlocking guard covering the top of the bowl. The bowl itself when in working position prevents access from other directions.

If the bowl is removable the bowl and kneading tool drive mechanisms shall not be capable of operation when the bowl is removed.

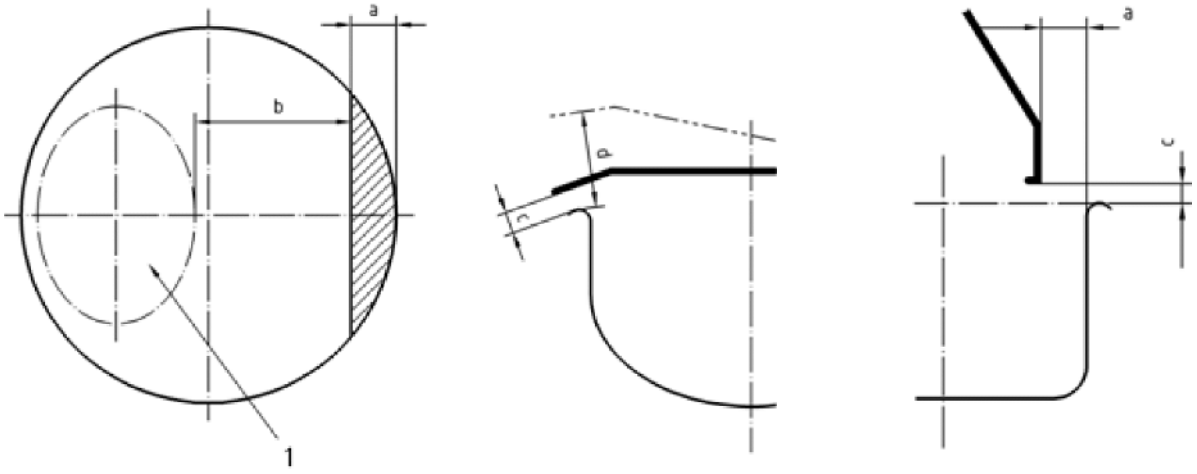
Guards may be, for example, hinged or move up and down vertically and be linked to suitable actuated position detectors functioning in the positive mode in compliance with EN ISO 14119:2013, 5.4. Position detectors themselves shall comply with EN ISO 14119:2013, 5.2 and 5.3.1, and any rotary or linear cams with EN ISO 14119:2013, 5.3.2.

To minimize the possibility of defeat the interlocking mechanism shall be designed taking into account EN ISO 14119:2013, Clause 7, for example by being located within the machine housing.

When there is an opening to enable the operator to see and take dough samples during the kneading process it shall be entirely within the hatched area shown in Figure 2. This opening shall have a self-closing lid.

This hatched area shall be located on the bowl side opposite the kneading tool zone, and it shall have the dimensional characteristics shown in Table 2. If the guard has holes, openings shall comply with EN ISO 13857:2008, Table 4.

The measurements of the interlocking guard can be deduced from Table 2 in relation to Figure 2.



a) **b)**

Key

(1) volume covered by the kneading tool

a distance between the internal rim of the bowl and the external part of the guard

b horizontal distance between the external part of the guard and the nearest point of the danger zone, i.e. the volume covered by the movement of the kneading tool(s)

c distance between the bowl guard and the rotating bowl rim

d distance between the upper rim of the bowl and the position of the outer edge of the guard when the interlocking device is actuated

Figure 2 — Dimensions of the guard

Table 2 — Dimensions of the guard

Dimensions in millimetres

b	a	c	d
b ≤ 120	a = 0	c ≤ 25	d < 25
120 < b ≤ 230	a ≤ 100	c ≤ 25	d < 50
b > 230	a ≤ 140	c ≤ 25	d < 75

5.2.2.2 In order to facilitate dough discharge from dough mixers with non-removable bowls, movement of the kneading tool and bowl motions at low speed (speed of the tool ≤ 120 rpm) is permitted with the guard opened, by operation of a hold-to-run control. This allows the operator to turn the bowl for unloading the bowl in different positions.

5.2.2.3 Guard-actuated stopping devices shall stop the dough mixer with the bowl empty with 4 s of opening the guard.

If this is not possible, opening of the guard shall be prevented until movement has ceased, for example by an interlocking guard with guard locking (EN ISO 14119:2013, 5.7).

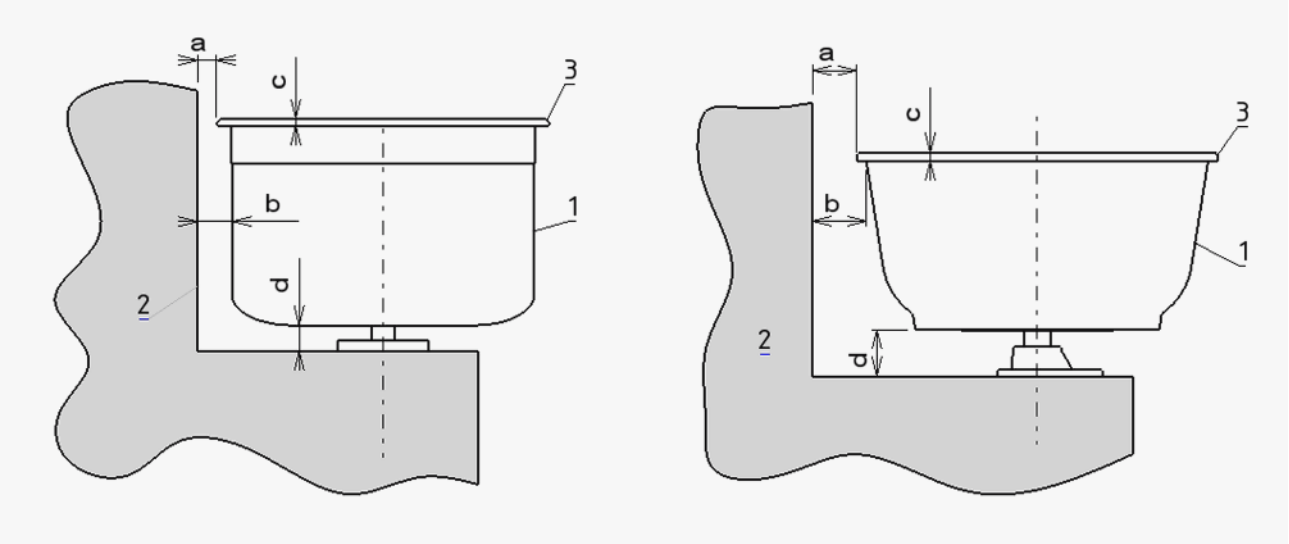
Release of any guard may be by a timer or operation of a stop detection device.

5.2.3 Zone 2 – Space between bowl and frame

If the design allows access between the rotating bowl and fixed vertical parts of the machine, the drawing-in hazard can be reduced by either one of the following solutions:

a) the distance between the frame and the outside wall of the bowl shall be at least 50 mm (b). The distance between the outside of the rim and the frame shall be at least 30 mm (a), and the height of the rim is less than or equal to 30 mm (c) (see Figure 3). The outside of the bowl shall be smooth.

b) by using a fixed guard, if the hygiene risk is acceptable. The distance between the fixed guard and the bowl shall be less than or equal to 4 mm (when the bowl is empty). The fixed guard shall follow the shape of the bowl.



