BRITISH STANDARD

BS EN
13390:2002

Food processing machinery — Pie and tart machines — Safety and hygiene requirements

The European Standard EN 13390:2002 has the status of a British Standard

ICS 67.260

National foreword

This British Standard is the official English language version of EN 13390:2002.

The UK participation in its preparation was entrusted by Technical Committee MCE/3, Safeguarding of machinery, to Subcommittee MCE/3/5, Food industry machines — Safety, which has the responsibility to:

— aid enquirers to understand the text;

— present to the responsible European committee any enquiries on the interpretation, or proposals for change, and keep the UK interests informed;

— monitor related international and European developments and promulgate them in the UK.

A list of organizations represented on this subcommittee can be obtained on request to its secretary.

Cross-references

The British Standards which implement international or European publications referred to in this document may be found in the BSI Standards Catalogue under the section entitled "International Standards Correspondence Index", or by using the "Find" facility of the BSI Standards Electronic Catalogue.

A British Standard does not purport to include all the necessary provisions of a contract. Users of British Standards are responsible for their correct application.

Compliance with a British Standard does not of itself confer immunity from legal obligations.

This British Standard, having been prepared under the direction of the Engineering Sector Policy and Strategy Committee, was published under the authority of the Standards Policy and Strategy Committee on 15 March 2002

Summary of pages

This document comprises a front cover, an inside front cover, the EN title page, pages 2 to 50, an inside back cover and a back cover.

The BSI copyright date displayed in this document indicates when the document was last issued.

Amendments issued since publication

Amd. No.	Date	Comments

ISBN 0 580 39296 1

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 13390

February 2002

ICS 67.260

English version

Food processing machinery - Pie and tart machines - Safety and hygiene requirements

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

Nahrungsmittelmaschinen - Tortelettmaschinen - Sicherheits- und Hygieneanforderungen

This European Standard was approved by CEN on 11 November 2001.

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

Management Centre: rue de Stassart, 36 B-1050 Brussels

Ref. No. EN 13390:2002 E

Contents

Foreword

This European Standard has been prepared by Technical Committee CEN/TC 153 "Food processing machinery" ,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 August 2002, and conflicting national standards shall be withdrawn at the latest by August 2002.

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 EC Directive(s).

For the relationship with EC Directives, see informative annex ZA, which is an integral part of this standard.

The annexes A and B are normative.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

0 Introduction

This document is a type C standard as stated in EN 1070.

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

When provisions of this type C standard are different from those which are stated in type A or B standards, the provisions of this type C standard take precedence over the provisions of the other standards, for machines that have been designed and built according to the provisions of this type C standard.

1 Scope

This standard specifies safety and hygienic design requirements for the manufacture of machines used for the production of pies, tarts, pasties, en croute products and other similar items where the pastry cases are formed by the closing under pressure of one or more forming heads. The standard applies to the following three basic types of machine :

- machines where operators hands enter hazard zone 1 (see 4.1) at each cycle ;
- machines which are loaded outside hazard zone 1 ;
- automatic machines.

Figure 1, 2 and 3 illustrate examples of these.

Automatic loading devices are not covered by this standard.

This standard applies to electrically, pneumatically and hydraulically powered machines. Manually operated machines are excluded from the scope of this standard.

Clause 4 lists the significant hazards identified on these machines on the basis of a risk assessment carried out following the principles in EN 1050:1996.

The safety and hygiene requirements take into account the hazards arising from use (including setting, process changeover, operation), cleaning and maintenance. Hazards arising from foreseeable misuse (3.12, EN 292-1:1991) are also included.

Flour dust is not a significant hazard at pie and tart machines.

A noise test code is included in annex B to assist manufacturers to measure noise level for the purpose of the noise emission declaration.

This document in not applicable to pie and tart machines which are manufactured before the date of publication of this document by CEN.

