BS EN 12041:2014

BSI Standards Publication

Food processing machinery — Moulders — Safety and hygiene requirements

bsi.

...making excellence a habit.™

National foreword

This British Standard is the UK implementation of EN 12041:2014. It supersedes BS EN 12041:2000+A1:2009 which is withdrawn.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.

ISBN 978 0 580 76460 8

ICS 67.260

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

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

Amendments issued since publication

Date	Text affected

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 12041

November 2014

ICS 67.260

Supersedes EN 12041:2000+A1:2009

English Version

Food processing machinery - Moulders - Safety and hygiene requirements

Machines pour les produits alimentaires - Façonneuses - Prescriptions relatives à la sécurité et à l'hygiène

Nahrungsmittelmaschinen - Langwirkmaschinen - Sicherheits- und Hygieneanforderungen

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

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CEN member.

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

CEN members are the national standards bodies of Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and United Kingdom.

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

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

Contents

Page

Foreword

This document (EN 12041:2014) 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 12041:2000+A1:2009.

This document has been prepared under a Mandate given to CEN by the Commission of the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive(s).

For relationship with EU Directive(s), see informative Annex ZA, which is an integral part of this standard.

Significant changes:

The significant changes with respect to the previous edition EN 12041:2000+A1:2009 are listed below:

— normative references updated;

— addition of 3 new definitions: flattening, rolling and elongating;

— more detailed and clearer description of the moulders Type 2 and Type 3;

— increase of the safety distances;

— clauses/subclauses technically updated: 5.2.2 (zone 1 – feeding area), 5.2.4 (zone 4 – input and output devices), 5.3.2 (electromagnetic phenomena), 5.9 (ergonomic principles), Clause 6 (verifications), Clause 7 (information for use), Annex A (noise test code) and Annex B (principles of design);

— new subclauses: 5.2.5 (flour duster), 5.7 (protection against dust emission) and 7.1 (signals and warning);

— addition of the emergency stop: 5.5.

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 applies to the design and manufacture of moulders of the types described from 3.2.1 to 3.2.4 and illustrated in Figure 1 to Figure 3.

These moulders are used separately or in a line in the food industry and shops (pastry-making, bakeries, confectionery, etc.) for flattening, rolling and, but not necessarily, elongating pieces of dough. These machines can be fed by hand or mechanically.

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

1.2 This European Standard does not deal with:

— designs of moulder other than those described from 3.2.1 to 3.2.4;

— experimental and testing machines under development by the manufacturer;

— domestics appliances;

— bagel machines;

— additional hazards generated when the machine is used in a line;

— dough and pastry brakes (see EN 1674).

1.3 This document 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 619:2002+A1:2010, *Continuous handling equipment and systems — Safety and EMC requirements for equipment for mechanical handling of unit loads*

EN 894-4:2010, *Safety of machinery — Ergonomics requirements for the design of displays and control actuators — Part 4: Location and arrangement of displays and control actuators*

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

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

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

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

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

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

EN ISO 13850, *Safety of machinery — Emergency stop — Principles for design (ISO 13850)*

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 Term, definition and description

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
flattening
transformation of the lump of dough into a flat piece, the shape of which depends on the form of the lump; for instance a pre-rounded lump can be transformed into a round or oval shape disc

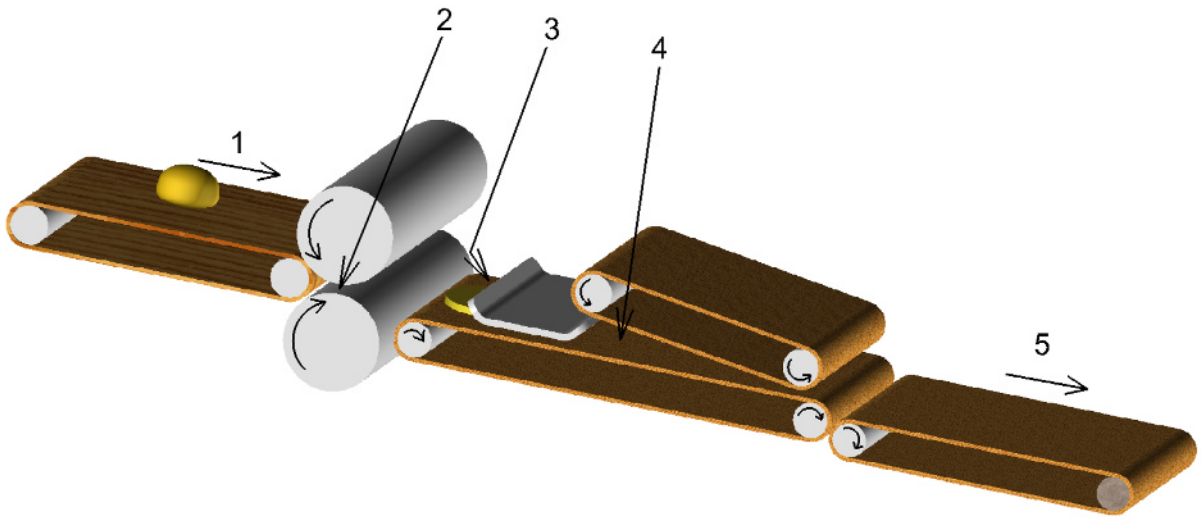
3.1.2
rolling
transformation of the flattened dough lump into a short cylindrical shape

3.1.3
elongating
transformation of a short cylindrical shape of dough into a long cylindrical shape

3.2 Description

3.2.1 General

Machines may be manually or automatically fed (for example by discharge conveyor from the intermediate prover, see Figure 1). Dough pieces are flattened between at least two cylinders (2), rolled between at least two surfaces (e.g. two moving belts, or one belt and a fixed plate, or one belt and a fixed band) (3), and, but not necessarily, elongated (4) in the same way (see Figure 1). Discharge may be manual or by conveyor. The machine can be equipped with a flour duster.



Key

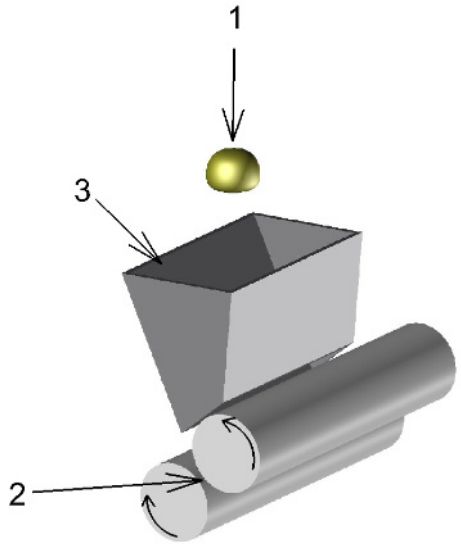
1 feeding (by belt)
2 flattening
3 rolling
4 elongating
5 discharge

Figure 1 — General principle

3.2.2 Type 1: Moulder with manual feeding by gravity

These machines are used mainly to produce long bread with soft dough (e.g. French baguette) (see Figure 2 and Figure 4).

NOTE Product quality depends on careful handling of the dough and in particular on manual introduction of the dough without any excessive drop.



Key

1 feeding

2 flattening

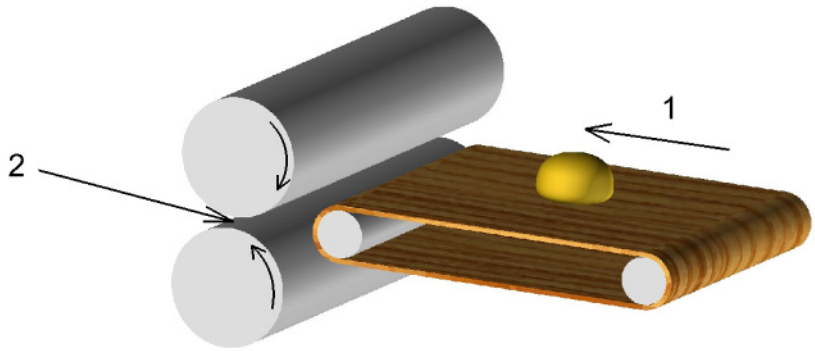
3 feed chute

Figure 2 — Feeding by gravity

3.2.3 Type 2: Compact moulder without elongating system and with feeding by belt

These machines without a specific elongating action are used mainly to produce rolled bread with soft or hard dough. The piece of dough is manually placed on the inlet conveyor belt (see Figure 2 and Figure 11) or can pass onto it by gravity, transfer, etc., from other machines (conveyor belts, intermediate provers, etc.), at different angles from the axes of cylinders in order to obtain several shapes of bread (e.g. banana, mantovane, barillini, bocconcini, etc.).

NOTE The flattened piece of dough is rolled by two counter-rotating belts, which are placed one over the other, divergent towards the outlet and with different linear speeds. When the rolled piece of dough comes out from the above said rolling belts, it passes to a rigid plate, which can be under the infeed belt or at the opposite side or at both sides (see the example shown in Figure 11), or to a conveyor belt (like the “discharge belt” (5) in Figure 1), different from the belts which carry out the dough rolling action.



Key

1 feeding

2 flattening

Figure 3 — Feeding by belt

3.2.4 Type 3: Moulder with elongating system and with feeding by belt

These machines are mainly suitable for producing large rolled bread (long loaves) laminating, rolling and elongating pieces of (usually) soft dough. The piece of dough is placed on the inlet conveyor belt (see Figure 3 and Figure 6) manually or can pass onto it by gravity, transfer etc. from other machines (conveyor belts, intermediate provers, etc.).