Key

1 bowl

2 frame

3 rim

Figure 3 — Safety distances between bowl and frame

The distance between the bowl and the horizontal frame shall be more or equal to 30 mm (d).

For the trapping hazard between the guide rollers and the bowl, see 5.2.7.

5.2.4 Zone 3 – Bowl driving mechanism

5.2.4.1 The bowl drive mechanism shall be protected by a fixed or interlocking guard. For example many manufacturers simply enclose it in the machine casing which is bolted shut. If the bowl is removable the bowl and kneading tool drive mechanisms shall not be capable of operation when the bowl is removed.

Suitable actuated position detectors functioning in the positive mode in compliance with EN ISO 14119:2013, 5.4, shall be used to ensure the bowl and tool positions. Position detectors themselves shall comply with EN ISO 14119:2013, 5.2 and 5.3.1, and any rotary or linear cams with EN ISO 14119:2013, 5.3.2.

5.2.4.2 If tilting is motorised, it shall be operated by a hold-to-run control. The bowl shall be prevented from falling in the event of power failure or breakdown by a device which guarantees a tilting movement with a safety-reduced speed. For example, this may be achieved by a lead screw with a second nut, by rack and pinion, or by hydraulic cylinders with a flow restrictor.

5.2.5 Zone 4 – Kneading tool-holder driving, positioning and adjusting mechanism

The access to the hazard points of the drive mechanism shall be protected by fixed or interlocking guards.

The kneading tool shall rotate only when it is in the operating position within the bowl. This may be achieved by interlocking using a rotary cam and a positively operated limit switch. See EN ISO 14119:2013, 5.4.

Power driven lowering of the kneading tool shall be controlled by a hold-to-run control as described in 5.2.2.3. Alternatively, a trip device may be used to stop lowering if an obstruction is met.

This may be achieved by a pressure-sensitive edge fixed on the guard.

5.2.6 Loss of stability

5.2.6.1 For machines designed to be fixed to the floor, the instruction handbook (see 7.2) shall indicate the values of forces at the fixing points.

5.2.6.2 Free standing machines without castors or machines installed on a base frame without castors shall be stable when tilted 10° from the horizontal plane in the most unfavourable direction.

5.2.6.3 Free standing machines with castors or machines installed on a base frame with castors shall be at least two castors (or sets of castors) fitted with a locking device, and shall comply with the provisions of 5.2.6.2.

5.2.7 Guide rollers and bowl

Access to any trapping or drawing-in hazards shall be prevented. This may be achieved by use of fixed guards.

5.2.8 Power operated guards and bowl

Crushing between the descending guard and the bowl shall be prevented. This shall be achieved by either:

— a pressure sensitive guard;

— or a hold-to-run control to operate the guard.

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 precisions given in the following subclauses (see 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 (see EN 60529) it shall be mounted inside an enclosure (see EN 60204-1:2006, 14.2) that guarantees a minimum degree of protection of IP23 (see EN 60529).

5.5 Emergency stop

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

5.6 Noise reduction

Dough 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 taken into account of technical progress, by particularly applying measures at source to control noise (for examples, 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.

5.7 Protection against dust emission

Dust emissions from dough mixers shall be minimized using a solid interlocked guard (e.g. a solid cover). Where the manufacturer uses some other method to limit 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 with the bowl in its working position, the manufacturer shall design measures in order to prevent dust emission without decreasing the level of safety.

A method of measuring dust is given for information in Annex C.

5.8 Hygiene requirements

Dough mixers shall be designed and manufactured in accordance with EN 1672-2 and Annex B.

The 3 zones defined in EN 1672-2 are shown in Figure 4 and are in general at least as described in the following passages:

a) food area:

   1) the inside of the bowl;

2) the side of solid guards facing the bowl or the whole of guards with holes;

3) the kneading tool.

b) splash area:

1) the outside of the bowl;

2) in the case of solid guards, the outside surface of guards;

3) the front surface of the frame;

4) the fixed horizontal surface above the bowl.

c) non-food area:

1) the remaining areas of the machine that do not come into contact with food.

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

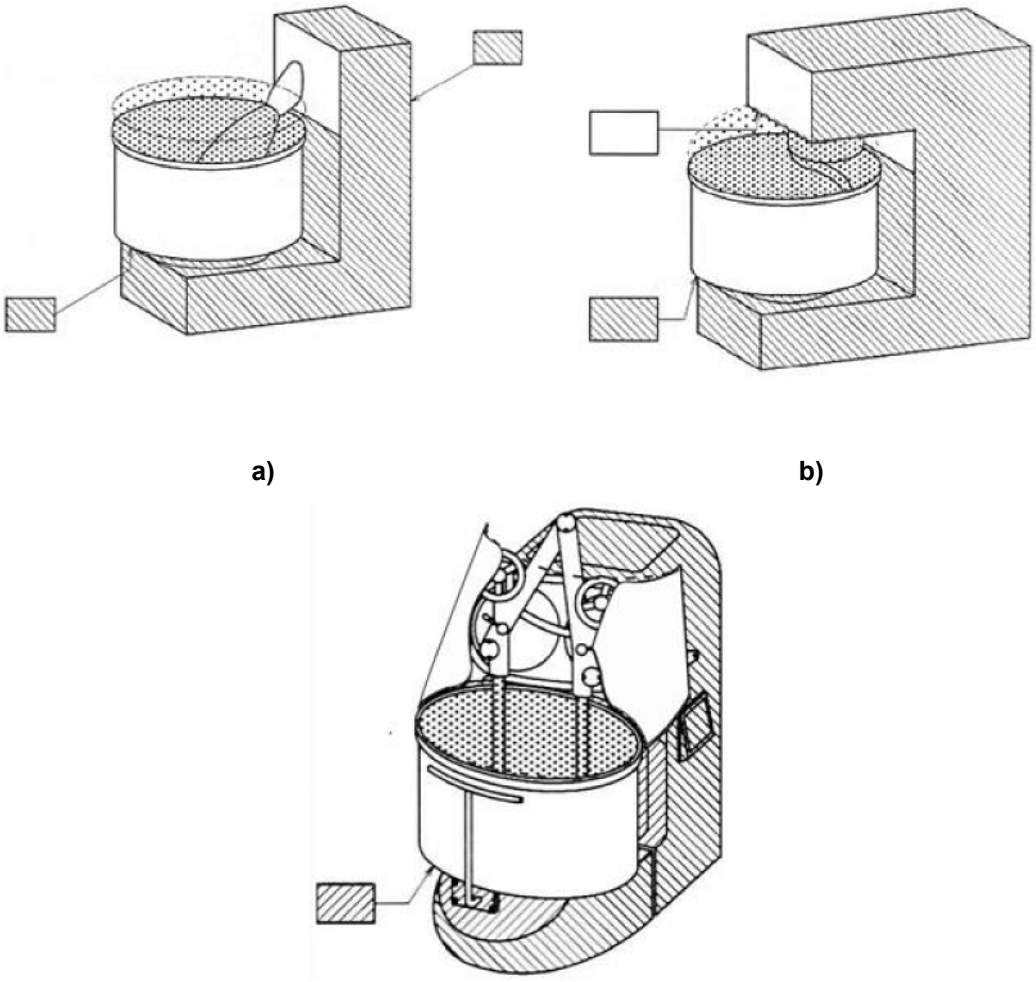


Figure 4 — Hygiene areas (with guards removed)

5.9 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 lifting devices and/or transport carriages shall be provided for installation, removal and transport of any part of the dough 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 excessive effort shall be avoided e.g. by use of low-friction castor wheels or by the design of the bowl coupling mechanism.