2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text, and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

EN 292-1:1991, *Safety of machinery - Basic concepts - General principles for design - Part 1: Basic terminology, methodology.*

EN 292-2:1991 + A1:1995, *Safety of machinery - Basic concepts - General principles for design - Part 2: Technical principles and specifications.*

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

EN 349:1993, *Safety of machinery - Minimum gaps to avoid crushing of parts of the human body.*

EN 563:1994, *Safety of machinery - Temperatures of touchable surfaces - Ergonomics data to establish temperature limit values for hot surfaces.*

EN 614-1:1995, *Safety of machinery - Ergonomic design principles - Part 1: Terminology and general principles.*

EN 953:1997, *Safety of machinery – Guards – General requirements for the design and construction of fixed and movable guards.*

EN 954-1:1996, *Safety of machinery - Safety related parts of control systems - Part 1: General principles for design.*

EN 982:1996, *Safety of machinery - Safety requirements for fluid power systems and their components – Hydraulics.*

EN 983:1996, *Safety of machinery - Safety requirements for fluid power systems and their components – Pneumatics.*

EN 1050:1996, *Safety of machinery – Principles for risk assessment.*

EN 1070, *Safety of machinery – Terminology.*

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

EN 1672-2:1997, *Food processing machinery - Basic concepts - Part 2: Hygiene requirements.*

EN 60204-1:1997, *Safety of machinery - Electrical equipment of machines - Part 1 : General requirements (IEC 60204-1:1997).*

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

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

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

EN ISO 11688-1:1998, *Acoustics – Recommended practice for the design of low-noise machinery and equipment - Part 1: Planning (ISO/TR 11688-1:1995).*

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

3 Terms and definitions

For the purposes of this European Standard, the terms and definitions given in EN 1070 and the following terms and definitions apply.

3.1
platform
mould into which the die presses, which is mounted on a supporting surface (see Figure 2)

3.2
platen
mould into which the die presses, which is integral with the supporting surface

3.3
die
shaped tool for pressing the pastry into the desired shape with the corresponding platform or platen. It can be heated

3.4
false table
device, shaped and dimensioned to fill the openings between the platforms on a rotating table machine through which access to hazard zone 1 may be gained (see Figure 6)

3.5
table frame
series of radial webs, located between platforms, shaped and dimensioned to close the gap between the lower edge of the guard and the upper surface of the rotating table on which the platforms are located (see Figure 5)

3.6
blocking
forming the pastry base

3.7
sheeter
device for dispensing sheets of dough e.g. a hopper with a set of rollers at its base (see Figure 7)

3.8
crimping
sealing the lid to the base

3.9
docking
piercing the pastry with a spike

3.10
tamping
levelling the filling

3.11
depositor
device for dispensing a measured quantity of product (pastry or filling), usually comprising a hopper and a cut off device

4 List of significant hazards

The significant hazards, hazardous situations and events, identified by risk assessment and listed below, take account of normal operation of pie and tart machines including loading and unloading, cleaning and maintenance. These require action to eliminate or reduce the risk.

4.1 Mechanical hazards

The significant mechanical hazards are :

- crushing;
- cutting;
- severing;
- shearing;
- drawing in;
- trapping;
- loss of stability.

The examples shown in Figures 1, 2 and 3 illustrate eight danger zones associated with the first six hazards :

Zone 1 : Zone between closing die and platform or platen
Hazard of crushing, to upper parts of the body, for example during blocking or crimping

Zone 2 : Depositor cut off device
Hazards of cutting or severing, to upper parts of the body

Zone 3 : Inrunning rollers of the sheeter
Hazard of drawing in, to upper parts of the body

Zone 4 : Guillotine (where fitted)
Hazard of cutting, to upper parts of the body

Zone 5 : Any moving table or conveyor and fixed parts
Hazard of shearing, to any part of the body

Zone 6 : Conveyor nip points
Hazards of drawing in and crushing, to upper part of the body

Zone 7 : Ejector unit
Hazard of trapping, to upper parts of the body

Zone 8 : Drive mechanisms
Hazards of drawing in, crushing, cutting or severing, to any part of the body

4.2 Electrical hazards

Hazard of electric shock from direct or indirect contact with live components. Hazard of external influences on electrical equipment, e.g. cleaning with water.

4.3 Thermal hazard

Hazard of burning from hand contact with heated dies or platforms or hot external machine components.

4.4 Hazards generated by neglecting hygienic design principles

Neglecting hygienic principles can create unacceptable modification of foodstuff and therefore a risk to human health, i.e. through physical, chemical or microbial contamination.

4.5 Hazards generated by neglecting ergonomic principles

The hazard of unhealthy posture or excessive effort relating particularly to repeated hand and arm movements during loading and unloading of hand fed machines and manual loading of depositors and sheeters.