The machine can be equipped also with two bars between which the rolled dough pass during the elongation phase for limiting the length of the long loaves and flattening their ends (e.g. long loaves for tin bread).

The product outlet can be as described for the type-2 moulder; it can also fall by gravity in a special container (e.g. long loaves for tin bread).

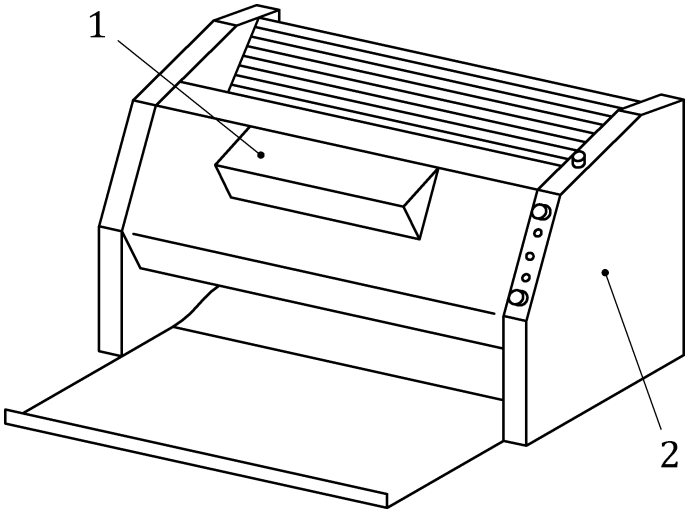
4 List of significant hazards

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).

Figures 4, 5 and 6 show the danger zones.

Table 1 –List of significant hazards

Hazards, hazardous situations and hazardous events	Location or cause	Clause/subclause in this European Standard
Mechanical hazards (see Figures 4, 5 and 6)		5.2
— drawing-in and crushing	Zone 1 – Feeding area (hazardous inrunning nips)	
— trapping, shearing and entanglement	Zone 2 – Drive mechanism	
— drawing-in and crushing	Zone 3 – Input and output devices (hazardous inrunning nips)	
Electrical hazards	Electric shock from direct or indirect contact with live components Electromagnetic disturbance External influences on electrical equipment (e.g. cleaning with water)	5.3 5.3 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

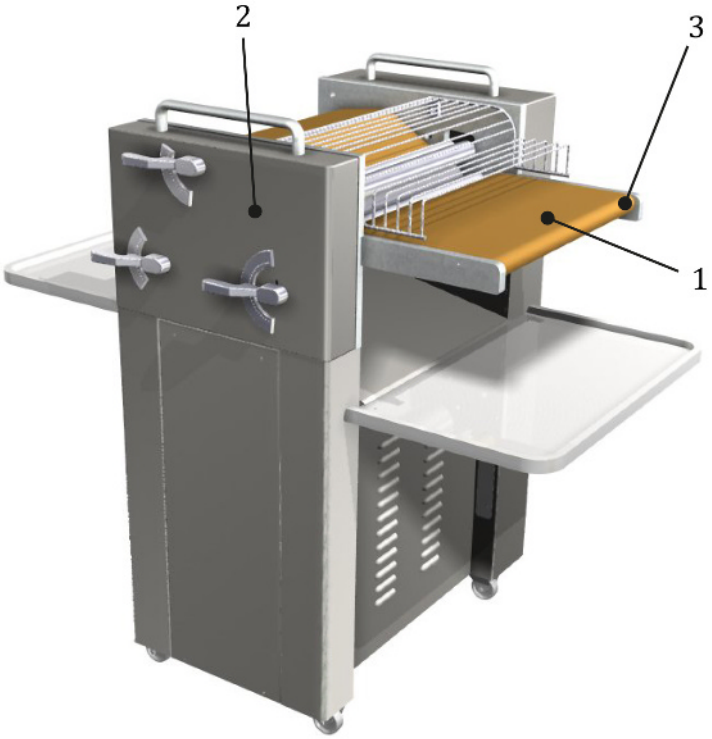


Key

1 zone 1 – feeding area

2 zone 2 – drive mechanism

Figure 4 — Danger zones of type 1 moulders



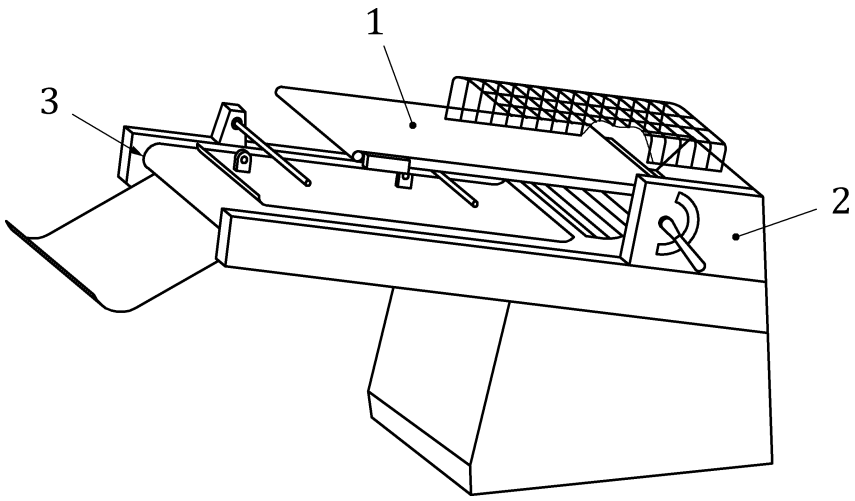
Key

1 zone 1 – feeding area

2 zone 2 – drive mechanism

3 zone 3 – input and output devices

Figure 5 — Danger zones of a type 2 moulder



Key

1 zone 1 – feeding area

2 zone 2 – drive mechanism

3 zone 3 – input and output devices

Figure 6 — Danger zones of a type 3 moulder

5 Safety and hygiene requirements and/or 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

Where reference is made to interlocking devices throughout Clause 5, they can be interlocked without guard locking and shall comply with EN ISO 14119:2013, Clauses 5, 7 and 8.

Where the interlocking mechanism has movable parts, e.g. position switches, these shall be protected from contamination with dough or dry ingredients, e.g. by mounting them within the machine body.

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

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.

The stopping time of the machine, when protective devices (e.g. interlocking guards, trip device) are actuated, shall be less than or equal to 1 s from their actuation. Restarting shall only be possible by actuating the starting control.

5.2.2 Zone 1: Feeding area

5.2.2.1 General

Access to the hazard zone (gap between the rollers) shall be prevented.

Moulders shall be equipped with an interlocking guard and/or a device preventing the introduction of the hand into the danger zone through the feeding devices (see 5.2.2.2 and 5.2.2.3).

The surface of the rollers shall be smooth and without groove or crevice, except for the Type 3 moulder.

5.2.2.2 Type 1: manual feeding by gravity

Restricting access to zone 1 shall be achieved by means of one of the following devices:

— a mechanical device with dimensions according to Figure 7;

— a feed chute which acts as a tripping device (see Figure 8);

— a feed chute with a tripping device (e.g. a pressure sensitive bar, a pressure sensitive edge) at the top of the hopper (see Figure 9).

The upper edge of the feed chute shall be at a minimum distance of 230 mm of the hazard zone (see Figure 8 and Figure 9).

The distance between the upper edge of the feed chute and the trip device shall be less than 20 mm (see Figure 8 and Figure 9).

The trip device shall be actuated between the resting position and the upper edge of the feed chute (see Figure 8 and Figure 9).

The width of the upper opening of the feed chute shall be less than or equal to 160 mm.

The distance between the upper edge of the feed chute and the floor shall be more than or equal to 1 400 mm. For machines that are too small to be placed directly on the floor (e.g. machines standing on a table), this requirement shall be specified in the instruction handbook (see 7.3).