If tilting of the bowl is manual, it shall require a force not more than 250 N.

When lowering of the kneading tool is manual, lowering or lifting with the bowl empty shall require a force not more than 250 N in normal operating conditions.

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 3.

Table 3

Relevant clause	Safety and hygiene requirements/location	Method of verification
5.2.2	Interlocking guard	By functional test (type verification)
	Safety distances	By measurement (type verification)
	Hold-to run control	By operation of the hold-to run control (type verification)
	Stopping device	By measurement of time (type verification) By functional test (type verification)
5.2.3	Space between bowl and frame	By measurement (type verification)
5.2.4	Bowl drive mechanism	By functional test of the interlocking guard and verification of the electric circuit diagram (type verification) By operation of the hold-to run control and inspection (type verification)
5.2.5	Kneading tool-holder driving, positioning and adjusting mechanism	By inspection (type verification) By operation of the hold-to run control and functional test (type verification)
5.2.6	Loss of stability	For free standing machines, when the machine is tilted 10°, it shall remain stable (type verification)
5.2.7	Guide rollers and bowl	By inspection (type verification)
5.2.8	Power operated guard and bowl	By inspection and functional tests (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	Noise reduction	By measurement according to Annex A (type verification)
5.7	Protection against dust emission	By inspection and measurement (type verification)
5.8	Hygiene	In accordance with EN 1672–2:2005+A1:2009, Clause 6 and with Annex B (type verification)
5.9	Ergonomics 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 and operation;

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;

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

d) the normal quantity of processed products;

e) information warning the user about the risk of dust. In particular:

   1) during cleaning: the use of a brush or pressurized air is not recommended. The use of a professional vacuum cleaner equipped with an appropriate filter is recommended;

   2) the machine instruction handbook shall include methods of loading to minimize dust emission, especially when loading manually dry ingredients, for example:

      i) careful handling of bagged products by minimizing the height above the bowl base from which they are poured;

      ii) careful slitting of bags in the lower part of the bowl to allow dust free discharge of flour as far as possible;

      iii) use of temporary bowl covers to minimize openings through which flour may escape;

   3) during unloading it is recommended to minimize the use of flour;

   4) during maintenance: the use of a brush or pressurized air is not recommended. The use of a professional vacuum cleaner equipped with an appropriate filter is recommended;

f) ingredients with known health risks should be listed, e.g. flour. Furthermore, the need to consult the supplier’s hazard data sheets should be highlighted. The possible need to wear respiratory protective equipment during manual loading and the residual risk of dust shall be indicated;

g) information for the user who has the obligation to comply with environmental standards applying in the country;

h) the values of forces at fixing points if the machine is to be fixed;

i) a warning to the operator during maintenance on the hazard of residual voltage especially from capacitors;

j) the value of the overcurrent protective device in the case of machines covered by 5.3.5;

k) 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;

l) 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;

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

n) 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;

o) 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, neutralizing residual energy, testing);

p) 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.

q) 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;

r) information for the user on the significant environmental characteristics and energy performance of the product;

s) 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 machinery shall be marked permanently and legibly with at least the following:

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

— designation of the machinery;

— mandatory marking[2)]

— 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 dough 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^3, with surfaces that are hard and sound-reflective. For rooms of volume less than or equal to 100 m^3 only machines whose largest dimension is less than or equal to 1 m may be tested. For rooms of volume greater than 100 m^3 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 σ_{R0} given by the applied noise emission measurement method and the uncertainty associated with the instability of the operating and mounting conditions σ_{omc}. The resulting total uncertainty is then calculated from:

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

The upper bound value of σ_{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 dough mixers a rather constant noise emission with a value of 0,5 dB for σ_{omc} is expected.

NOTE 2 σ_{tot} is referred to as σ_R in EN ISO 4871:2009.

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 4871:2009.

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 7.2.

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
(normative)

Principles of design to ensure the cleanability of dough mixers

B.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:

B.1.1

easily cleanable

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

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

B.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 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.

B.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 B.1.

Table B.1 — Surface condition for food area

In micrometres

Technique of construction	Roughness (R_z)	
	Food area	Splash area
Drawn – rolled – spun	≤ 34	≤ 40
Moulded – cast	≤ 40	≤ 54
Machined	≤ 34	≤ 54
Injected - metals - plastics	≤ 34 ≤ 34	≤ 54 ≤ 54
Coating - paint (test reservation) - plastics (test reservation) - glass - metal (test reservation)	≤ 22 ≤ 22 ≤ 22 ≤ 22	≤ 40 ≤ 40 ≤ 40 ≤ 40

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

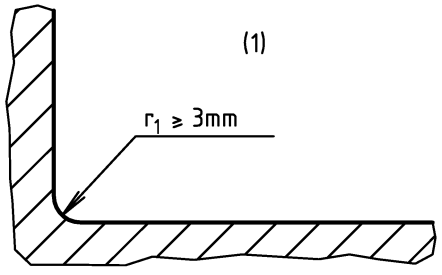
Two surfaces shall be connected according to:

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 B.1).