4.6 Hazards generated by noise

Pie and tart machines can generate airborne noise which can result in hearing damage, in accidents due to interference with speech communication and in interference with the perception of acoustic signals.

5 Safety and hygiene requirements and/or protective measures

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 292 for hazards relevant but not significant which are not dealt with by this document.

5.1 Mechanical hazards

Pneumatically operated machines shall be designed and use components to meet the requirements of EN 983:1996. Hydraulic machines shall comply with EN 982:1996.

Where reference is made to interlocking devices throughout clause 5, they shall comply with 4.2.1, 5 and 6 of EN 1088:1995.

Unless stated otherwise, safety related parts of control systems shall be to category 1 of EN 954-1:1996.

All guards shall be constructed in accordance with EN 953:1997 in particular clauses 6 and 7.

Unless stated otherwise interlocking shall be by use of control interlocking (4.1.1, EN 1088:1995). Manual controls shall be located outside the hazard zones and as detailed in 5.5.

5.1.1 Access to zone 1

5.1.1.1 Machines where the operator's hands enter the hazard zone at each cycle

Access shall be prevented by provision of a moveable interlocking guard (Figure 4). The interlocking device chosen shall stop movement of the closing die before injury can occur. This may be achieved by a maximum stopping time of one second after any movement of the guard from close or use of guard locking (3.3 and 4.2.2, EN 1088:1995).

Either power interlocking (4.1.2, EN 1088:1995) or control interlocking (4.1.1, EN 1088:1995) with a dual circuit may be used and devices shall comply with clauses 5 and 6 of EN 1088:1995.

The safety related control system shall be in accordance with EN 954-1:1996, category 3. The performance of the interlocking device(s) shall be compatible with this category (7.6, EN 1088:1995).

5.1.1.2 Machines which are loaded outside the hazard zone

Access shall be prevented by a combination of fixed guards and moveable interlocking guards (3.2 and 4.2.1, EN 1088:1995) used if necessary in conjunction with false tables or table frames and adjustable sections so that all openings giving access to the hazard zone are minimized and a permanent warning sign showing the risk (see EN 61310-1) shall be fixed to the machine.

Suitable false tables and/or frames shall be supplied for use with all dies/platforms provided with the machine. In relation to height of frames the minimum provision necessary for any particular size of mould is one frame corresponding to the deepest pie mould of that size. Means to avoid pastry fouling the guard shall be provided, for example, the frame webs may be higher than the pie moulds.

Where shearing traps are created between guards and false tables or frames, injury shall be prevented by :

- limiting the force, with which the rotating table indexes round, to 75 N ;
- using a device which causes the table to stop in a time less than or equal to 0,5 s (e.g. trip flaps).

Figures 5 and 6 show examples of the use of table frames and false tables respectively.

When false tables or table frames are used means shall be provided to ensure that the machine cannot operate unless these are in place. This may be achieved by interlocking with the machine control circuit. Because of the technical difficulty of interlocking a rotating frame or table the use of proximity switches which complies with 5.7.3 and 6.3 of EN 1088:1995 is allowed for example a metal detecting proximity switch will be acceptable. If adjustable guards are used the detection switch shall be fixed to the adjustable portion of the guard so that guard adjustment allowing only openings in accordance with Table 4 of EN 294:1992 is necessary to allow machine operation.

5.1.1.3 Automatic machines

Access shall be prevented by a combination of fixed and movable interlocking guards (Figure 7).

5.1.2 Access to zone 2

During its operation, access to the depositor cut off device, shall be prevented. Access via the feed hopper may be prevented by fixed or movable interlocking guards whose dimensions comply with EN 294:1992, Table 4. Where the hopper itself is removable for cleaning access to the hazard zone shall be prevented. This may be achieved by interlocking the hopper itself.
Where movable interlocking guards or removable hoppers are used, the stopping time shall be less than or equal to 0,5 s.

Access via the discharge outlet shall be prevented by use of an outlet whose dimensions comply with EN 294:1992, Table 4 or by a suitable curved outlet tube designed to prevent access.

Because of the need for accurate dispensing of product this may not always be achievable. The use of a piston mechanism (with a maximum force of 50 N) can be used to prevent access to the depositor cut off device. The residual risk of slight injury from these should be highlighted by a warning sign on the machine and in the machine instruction handbook.