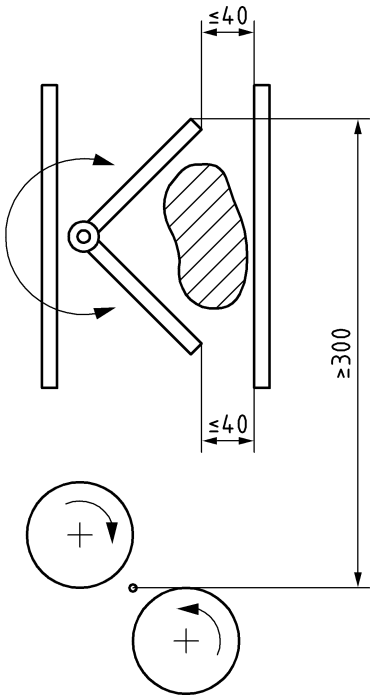


Figure 7 — Feed chute with mechanical device

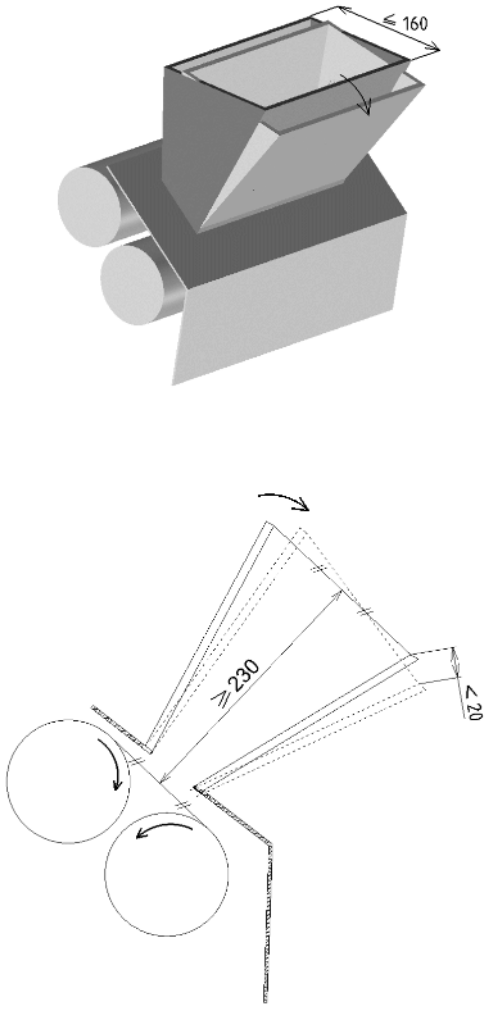


Figure 8 — Feed chute which acts itself as a tripping device

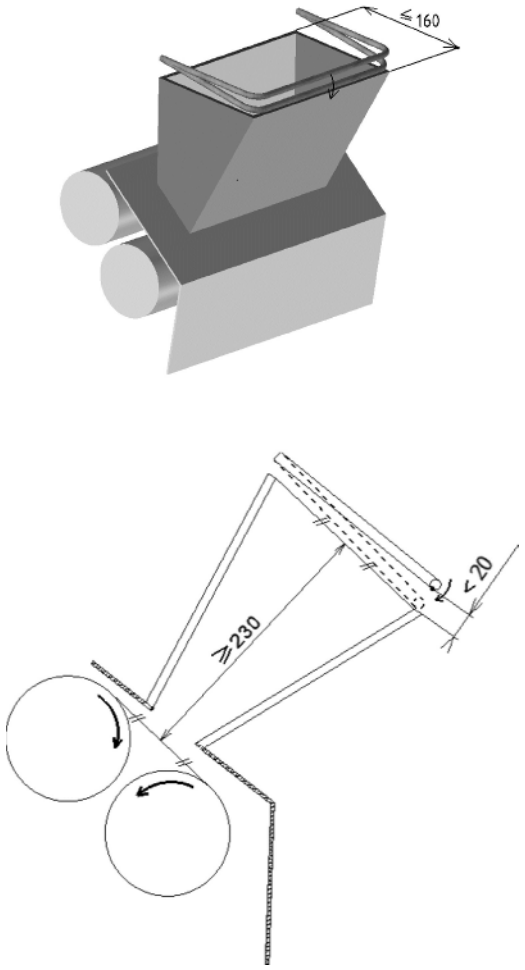


Figure 9 — Fixed feed chute with a pressure sensitive bar

5.2.2.3 Type 2: compact moulder without elongating system and with feeding by belt

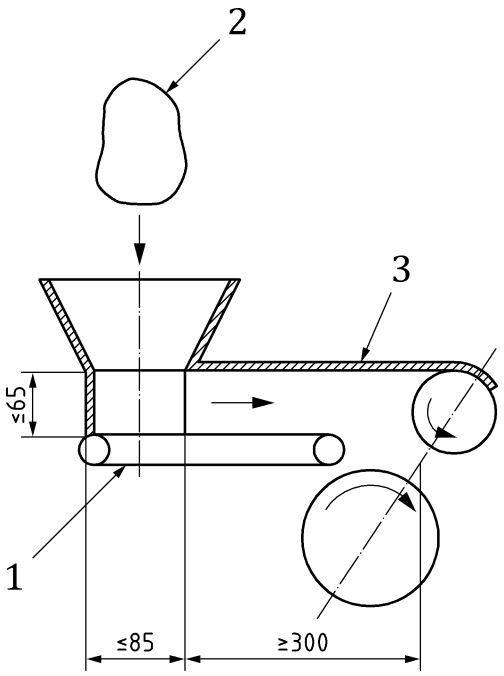
Access to the rollers shall be prevented. This may be achieved by the provision of:

— a fixed feed guard (e.g. feed tunnel) on the conveyor, see EN ISO 13857:2008, Table 4;

— an impeding device on the conveyors: a fixed or an interlocked feed chute/chicane with the dimensions given in Figure 10;

— a movable interlocking guard acting as a trip device (see Figure 11).

The guard shall comply with Table 2 and be free to move vertically or near vertically at the feed opening. Openings in the guard shall comply with EN ISO 13857:2008, Table 4, except for the feeding opening.



Key

1 belt

2 piece of dough

3 chicane

Figure 10 — Feed chute with feed tunnel

Table 2 — Dimensions of the interlocking guard for type 2 moulders

Dimensions in millimetres

A max.	70	75	80	85	90	95	100	105	110
B min.	250	270	290	310	330	350	370	390	410
C min.	100								
E	See EN ISO 13857:2008, Table 4.								

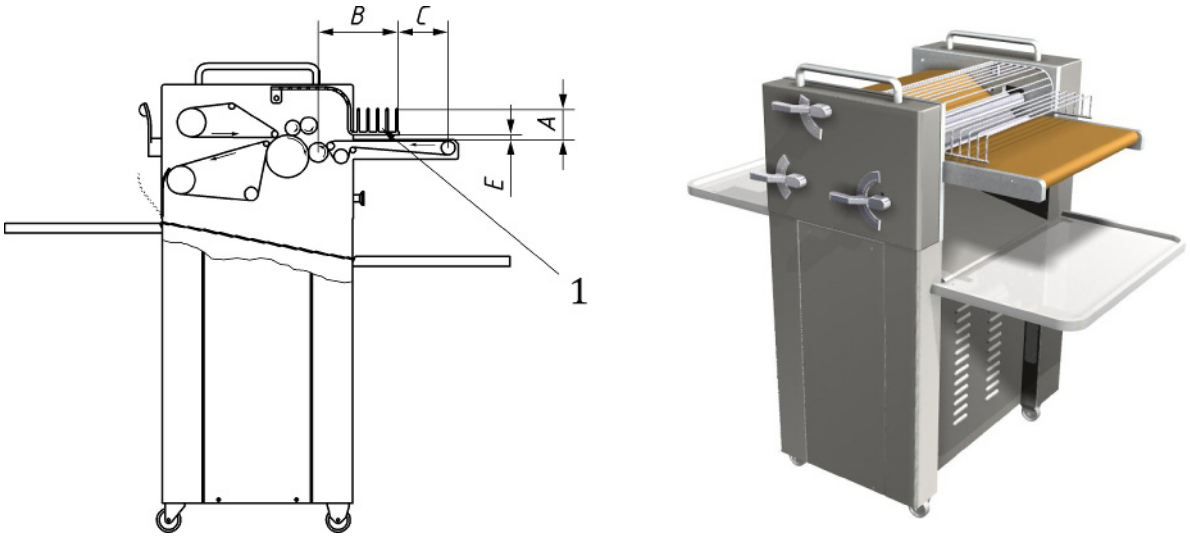
Where:

A: distance between the belt and the front opening of the guard when the interlocking device actuates;

B: the shortest distance between the edge of the guard and the vertical plane through the axis of the nearest roller;

C: distance between the edge of the guard and the vertical plane through the axis of the front roller of the belt;

E: distance between the lower edge of the guard and the conveyor belt.



Key

1 trip device

Figure 11 — Type 2 moulders

5.2.2.4 Type 3: Moulder with elongating system and with feeding by belt

Access to the rollers shall be prevented. This may be achieved by the provision of:

— a fixed feed guard (e.g. feed tunnel) on the conveyor, see EN ISO 13857:2008, Table 4;

— an impeding device on the conveyors: a fixed or an interlocked feed chute/chicane with the dimensions given in Figure 10;

— a movable interlocking guard acting as a trip device (see Figure 12).

The guard shall comply with Table 3 and be free to move vertically or near vertically at the feed opening. Openings in the guard shall comply with EN ISO 13857:2008, Table 4, except for the feeding opening.