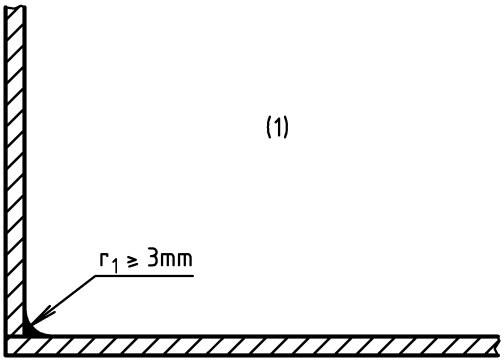


Key

(1) food area

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

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

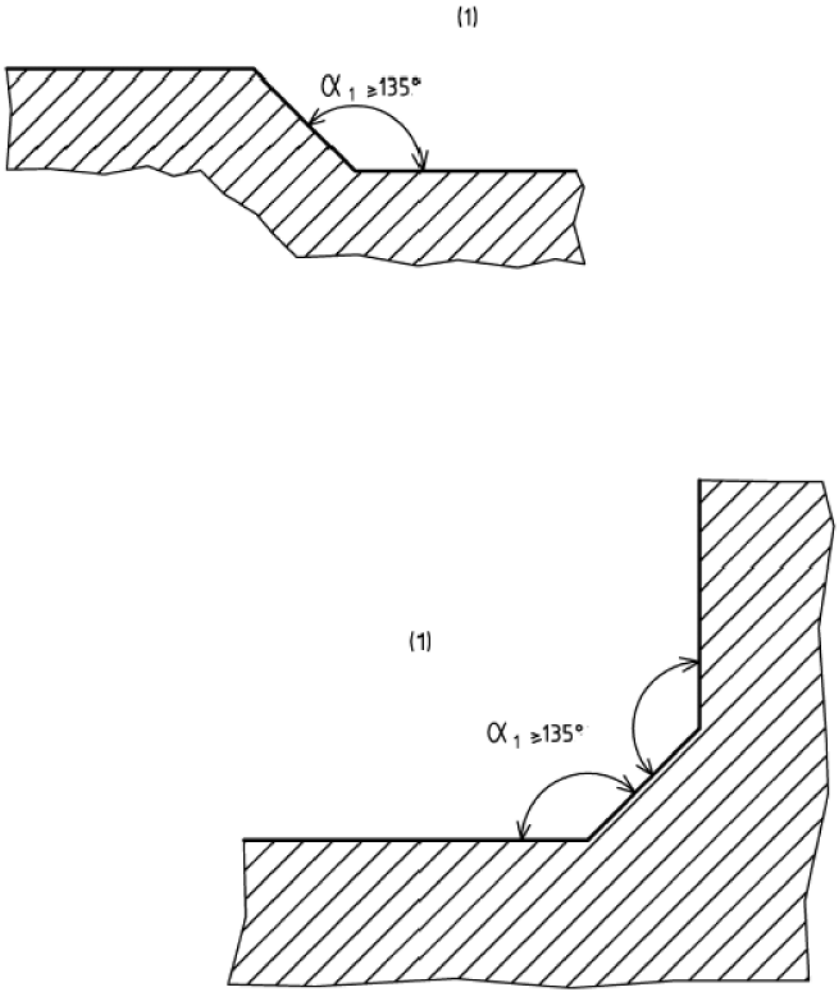


Key

(1) food area

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

5) 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

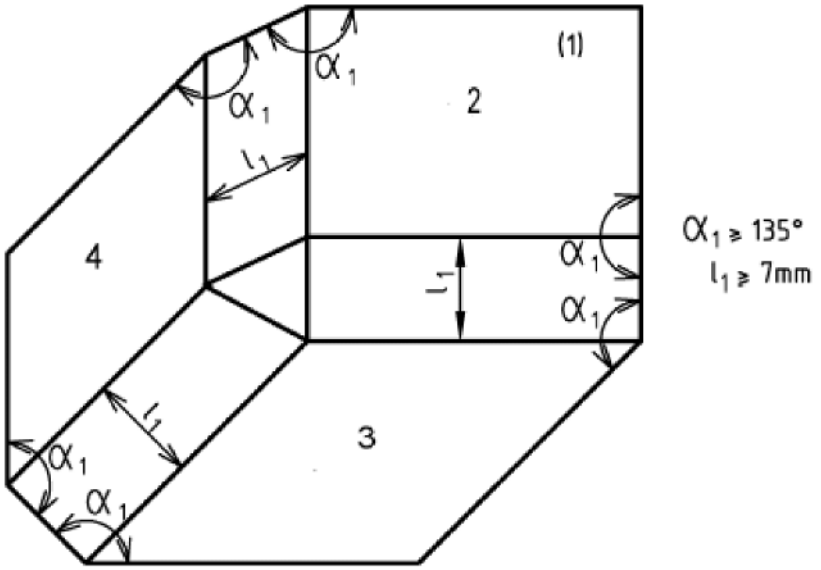
(1) food area

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

Three surfaces shall be connected (see Figure B.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.



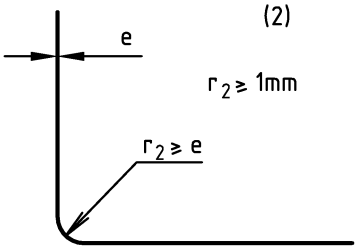
Key

(1) food area

Figure B.4 — Connections of three surfaces for food area

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).

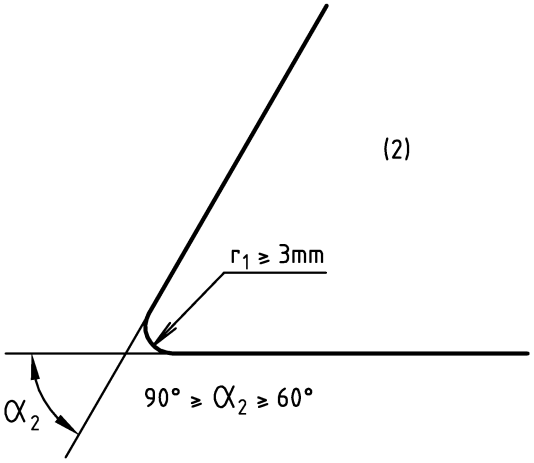


Key

(2) splash area

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

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.6):

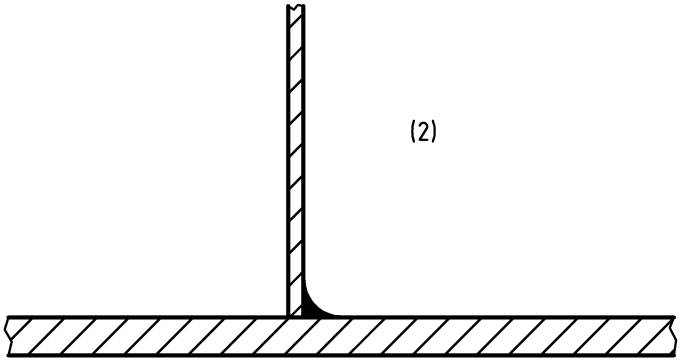


Key

(2) splash area

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

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



Key

(2) splash area

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

B.3.1.3 Connections of internal surfaces for non-food area

No particular requirements.

B.3.2 Surface assemblies and overlaps

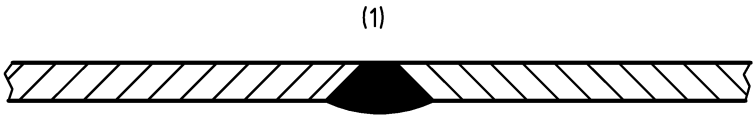
The sheet metal assembly methods shall take into account the expanding or contracting due to temperature variations.

B.3.2.1 Surface assemblies and overlaps for food area

B.3.2.1.1 Surface assembly

Assembled surfaces are considered joined either:

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

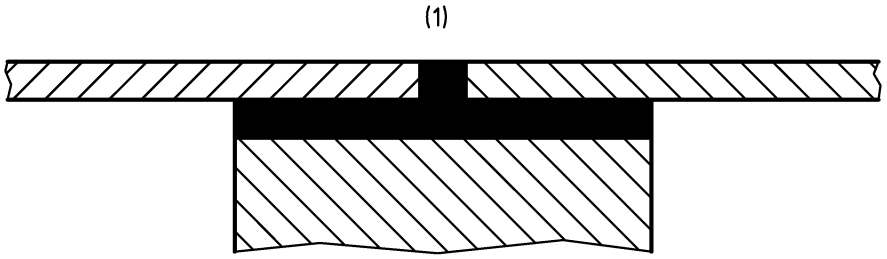


Key

(1) food area

Figure B.8 — Surface assemblies for food area (welded)