5.1.3 Access to zone 3

Access to the inrunning rollers of the dough sheeter, shall be prevented. This may be achieved by a combination of fixed and movable interlocking guards to prevent access via the hopper. When an open hopper is used access may be prevented by use of swan neck extension, whose dimensions comply with Table 4 of EN 294:1992 (see Figure 7).

5.1.4 Access to zone 4

Access to the dough cutting guillotine shall be prevented. This may be achieved by fixed guarding (EN 953) to the infeed and outfeed conveyors which complies with the distance requirements in Table 4 of EN 294:1992.

5.1.5 Access to zone 5

The shearing hazard at zone 5 shall be eliminated as far as possible by design, for example careful location of structural members below moving conveyors with openings for foils.

Access to any such traps through the foil dispensing magazine shall be prevented. This may be by the presence of the foils themselves if a sensing device e.g. a suitable photocell (see EN 61496-1:1997) stops the machine before the magazine becomes empty and prevents it starting unless a foil is in place.

A trip mechanism or flap may also be used to prevent injury at Zone 5. Movement of the mechanism or flap shall be interlocked to stop movement of the machinery before injury occurs. Figure 5 shows an example of a trip mechanism. In the case of rotating table machines the entire front guard may act as a trip mechanism.

5.1.6 Access to zone 6

Access to the inrunning nips shall be prevented by fixed guards complying with dimensions of Table 4 of EN 294:1992.

For example a guard such as the one marked B in Figure 10, shall be fitted to prevent access to the inrunning nip.

5.1.7 Access to zone 7

Trapping points at the ejector unit shall be prevented by design in accordance with EN 349:1993, Table 1.

Alternatively, the trapping hazard may be eliminated by observing the safety distances set out in EN 294:1992, Table 4 or by provision of an interlocked guard.

5.1.8 Access to zone 8

Access to hazards in the drive mechanism shall be prevented. This may be achieved by the use of fixed or movable and interlocked guards.

5.1.9 Loss of stability

Machines shall be designed to be stable and shall comply with 5.1.9.1 to 5.1.9.2 as applicable. For machines designed to be fixed to the floor, the instruction handbook shall indicate the values of forces at the fixing points.

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

5.1.9.2 Free standing machines with castors shall have at least two castors (or sets of castors) fitted with a locking device, and shall comply with the provisions of 5.1.9.1.

5.2 Electrical hazards

The electrical equipment shall comply with EN 60204-1:1997, with the following precisions.

5.2.1 Electromagnetic compatibility (see 4.4.2 of EN 60204-1:1997)

Where electrical/electronic components are used, the manufacturer shall ensure that the equipment shall not generate electromagnetic disturbances above the levels that are appropriate for its intended place of use. In addition, the equipment shall have adequate level of immunity to electromagnetic disturbances so that it can correctly function in its intended place of use.

NOTE 1 The supplier of the electrical/electronic equipment should be able to detail its electromagnetic compatibility.

NOTE 2 Where conditions of use, installation and maintenance are specified by the supplier in order to achieve electromagnetic compatibility, these should be complied with by the manufacturer.

5.2.2 Cleaning with water

If the machine or part of the machine is intended to be cleaned with water, the manufacturer shall provide warnings and a method of cleaning in the instruction handbook.

5.2.3 Protection against electric shock (see clause 6 of EN 60204-1:1997)

The electrical equipment shall comply with clause 6 of EN 60204-1:1997.

5.2.4 Power circuits (see 7.2.3 of EN 60204-1:1997)

A device for detection and interruption of overcurrent in the phase conductor is sufficient for single phase machines.

5.2.5 Earth faults (see 9.4.3.1 of EN 60204-1:1997)

For machinery supplied from a single phase conductor and an earthed neutral conductor, there is no requirement for double pole interruption.

5.2.6 Emergency stop (see 10.7 of EN 60204-1:1997)

For machines where the operator's hands enter the hazard zone at each cycle and guarded according to 5.1.1.1 (Figure 1), an emergency stop is not required. A normal stop shall be fitted which causes the die to rise to its top position before power is disconnected.

For machines which are loaded outside the hazard zone Ffigure 2), an emergency stop of category 1 is required, which stops the rotation of the table within 0,5 sand causes the die to rise to its top position before power is disconnected.