Table 3 — Dimensions of the interlocking guard for type 3 moulders

Dimensions in millimetres

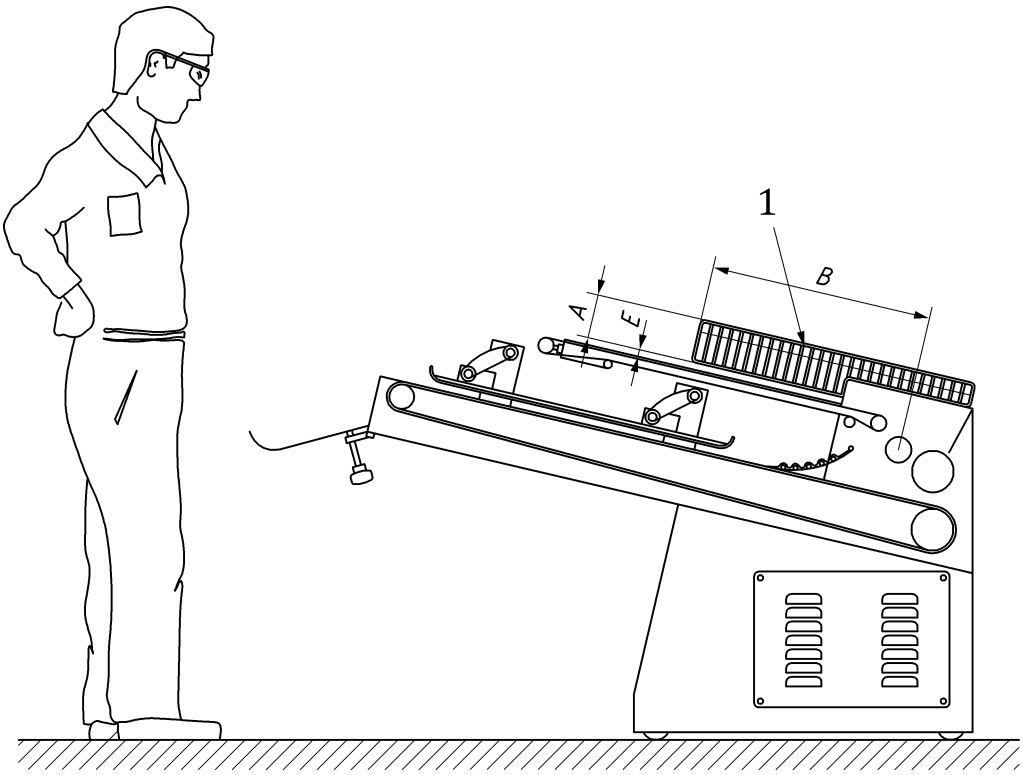
A max.	40	45	50	55	60	65	70	105	140
B min.	230	250	300	350	400	450	500	550	600
E	See EN ISO 13857:2008, Table 4.								

Where:

A: distance between the table and the front opening of the guard when the interlocking device actuates;

B: the shortest distance between the edge of the guard and the vertical plane through the axis of the nearest roller;

E: distance between the lower edge of the guard and the conveyor belt.



Key

1 movable interlocking guard

Figure 12 — Type 3 moulders

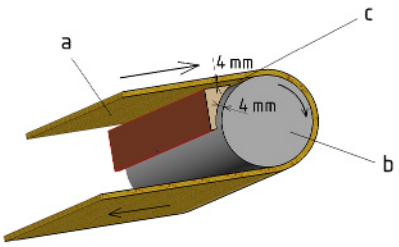
5.2.3 Zone 2 – Drive mechanism

The drive mechanism shall be protected by a fixed or interlocking guard.

5.2.4 Zone 3 – Input and output devices (hazardous inrunning nips)

If there is hazard with inrunning nips, nip points shall be safeguarded with fixed guards. An example is shown in Figure 13, they shall be safeguarded in accordance with EN 619:2002+A1:2010, 5.1.3.2.

The distance between the belt and the fixed guard of the machine and between the roller and the guard shall be less than or equal to 4 mm.



Key

a discharge belt

b roller

c inrunning nip

Figure 13 — Inrunning nip on a discharge belt

5.2.5 Flour duster

If there are mechanical risks, the flour containers shall be fitted with a fixed or interlocked guard with dimensions according to EN ISO 13857:2008, Table 4, acting on the flour feed system. If the stopping time of the flour duster is more than 1 s, the movable guard shall be interlocked with guard locking.

If there are no mechanical hazards (e.g. if the feed consists of a spindle with rubber spokes or notches, or if the flour is sprinkled by a vibrating device) due to the flour feed system and if a guard is necessary to prevent dust emission (see 5.7), this guard shall automatically be closed (e.g. by gravity, etc.). In this case, an interlocked guard is not necessary.

5.2.6 Loss of stability

5.2.6.1 Machines shall be designed to be stable and shall comply with 5.2.6.2 and 5.2.6.3. 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 have at least two castors (or sets of castors) fitted with a locking device, and shall comply with the provisions of 5.2.6.2.

5.3 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 to 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

An emergency stop device according to EN ISO 13850 is required. Stopping category 0 according to EN 60204-1:2006, 9.2.2, is required.

5.6 Noise reduction

Moulders 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.

5.7 Protection against dust emission

Means shall be provided to prevent flour from spilling onto the floor, for example a collecting device for flour below the rear end of the outlet conveyor, if exist.

If a flour duster is used to sprinkle special types of dough, the following shall be provided:

— a guard according to 5.2.5;

— automatic stop of the flour duster when the machine stops;

— maximum height of 50 mm of the underside of the flour duster above the height of the largest dough pieces as specified in the instruction handbook.

5.8 Hygiene requirements

Moulders 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 Figures 14, 15 and 16 and are in general at least as follows:

a) food area:

1) the surfaces of the rollers;

2) the surfaces of the scraping devices;

3) the surfaces of the input/output tables or conveyor belts;

4) the guards (the whole guard when made of bars, the inside face when the guard is solid);

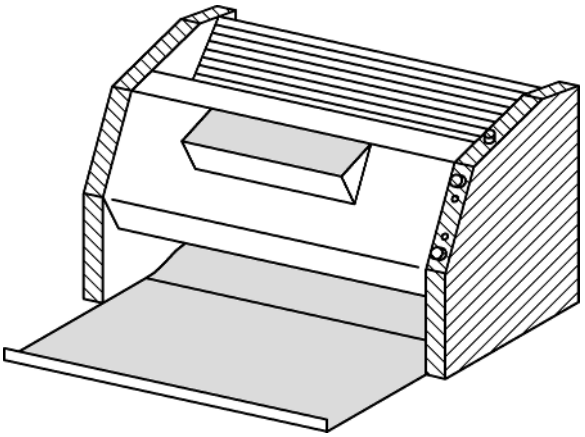
b) splash area:

1) The splash area includes the side and internal parts of the base, the outside of the solid guards;

c) non-food area:

1) The non-food area included all areas which have not been mentioned above.

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



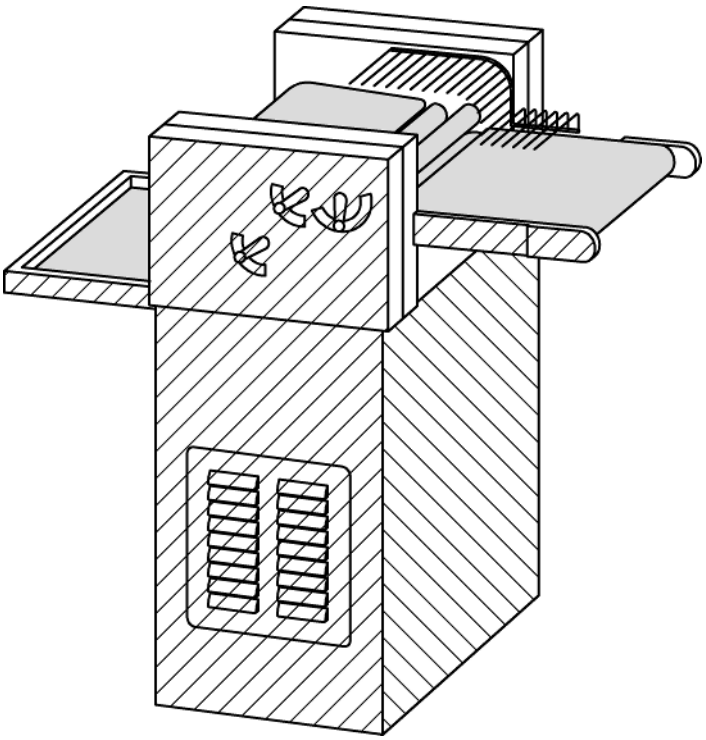
Key

food area

splash area

non-food area

Figure 14 — Type 1 moulder



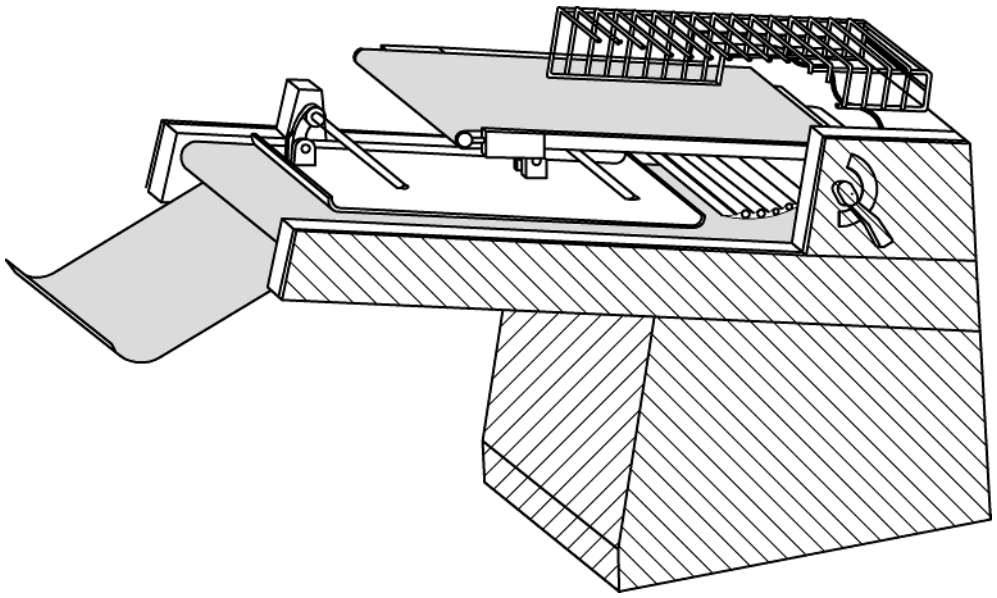
Key

food area

splash area

non-food area

Figure 15 — Type 2 moulder



Key

food area

splash area

non-food area

Figure 16 — Type 3 moulder

5.9 Ergonomic principles

For hand-fed machines the manufacturer shall pay particular attention to the ergonomic aspects of the loading of pieces of dough and define procedures for facilitating the loading and avoid awkward body postures (e.g. hand feeding at a height more than 1,6 m).