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



Key

(1) food area

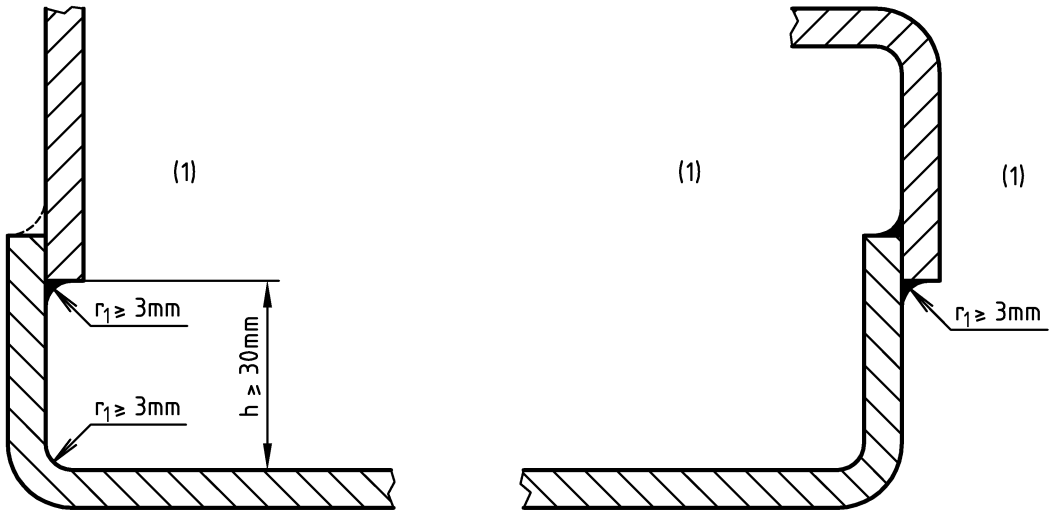
Figure B.9 — Surface assemblies for food area (sealed)

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 are 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 with a distance (*h*) more than or equal to 30 mm (see Figure B.10):

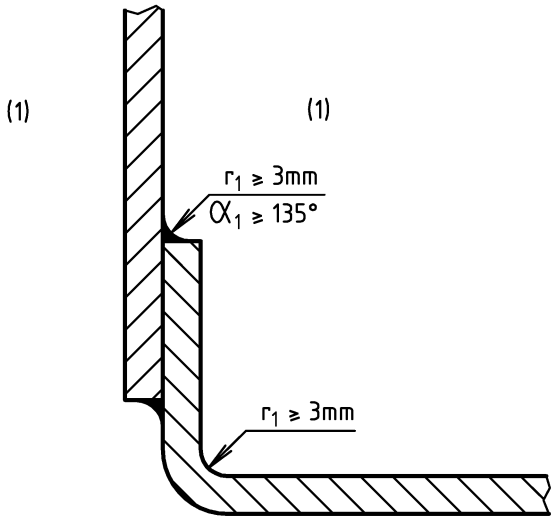


Key

(1) food area

Figure B.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 B.3.1.1 and Figure B.11).



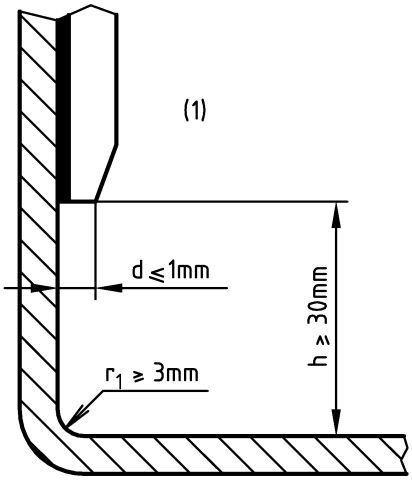
Key

(1) food area

Figure B.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 B.12).



Key

(1) food area

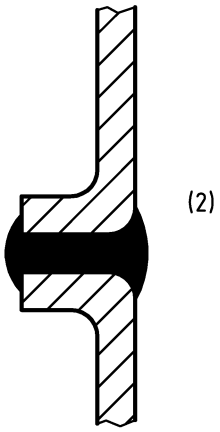
Figure B.12 — Surface overlapping for food area (sealed)

B.3.2.2 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 B.13):

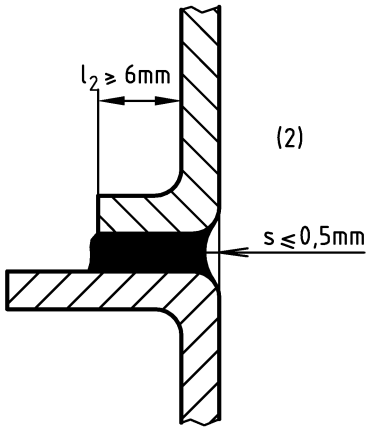


Key

(2) splash area

Figure B.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 B.14).

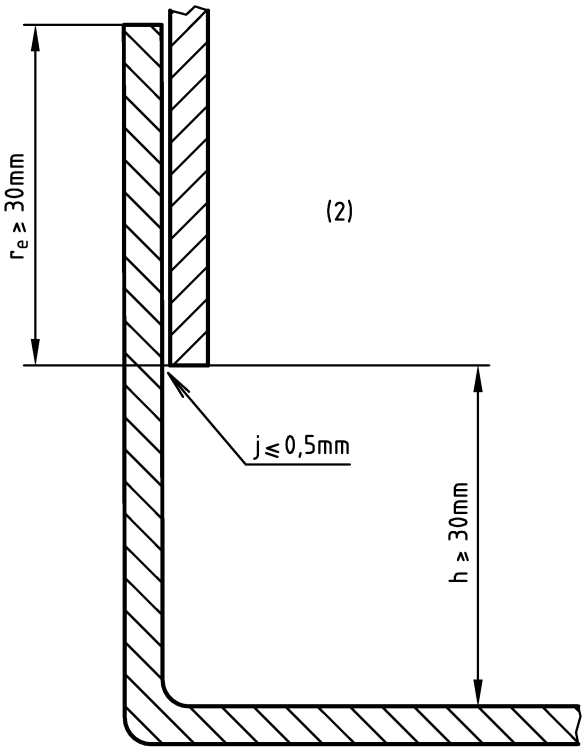


Key

(2) splash area

Figure B.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 B.15).



Key

(2) splash area

Figure B.15 — Surface overlapping for splash area

B.3.2.3 Surface assemblies and overlaps for non-food area

No particular requirements.