For automatic machines (Figure 3), one or more emergency stop of category 1 (see 4.1 of EN 418:1992) shall be fitted at each side of the machine so that index, sheeters and depositors stop within 0,5 sand the guillotine and dies rise to their top positions before power is disconnected.

5.2.7 Start function (see 10.6 of EN 60204-1:1997)

Start devices shall be designed to reduce the risk of inadvertent operation by conforming to EN 60204-1, 10.6.

5.2.8 Motor enclosures (see 15.2 of EN 60204-1:1997)

Where a motor has a degree of protection lower than IP23 it shall be mounted inside an enclosure that guarantees a minimum degree of protection of IP23.

5.3 Thermal hazards

The temperature of external machine components, except the dies, which in ordinary use can come into contact with the operator for 3 s maximum, shall not exceed the temperature limit value of 65 °C for uncoated metal.

For other materials, see EN 563:1994.

On machines where the die(s) is (are) heated, the design shall minimize the risk of accidental contact with the die when loading and unloading.

5.4 Hygiene requirements

The machines shall be designed and manufactured in accordance with EN 1672-2:1997 and annex A which gives additional information.

The three zones in EN 1672-2:1997 are defined as follows.

5.4.1 Food area

The food area is generally at least as follows :

- inside of all hoppers, sheeters and associated solid guards. Where guards have grids or bars the whole guard shall be included in the food area ;

- all dies, platforms, platens, the top of false tables and table frames ;

- all surfaces of rotating tables or moving belts;

- all measuring and sheeting devices.

On the manually loaded machines, where the operator is frequently touching the product directly with the hand (without a tool) and then the controls, controls need to be included in the food area and be designed and protected in that way.

5.4.2 Splash area

The splash area is generally at least as follows :

- table ;

- the sides and underside of the false table ;

- supports of : platform, platen, die ;

- outside of hoppers, sheeters, etc.

5.4.3 Non food area

The remaining areas of the machine do not generally come into contact with food.

5.5 Ergonomics

Awkward body postures during the intended use (loading, unloading, maintenance, cleaning, …) shall be avoided by the design of the machine. Repetitive work and lifting of heavy loads (see annex A of EN 614-1:1995) may be avoided by use of automatic loading devices. The manufacturer shall give advice in the instruction handbook on the ergonomic aspects of repetitive manual loading and unloading.

Control devices shall be placed within proper reach distance for the operator as stated in annex A of EN 614-1:1995.

Adjusting and operating controls on the machine shall be designed and located in compliance with ergonomic requirements as described in annex A of EN 614-1:1995.

5.6 Noise reduction

Pie and tart machines shall be so designed and constructed that risks from airborne noise emission are reduced to the lowest level by particularly applying measures at source to control noise, 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 B) in relation to other machines of the same family.

6 Verification of safety requirements and/or measures

Table 1

Relevant subclause	Method of verification
5.1.1 to 5.1.8	By verification of the interlocking or fixed guard and of the circuit diagram and functional test of interlocking guards. By measurement of the dimensions, stopping time and force.
5.1.9	In accordance with 5.1.9.1 and 5.1.9.2.
5.2	Verification in accordance with clause 19 of EN 60204-1:1997 except for the following two cases : Tests relating to electromagnetic compatibility may be limited where the supplier of the electric/electronic equipment has successfully tested for compatibility and the manufacturer has mounted the equipment in accordance with the supplier's recommendations. An additional test to that detailed in 19.2 of EN 60204-1:1997 shall be carried out to test the continuity of the protective bonding circuit between the PE (protective earth) terminal and accessible metallic parts of the equipment.
5.3	By measurement of temperature.
5.4	In accordance with clause 6 of EN 1672-2:1997 and annex A of this document.
5.5	By measurement of the forces. By inspection of the visibility of the indications, buttons.
5.6	In accordance with annex B.

7 Information for use

7.1 Instruction handbook

The manufacturers shall provide an instruction handbook in accordance with 5.5 in EN 292-2:1991 + A1:1995.