Where unloading is manual, the manufacturer shall pay particular attention to the ergonomic aspects and define procedures for facilitating the discharge of the dough roll and avoid awkward body postures (e.g. unloading at a height less than 800 mm).

Awkward body postures shall be avoided during maintenance and cleaning (e.g. platform, etc.).

Control devices shall be placed within proper reach distance for the operator as stated in EN 894-4:2010, 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 measurement, 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 — Verification

Relevant clause	Safety and hygiene requirements	Method of verification
5.2.1	Performance level	By calculation
	Stopping time	By measurement
	Fixed guards	By inspection
5.2.2	Interlocking guard	By functional test
	Safety distances	By measurement
	Stopping device	By functional test
5.2.3	Drive mechanism	By inspection and functional test
5.2.4	Input and output devices	By inspection and measurement
5.2.5	Flour duster	By inspection
5.2.6	Loss of stability	For free standing machines, when the machine is tilted by 10°, it shall remain stable
5.3	Electrical hazards	By tests given in EN 60204–1:2006, Clause 18 a), b) and f)
5.4	Motor enclosure	By inspection
5.5	Emergency stop	By visual inspection
5.6	Noise reduction and noise declaration	By measurement according to Annex A
5.7	Protection against dust emission	By inspection and measurement
5.8	Hygiene	In accordance with EN 1672–2:2005+A1:2009, Clause 6 and Annex B of this standard
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.

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 Signals and warning

Clearly visible and permanent warning signs with appropriate dimensions according to EN 61310-1 shall be fitted to warn the operator about residual risk (drawing-in and crushing fingers between the rollers if the stopping device is not actuated) according to Figure 17 (see also 5.2.2.2 and 5.2.2.3).

Figure 17 — Warning signs

7.3 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) instructions for handling, transportation, storage, installation, starting up and operation;

b) the provisions for cleaning and maintenance: 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 a plastic scraper, a professional vacuum cleaner,… Metallic implements are not recommended);

c) information warning the user about the risk of dust. In particular, the machine instruction handbook shall include methods of loading to minimize dust emission during flouring (for example: ingredients with known health risks should be listed, e.g. flour, and the need to consult suppliers' hazard data sheets should be highlighted);

d) information warning the user about repetitive work (see EN 614-1:2006+A1:2009, Annex A) that may be avoided by use of automatic loading device;

e) the values of forces at fixing points if the machine is fixed;

f) the value of the overcurrent protective device in the case of machines covered by 5.3.4;

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

h) the nature and frequency of checks on the operation of stopping devices;

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

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

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

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

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

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;

r) height of the largest dough pieces;

s) in the case of machinery that is too small to be placed directly on the floor (e.g. machinery standing on a table): information to the user that the distance between the upper edge of the feed chute and the floor shall be more than or equal to 1 400 mm (see 5.2.2.2).

7.4 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[1)];

— designation of series or type;

— serial number if any;

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

— rating information (mandatory for electrical products: voltage, frequency, power,…);

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

Annex A
(normative)

Noise test code – Grade 2 of accuracy

A.1 Installation and mounting conditions

The test environment suitable for the measurement of the emission sound pressure level shall be a flat outdoor area (for example a car park) or an indoor space that provides an essentially free field over a reflecting plane. This test environment shall be in accordance with the requirements given in EN ISO 3744:2010, Annex A.

Care shall be taken to ensure that any electrical conduits, piping or air ducts which are connected to the machinery do not radiate significant amounts of sound energy thus influencing the determination of the noise emission values of the machine under test. It shall comply with the requirements stated in EN ISO 11201:2010, 5.2.2, grade 2.

A.2 Operating conditions

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

— the machine shall be empty;

— it shall operate at its maximum speed.

A.3 Emission sound pressure level determination

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

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

The measurement shall be done in the normal work station of the operator without the operator:

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

— 0,20 m ± 0,02 m in front of the control board of the machine.

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

A.4 Measurement uncertainties

The total measurement uncertainty of the emission sound pressure level 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 method in EN ISO 11201.

NOTE 1 For moulders a rather constant noise emission with a value of 0,5 dB for σ_{omc} is expected for the proposed operating condition for measurement.

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

NOTE 3 The expanded measurement uncertainty *U*, in decibels, is 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.5 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.6 Information to be reported

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

As a minimum, the following information shall be included:

— 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;

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

— the A-weighted emission sound pressure level at workstation plus its uncertainty.

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.7 Declaration and verification of noise emission values

The declaration of the noise emission value shall be made as a dual number noise emission declaration according to EN ISO 4871:2009.

It shall declare the value of the emission sound pressure level L_{pA} and the respective uncertainty K_{pA} according to Clause 7 of this standard.

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

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

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

Annex B
(normative)

Principles of design to ensure the cleanability of moulders

B.1 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.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) (see EN ISO 4287) shall comply with the values given in Tables B.1 and B.2.

Table B.1 — Surface condition for food area

Values in micrometres

Technique of construction	Roughness (R_z)
Drawn – rolled – spun	≤ 34
Moulded – cast	≤ 40
Machined	≤ 34
Injected - metal - plastics	≤ 34 ≤ 34
Textiles - woven - non woven	According to manufacturer cleaning specifications
Netting-nets-perforated metal	According to manufacturer cleaning specifications
Coating - paint (test reservation) - plastics (test reservation) - glass - metal (test reservation)	≤ 22 ≤ 22 ≤ 22 ≤ 22

Table B.2 — Surface condition for splash area

Values in micrometres

Technique of construction	Roughness (R_z)
Drawn – rolled – spun	≤ 40
Moulded – cast	≤ 54
Machined	≤ 54
Injected - metals - plastic	≤ 54 ≤ 54
Netting-nets-perforated metal	According to manufacturer cleaning specifications
Coating - paint - plastics - glass - metal	≤ 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.

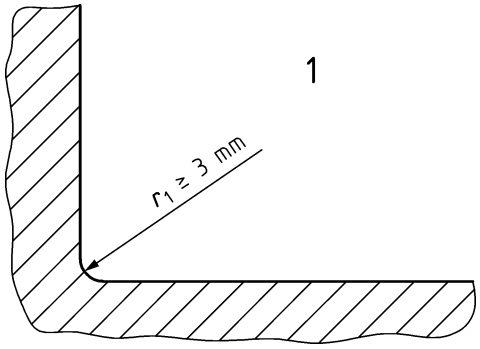
Two surfaces shall be connected according to:

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, foundry patterns, injection and blasting…) (see Figure B.1);

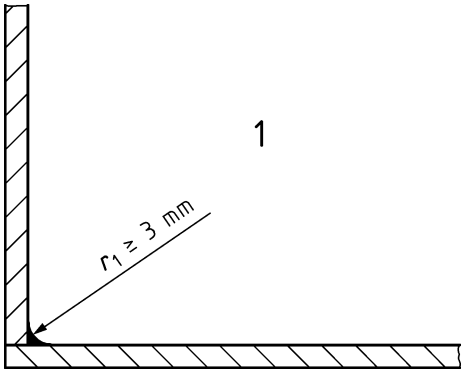


Key

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).