B.3.3 Fasteners

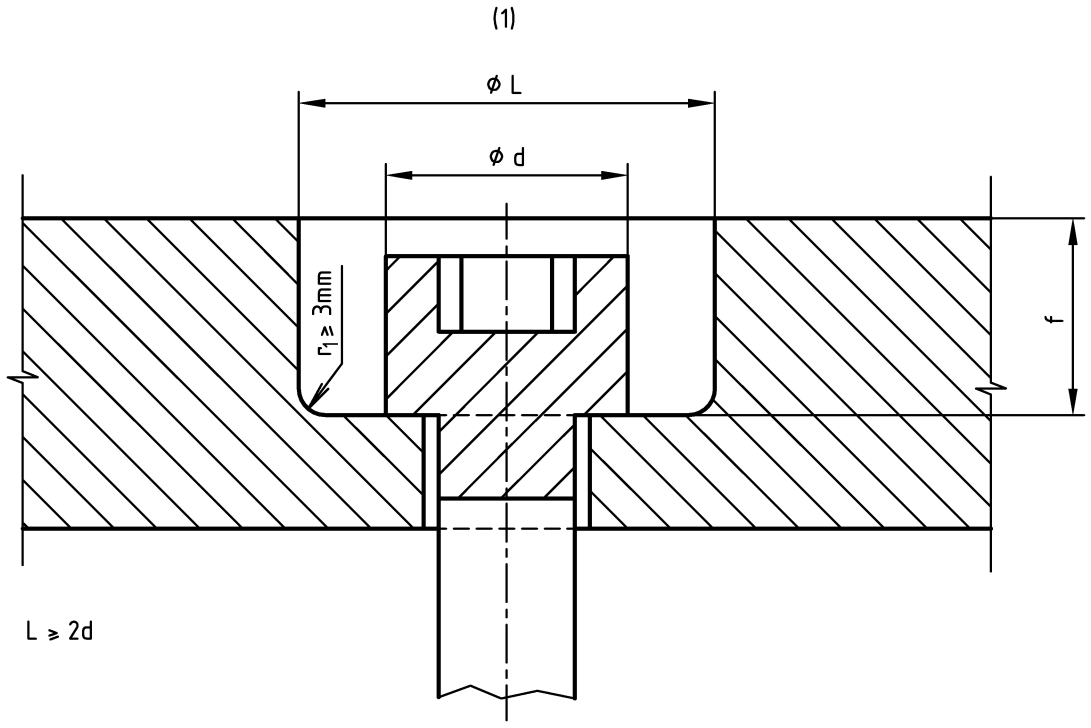
B.3.3.1 Fasteners for food area

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

B.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 the Figure B.16 and the manufacturer in his instruction handbook can prescribe suitable cleaning facilities;



Key

(1) food area

Figure B.16 — Spot-facing

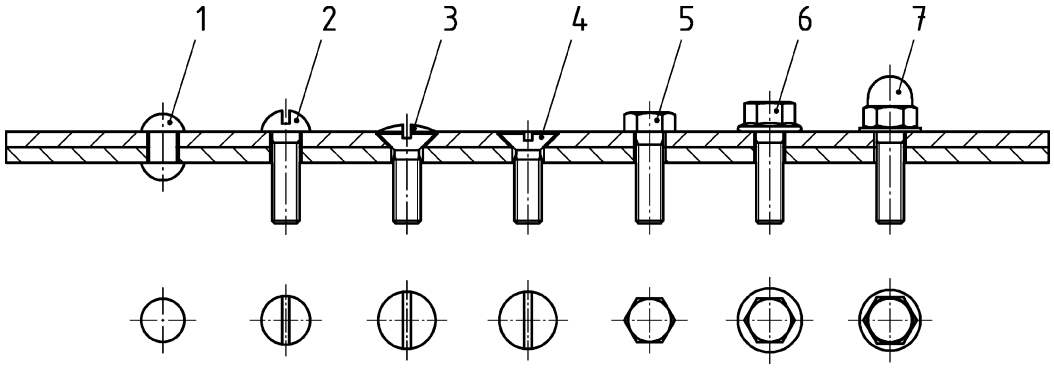
— or the manufacturer shall take the necessary steps to fill in the spot-face by sealed and lasting plugs corresponding to the requirements of the food area.

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

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



Key

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

Figure B.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 B.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.

B.3.3.3 Fasteners for non-food area

No particular requirements.

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

B.3.4.1 Table-top machines

B.3.4.1.1 Portable or tilting 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.

However, the equipment shall be provided with specific elements for the tilting movement to ensure stability in the tilted position (suitable feet, supporting means, etc.).The tilting procedure shall be clearly specified in the instruction handbook.

B.3.4.1.2 Non-portable and non-tilting table-top machines

The machines are provided either with feet or with a base.

To determine the minimum height (*H*) of the feet, the access distance (*P)* given in Table B.2 permitting the cleaning of the positioning surfaces shall be considered (see Figure B.18).

Table B.2 — Minimum height of the feet

Dimensions in millimetres

$P \leq 120$	$H \geq 50$
$120 < P \leq 500$	$H \geq 75$
$500 < P \leq 650$	$H \geq 100$
$P > 650$	$H \geq 150$

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.

Dimensions in millimetres

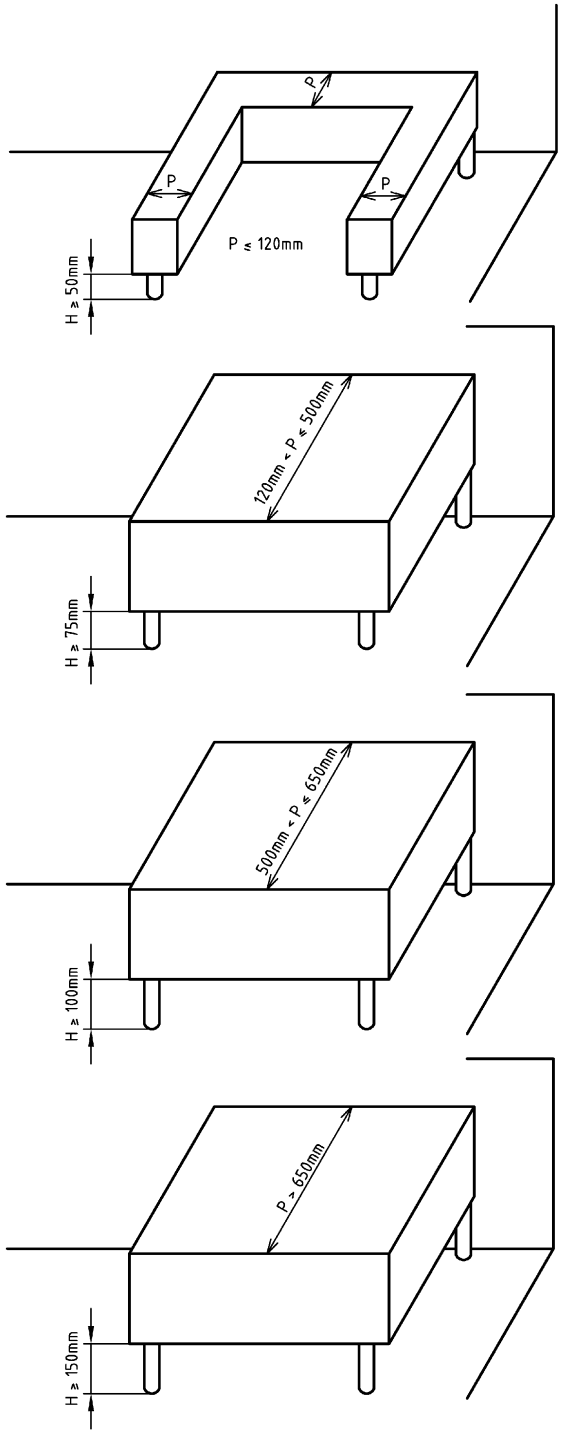


Figure B.18 — Table-top machines

B.3.4.2 Machines on the floor

B.3.4.2.1 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 B.19), or shall have their feet (*H*) higher than or equal to 150 mm.