The instruction handbook shall provide :

- the provisions for handling, transportation, storage, installation, starting up and cleaning and maintenance. A warning to maintenance staff on the hazard of residual voltage (especially on capacitors) shall be provided ;

- necessary instructions to permit access for cleaning ;

- description of the provisions for cleaning, disinfecting 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).
  Where water alone is insufficient, state chemicals which can be safely used when cleaning or disinfecting the machine.
  Moreover, if cleaning with water jet is authorised, the manufacturer shall indicate the maximum pressure permitted ;

- instructions on the correct choice of false table or table frame and adjustment of guards when using these ;

- warning about the dangers and a warning note shall be fixed to the machine, if a depositor with a piston mechanism is used (see 5.1.2) ;

- specifications about all necessary measurements needed to maintain the required hygiene level (e.g. : degradation of surface state, wear of seals and certain parts) ;

- advice to the user to carry out a risk assessment to identify the correct ergonomic use of the machine, where it is manually loaded/unloaded, because of the risk of injury from repetitive strain ;

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

- the value of the overcurrent protective device in the case of machines covered by 5.2.4 ;

- the declared noise emission values of the machinery with reference to annex B of this standard and to relevant basic noise emission standards used.

7.2 Marking

The minimum marking shall include :

- name and address of the manufacturer ;

- mandatory marks [1)] ;

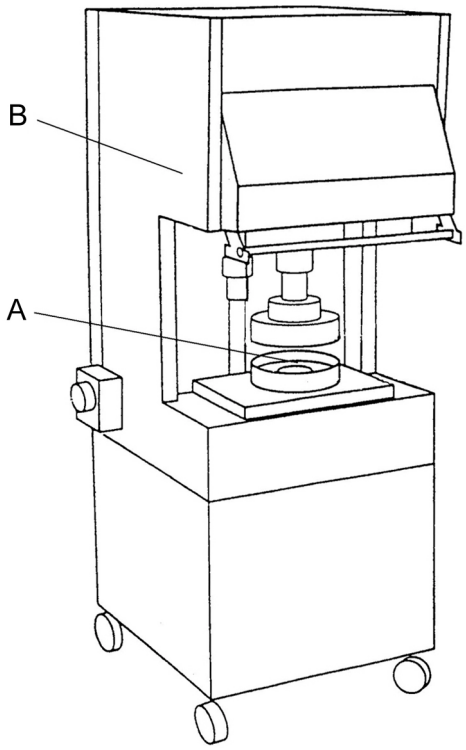
- year of construction ;

- designation of series or type ;

- serial number if any ;

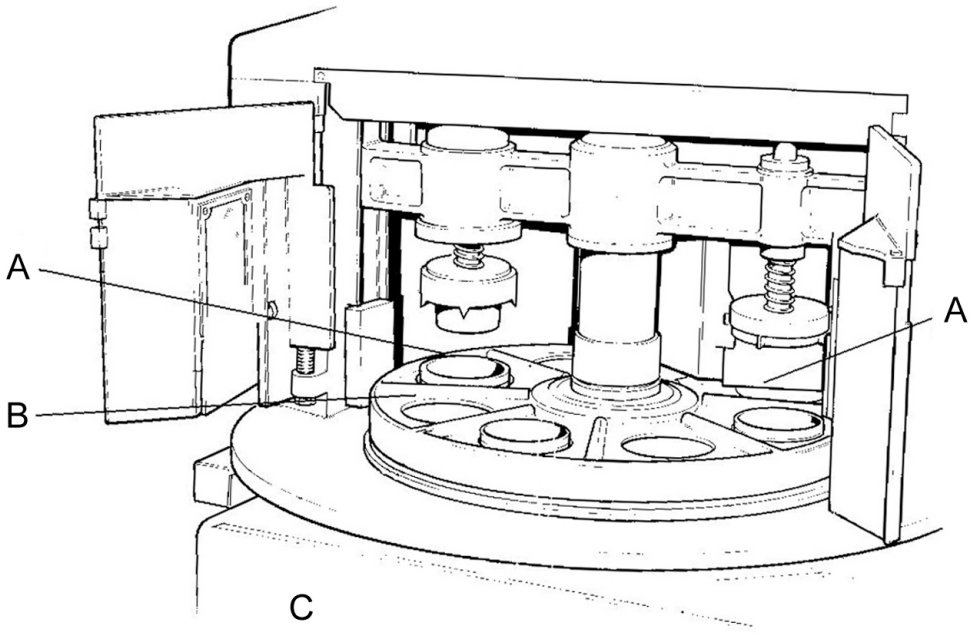
- rating information (mandatory for electrical products : voltage, frequency, power).