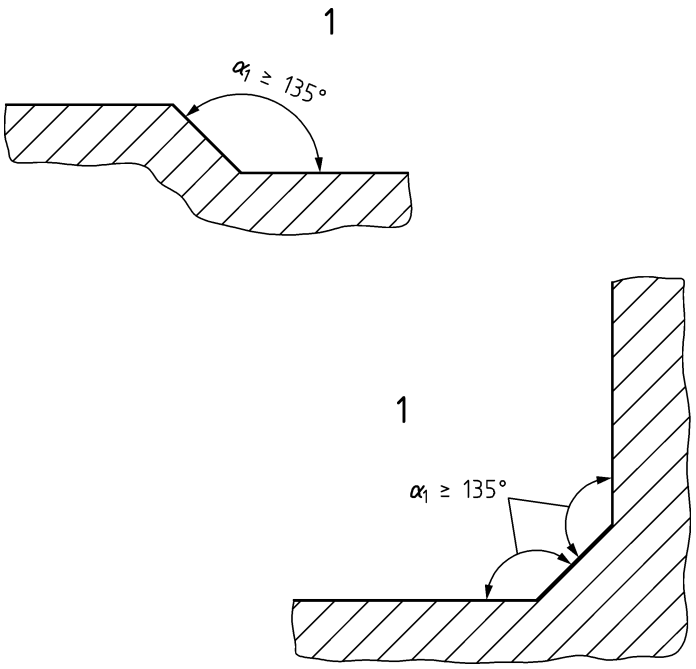


Key

1 food area

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

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

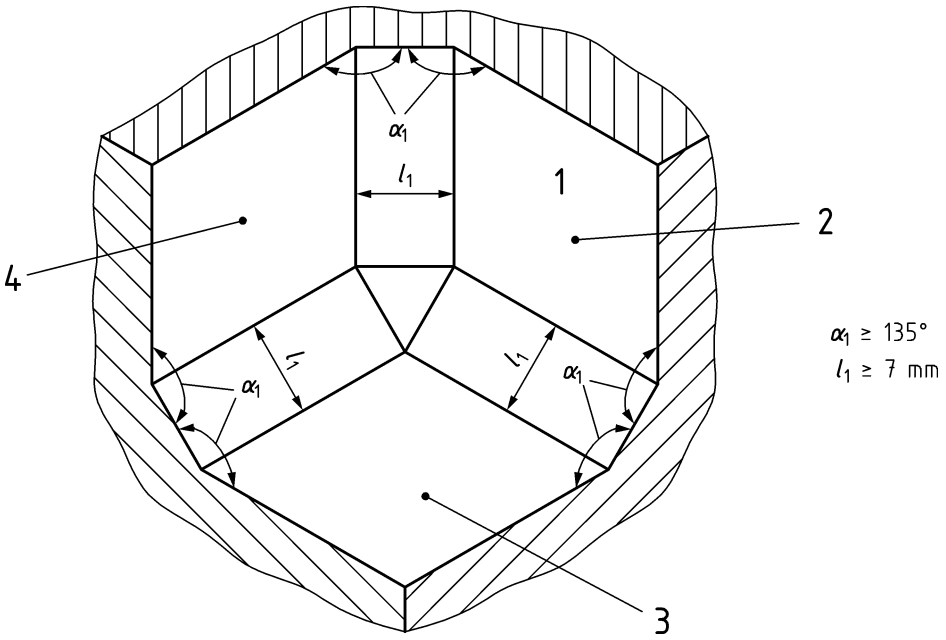
1 food area

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

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



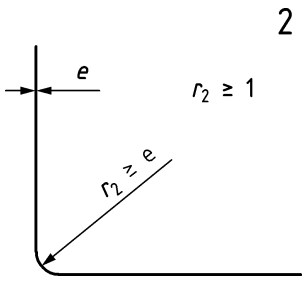
Key

1	food area
2, 3 and 4	plans

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).

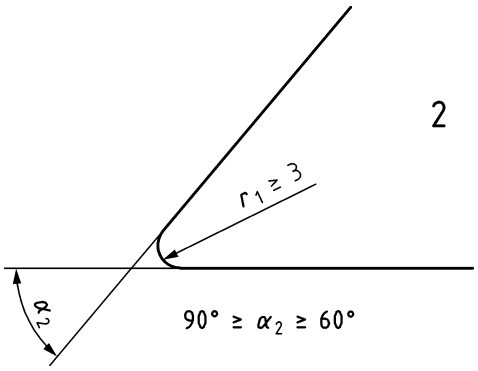


Key

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).

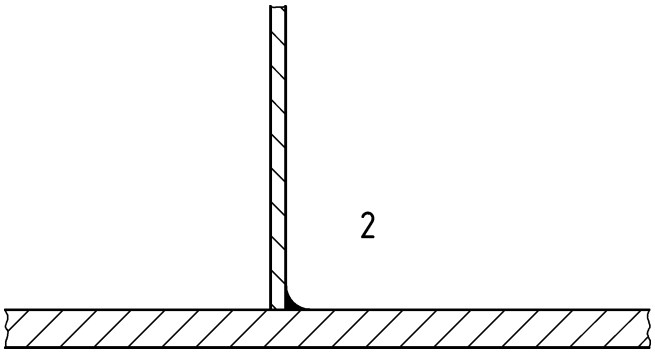


Key

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 requirement.

B.3.2 Surface assemblies and overlaps

B.3.2.1 General

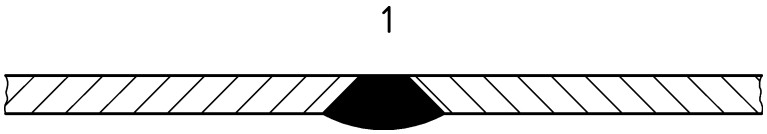
The sheet metal assembly methods shall take into account expansion and contraction due to temperature variations.

B.3.2.2 Surface assemblies and overlaps for food area

B.3.2.2.1 Surface assembly

Assembled surfaces are considered joined either:

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

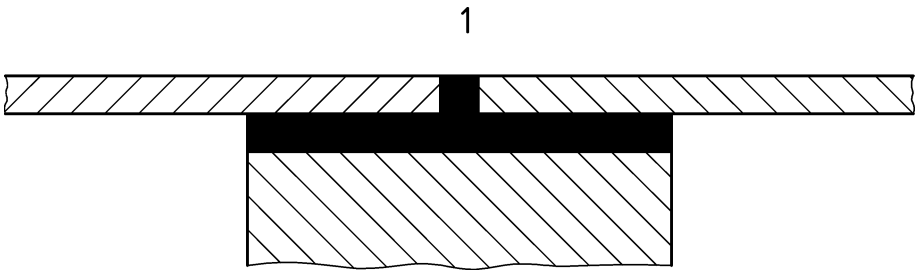


Key

1 food area

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

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



Key

1 food area

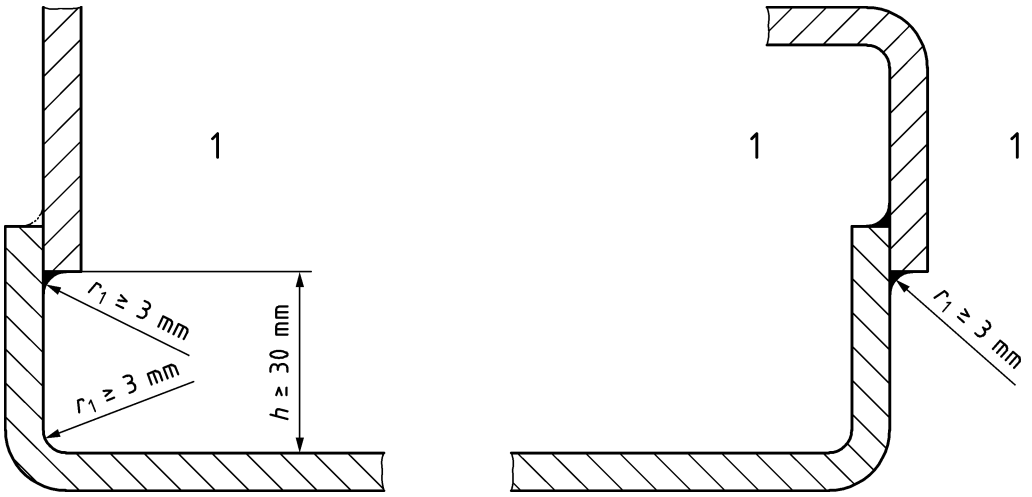
Figure B.9 — Surface assemblies for food area (sealed)

B.3.2.2.2 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).

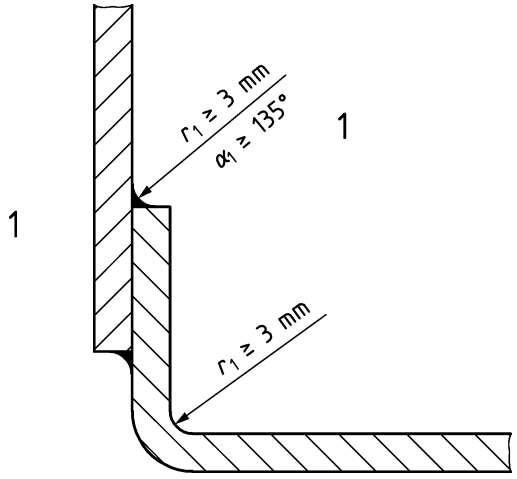


Key

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).



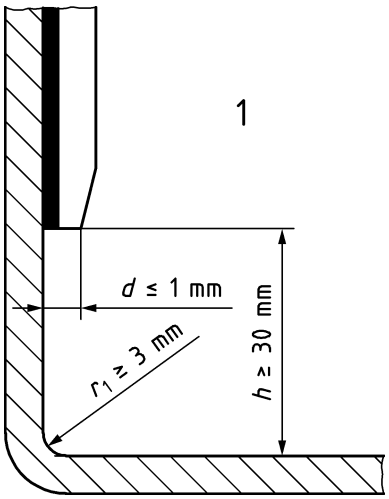
Key

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)

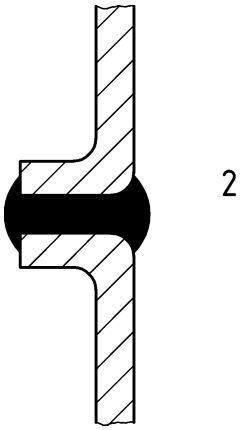
B.3.2.3 Surface assemblies and overlaps for splash area

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 B.13)

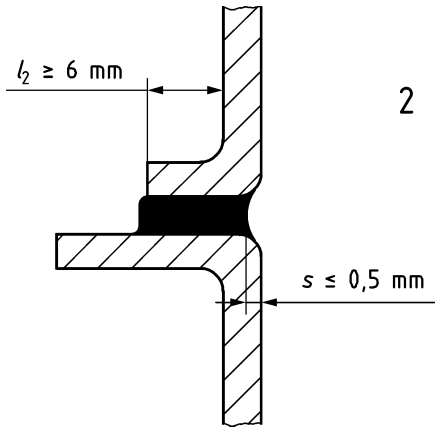
2) by flush bonding (the folds of the part used for bonding shall have a flange length (l_2) greater than 6 mm and the flash of the bond shall not have a shrinkage (s) more than 0,5 mm), (see Figure B.14).