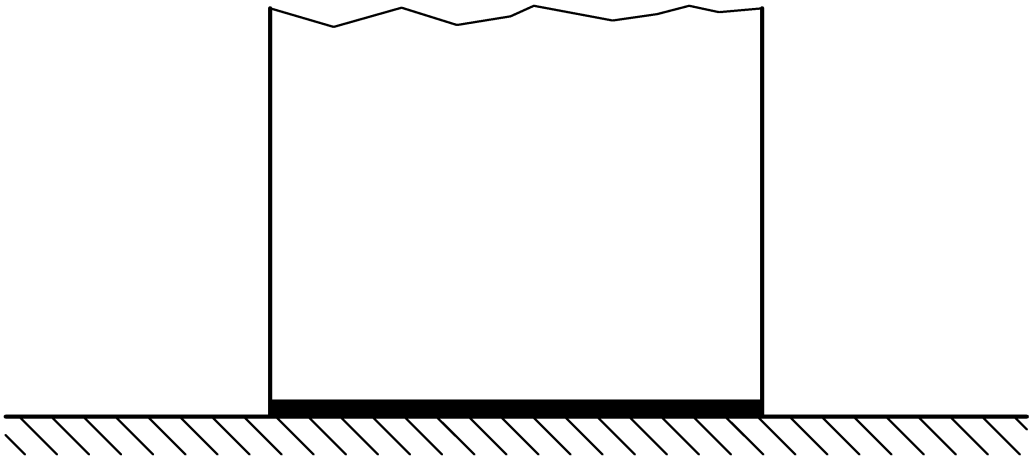


Figure B.19 — Machine standing on the floor

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 B.20).

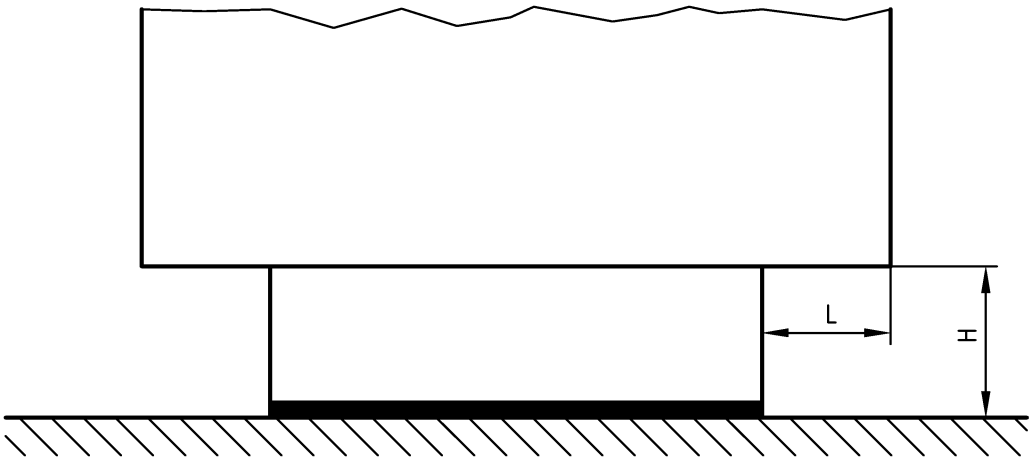


Figure B.20 — Machine with protrusion

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.21).

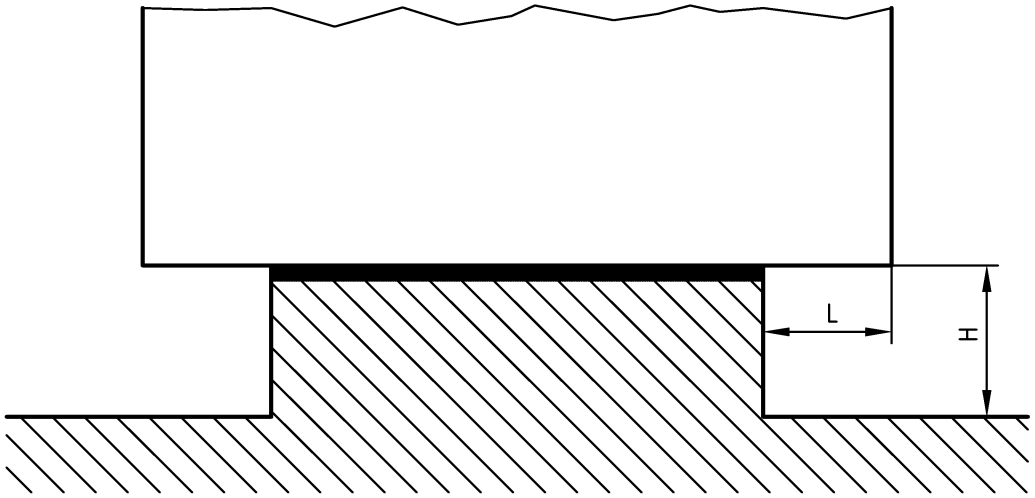
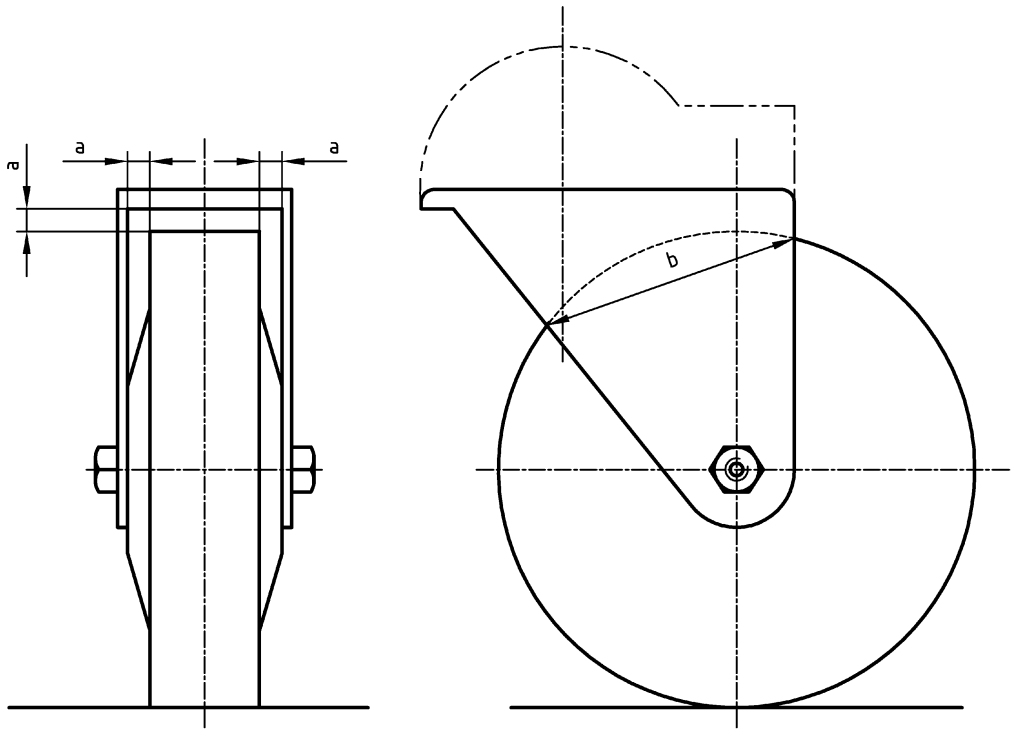


Figure B.21 — Machine with a base

B.3.4.2.2 Mobile machines

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

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.