[1] For machines and their related products intended to be put on the market in EEA, CE marking, as defined in the European Machinery directive.



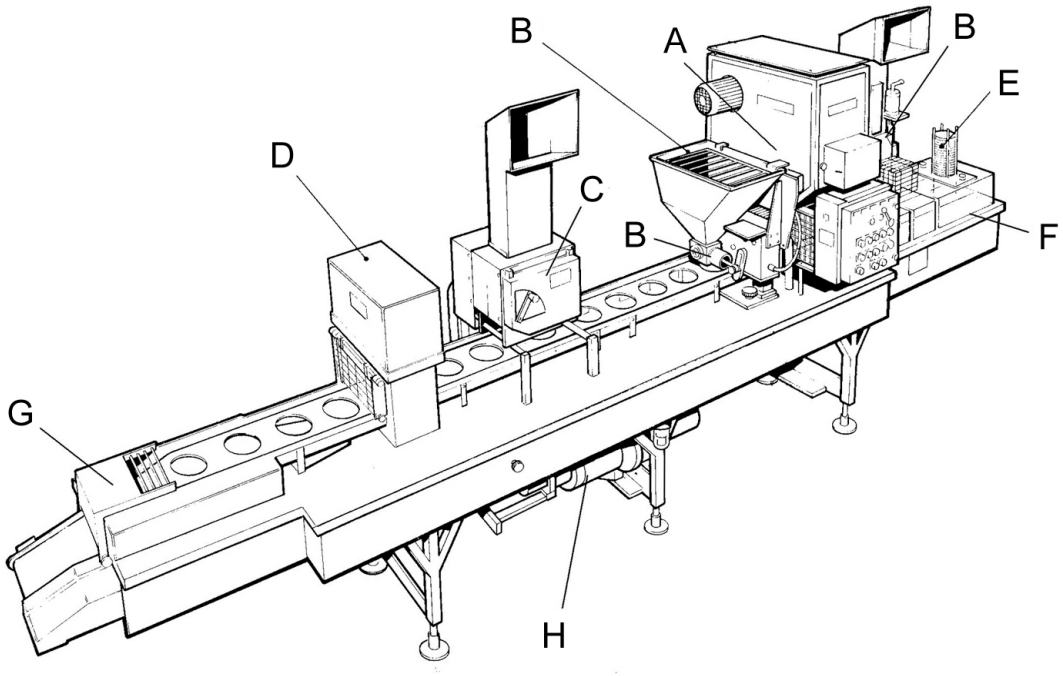
Key
A - Zone 1
B - Zone 8

Figure 1 - Hazards on a class I machine



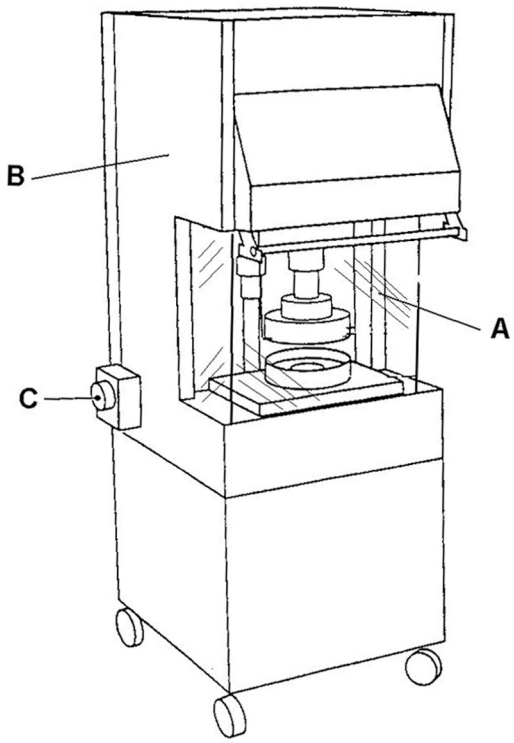
Key
A - Zone 1
B - Zone 5
C - Zone 8