Key

2 splash area

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

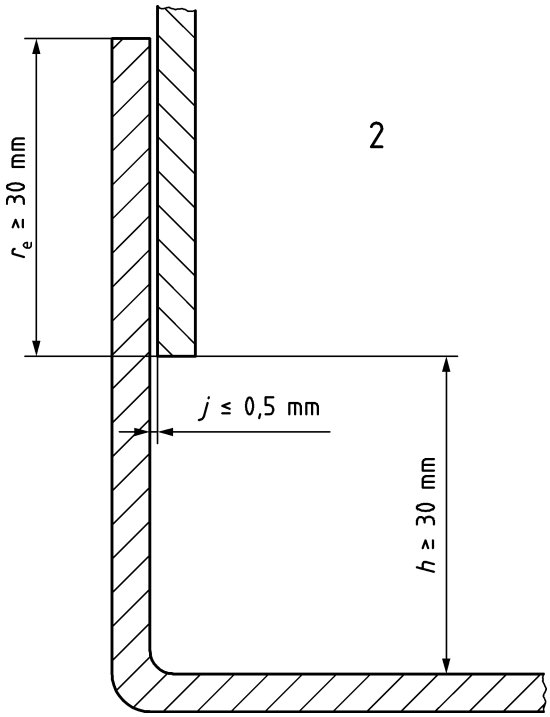


Key

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 capillarity (see Figure B.15).



Key

2 splash area

Figure B.15 — Surface overlapping for splash area

B.3.2.4 Surface assemblies and overlaps for non-food area

No particular requirements.

B.3.3 Fasteners

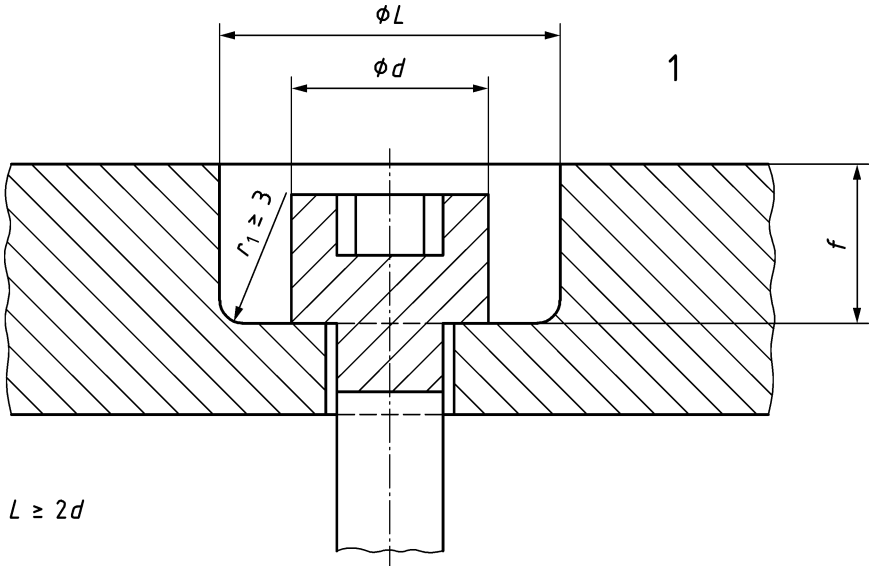
B.3.3.1 Fasteners for food area

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



Key

1 food area

Figure B.16 — Spot-facing

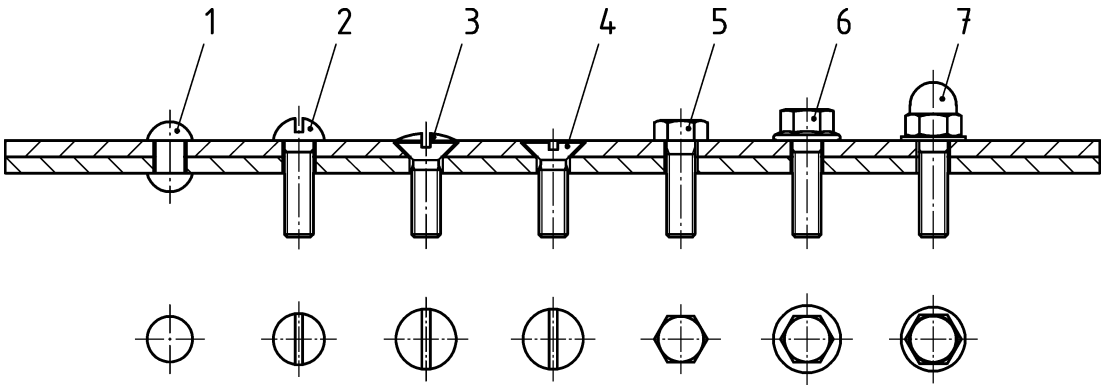
— or the manufacturer shall take the necessary steps to fill in the spot-face by sealed and lasting plugs corresponding to the requirements of the food area.

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 shall be easily cleaned and shall be chosen from those illustrated in 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 the 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 requirement.

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

B.3.4.1 Non-portable and non-tilting 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.3 permitting the cleaning of the positioning surfaces shall be considered (see Figure B.18).

Table B.3 — Minimum height of the feet

Dimensions in millimetres

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

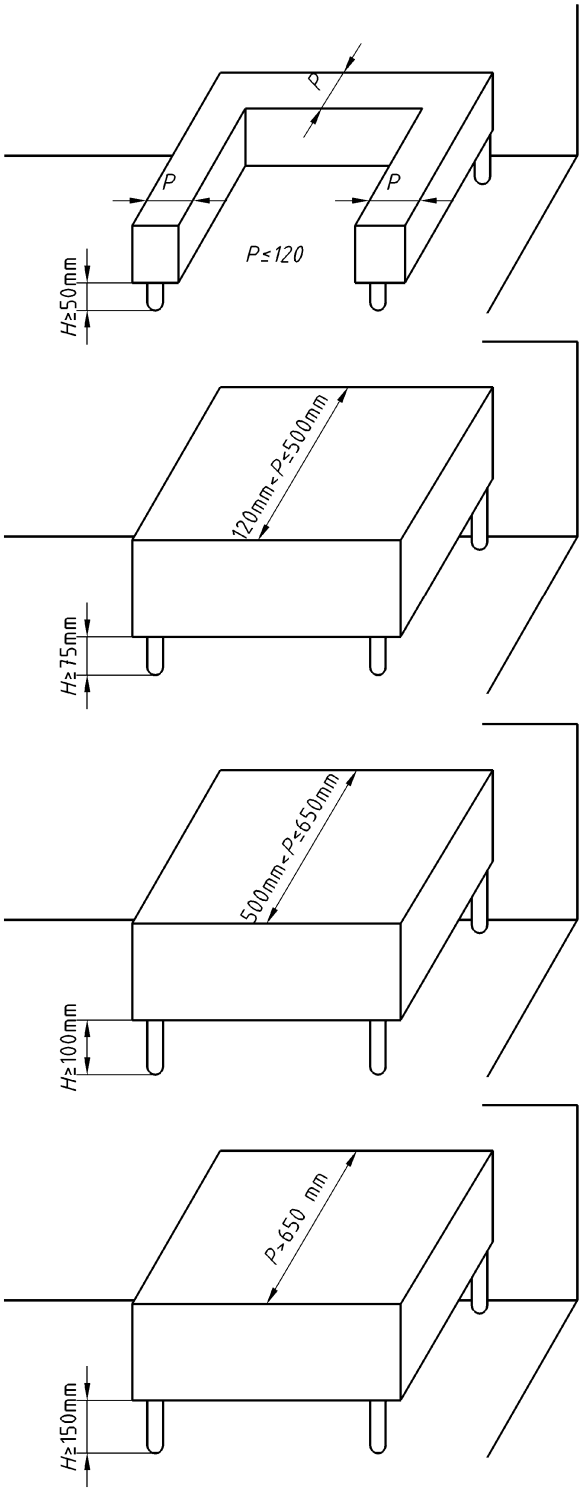


Figure B.18 — Dimensions of the base and the feet

— If the machine has no feet or base, it shall be placed on a working table or an intermediate prover with an interposed continuous and sealed joint.

The instruction handbook shall specify the jointing method.

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.

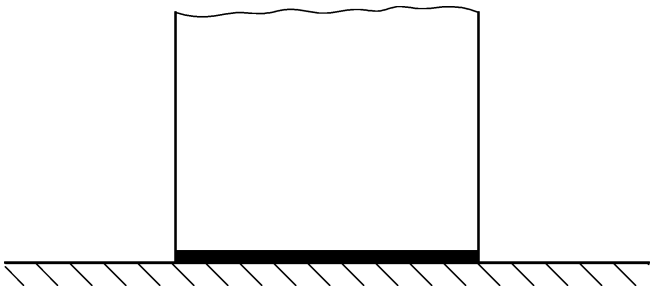


Figure B.19 — Machine standing on the floor

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).