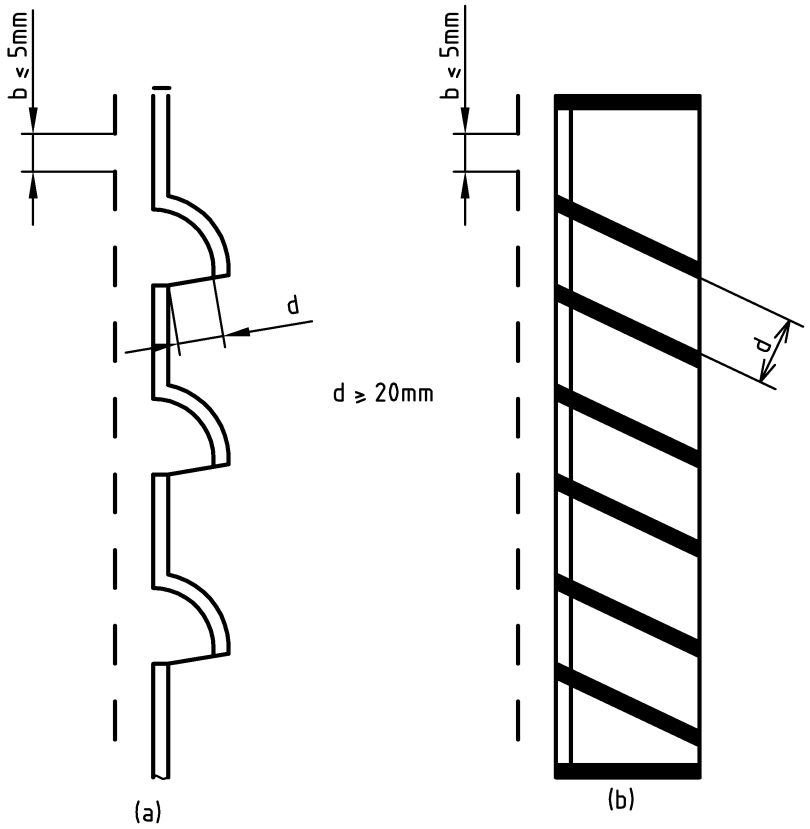


Figure B.23 — Ventilation openings for splash area

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 B.23).

B.3.6 Hinges

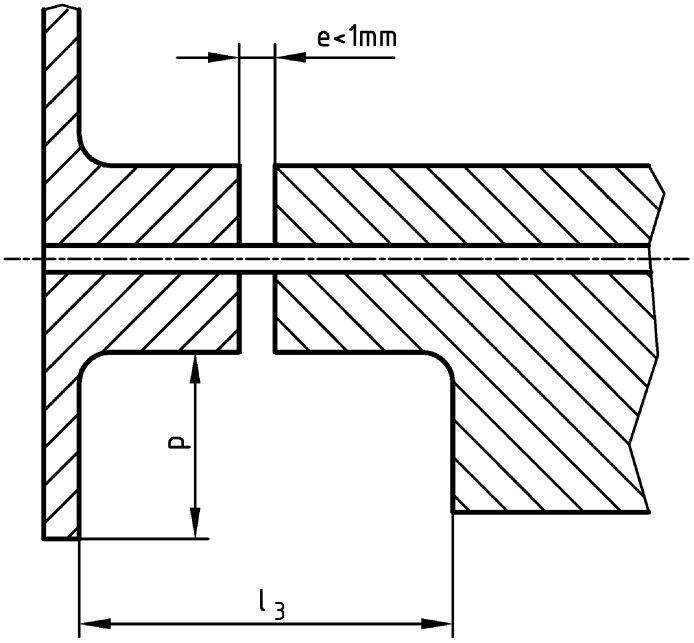
Whenever possible, the manufacturer shall eliminate swivel points from the food area.

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

— they shall be easily 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 (p). In no case this width (l_3) shall be less than 10 mm (see Figure B.24).



With: $l_3 \geq 2p$ and $l_3 > 10$ mm

Figure B.24 — Hinges

B.3.7 Control panel

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 whenever possible.

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.25);

— 12,5 mm if their height h is less than or equal to 8 mm (see Figure B.26).

If the above requirements cannot be complied with, controls shall be protected by a cap (see Figure B.27).

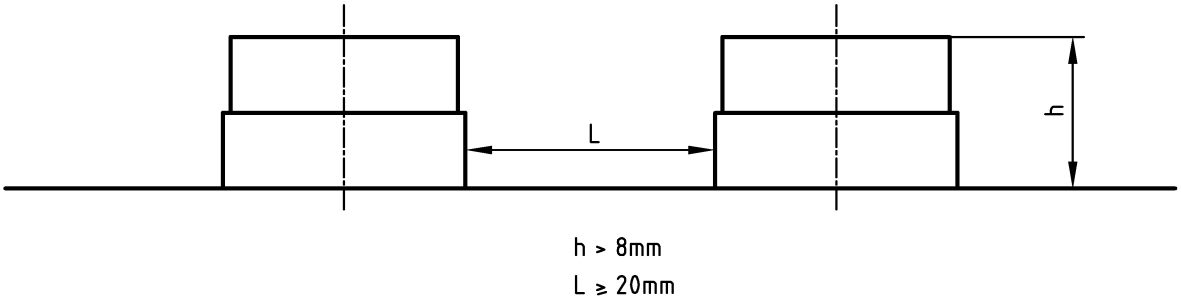


Figure B.25 — Control panel in the splash area with *h* > 8 mm

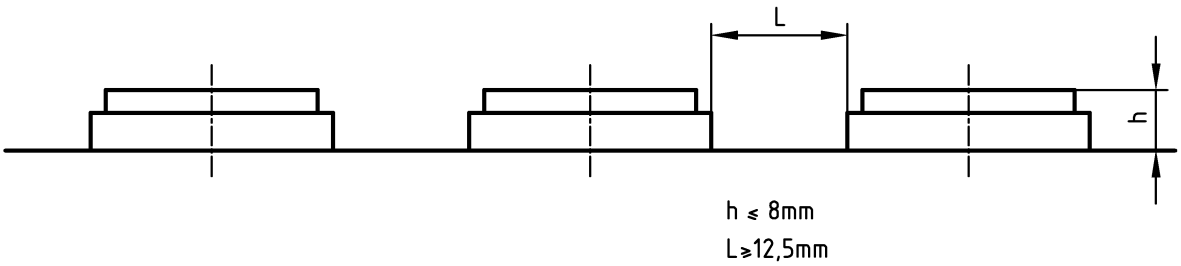


Figure B.26 — Control panel in the splash area with *h* ≤ 8 mm

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

Annex C
(informative)

Method of measuring dust

C.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.

C.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 mg/m^3. It is thus possible to follow the change in emission of flour above the dough mixer.

The test measures the respirable fraction (diameter < 8 µm) of the dust.

C.3 Operating conditions

Testing should be carried out in a room of volume at least of 100 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 dough 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 dough 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 dough mixer, measurements are then carried out during the kneading operation. 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 mg/m^3 against time elapsed in s.

The type of flour used should be reported.

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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