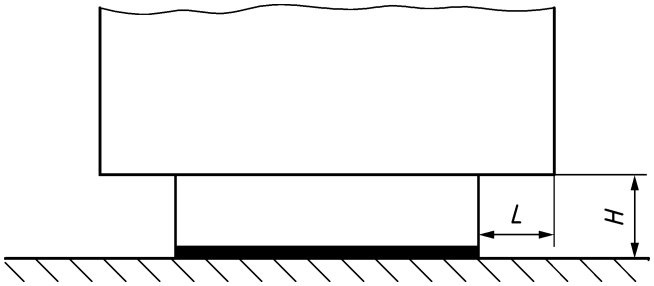


Figure B.20 — Machine with protrusion

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).

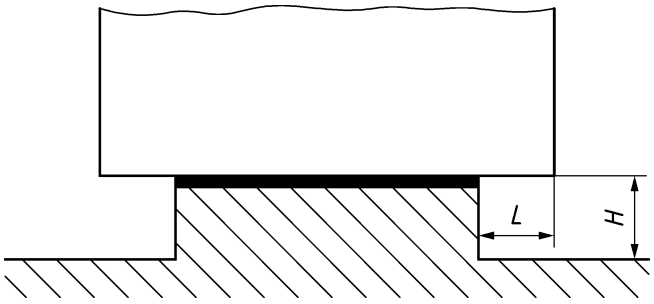
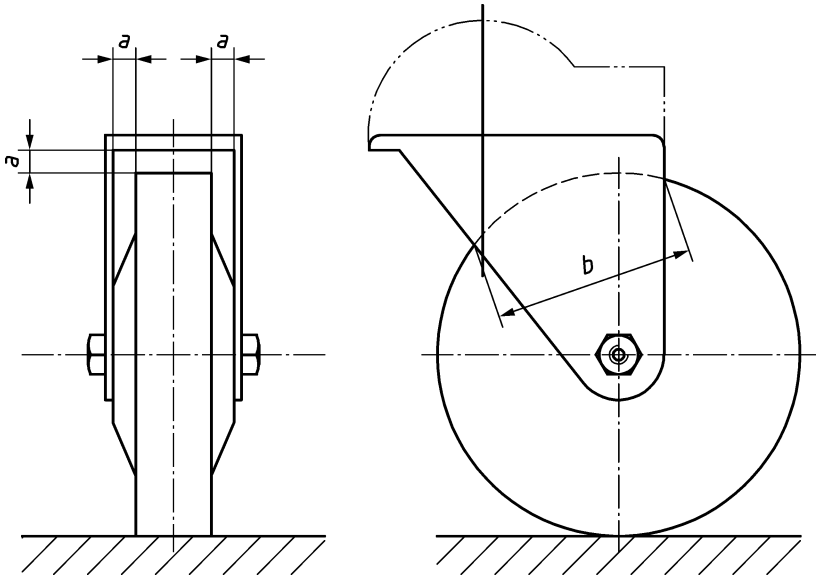


Figure B.21 — Machine with a base

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

Any 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.

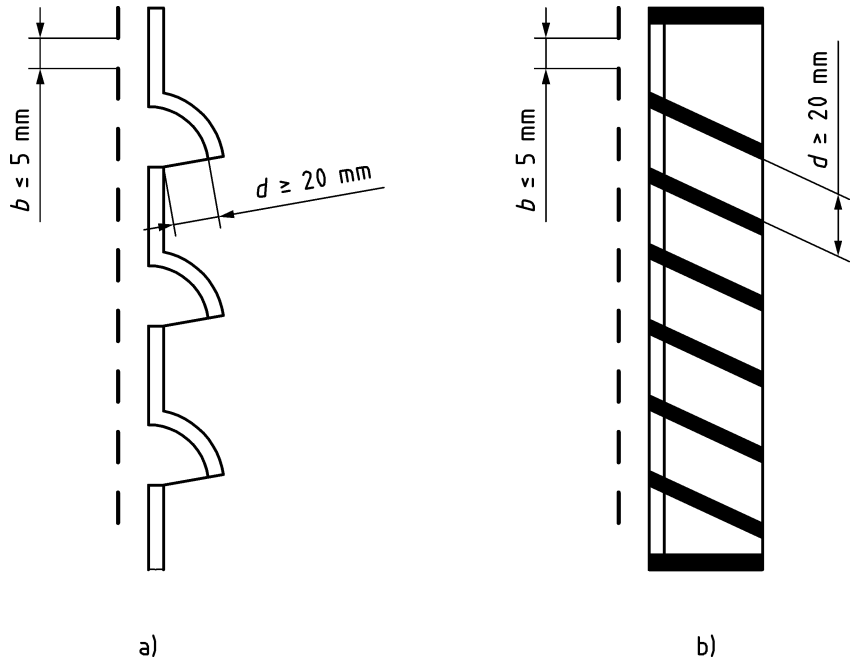


Figure B.23 — Ventilation openings for splash area

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

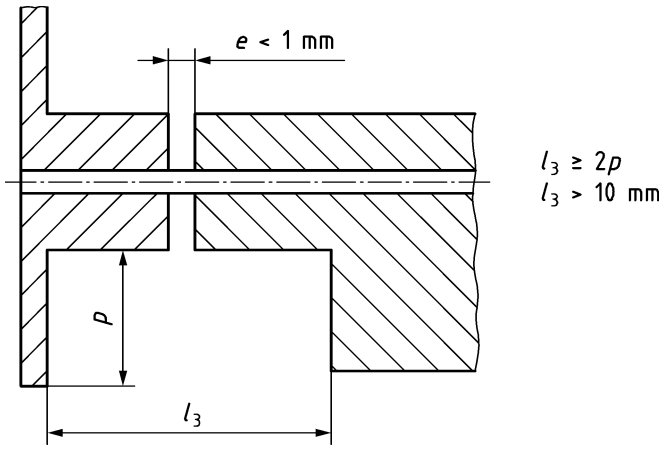
Whenever possible, the manufacturer shall eliminate swivel points from the food area.

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).

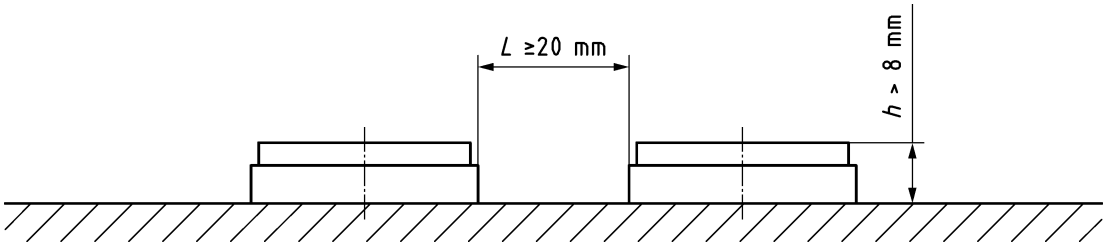


Figure B.25 — Control panel in the splash area with h > 8mm

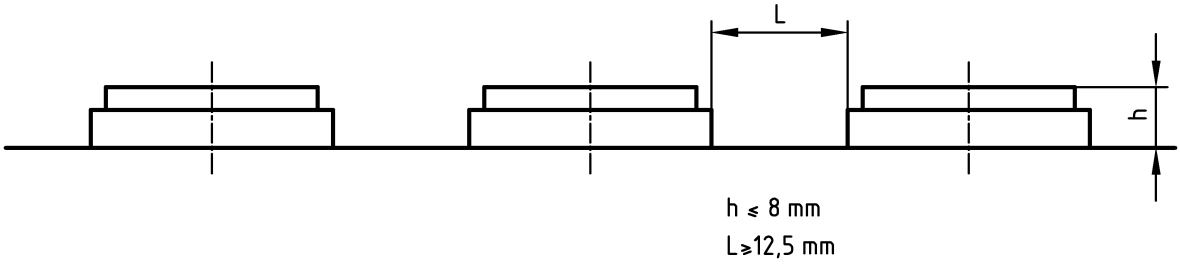


Figure B.26 — Control panel in the splash area with h ≤ 8mm

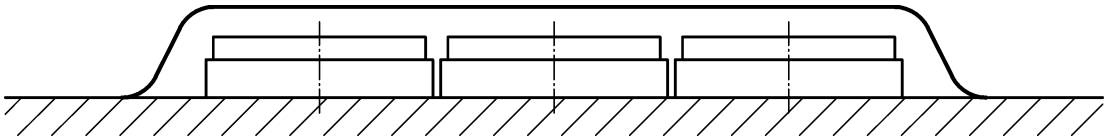


Figure B.27 — Control panel in the splash area with a covering

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.

Bibliography

[1] EN 626-1, *Safety of machinery — Reduction of risks to health from hazardous substances emitted by machinery — Part 1: Principles and specifications for machinery manufacturers*

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

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

[4] EN 1005-2, *Safety of machinery — Human physical performance — Part 2: Manual handling of machinery and component parts of machinery*

[5] EN 1005-3, *Safety of machinery — Human physical performance — Part 3: Recommended force limits for machinery operation*

[6] EN 1672-1, *Food processing machinery — Basic concepts – Part 1: Safety requirements*

[7] EN 1674, *Food processing machinery — Dough and pastry brakes — Safety and hygiene requirements*

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

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

This page deliberately left blank

This page deliberately left blank

British Standards Institution (BSI)

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

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

About us

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

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

Information on standards

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

Buying standards

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

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

Subscriptions

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

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

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

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

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

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

BSI Group Headquarters

389 Chiswick High Road London W4 4AL UK

Revisions

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

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

Copyright

Useful Contacts:

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

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

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

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

bsi.

...making excellence a habit.™