Figure 2 - Hazards on a class II machine



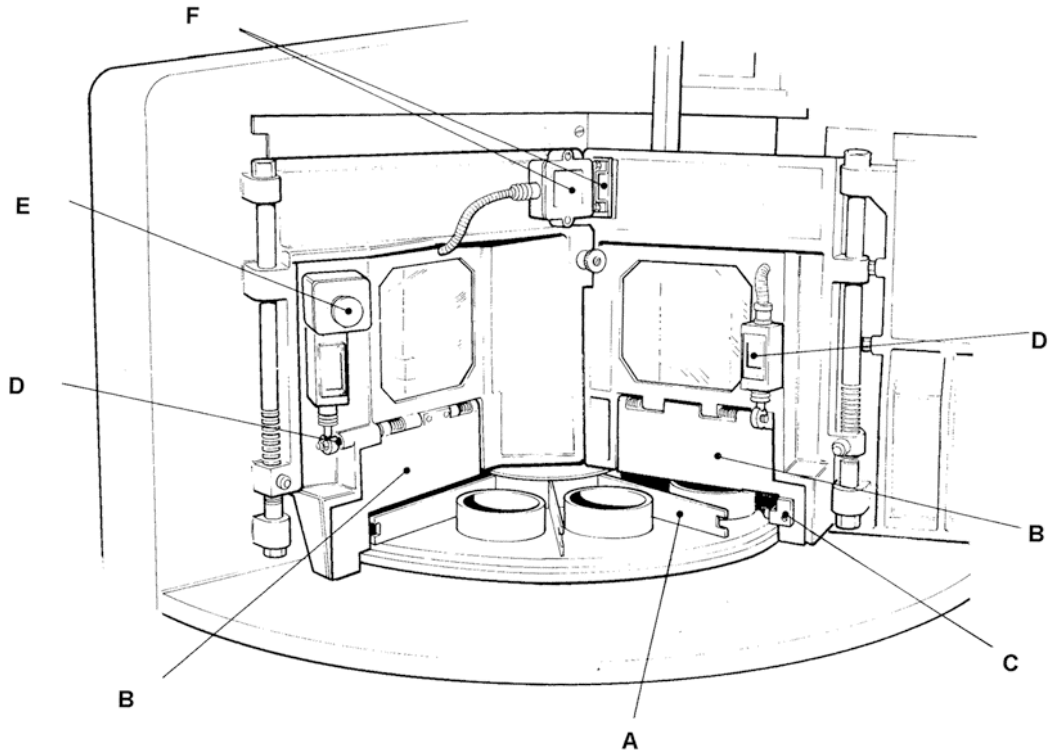
Key
A - Zone 1
B - Zone 2
C - Zone 3
D - Zone 4
E - Zone 5
F - Zone 6
G - Zone 3 et 7
H - Zone 8

Figure 3 - Hazards on a class III machine



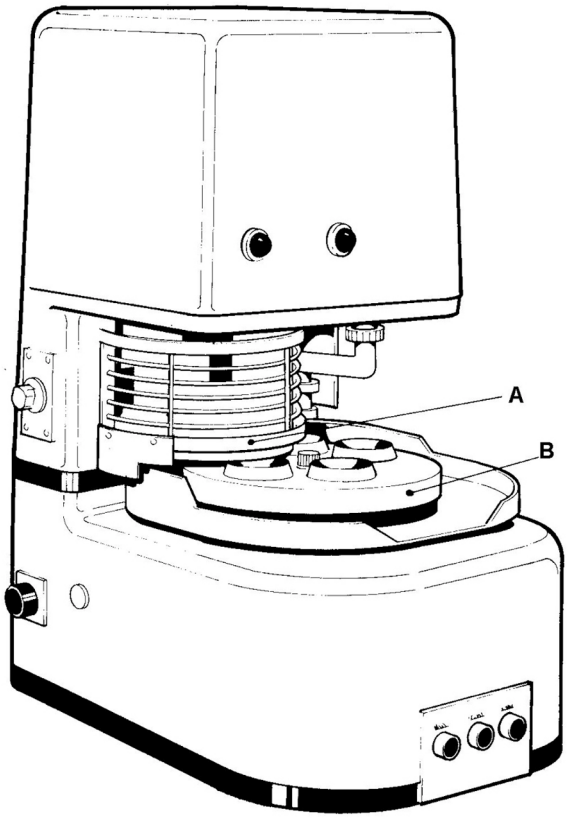
Key
A – Interlocked guard
B – Fixed guard
C – Isolator

Figure 4 - Safeguarding measures on a class I machine



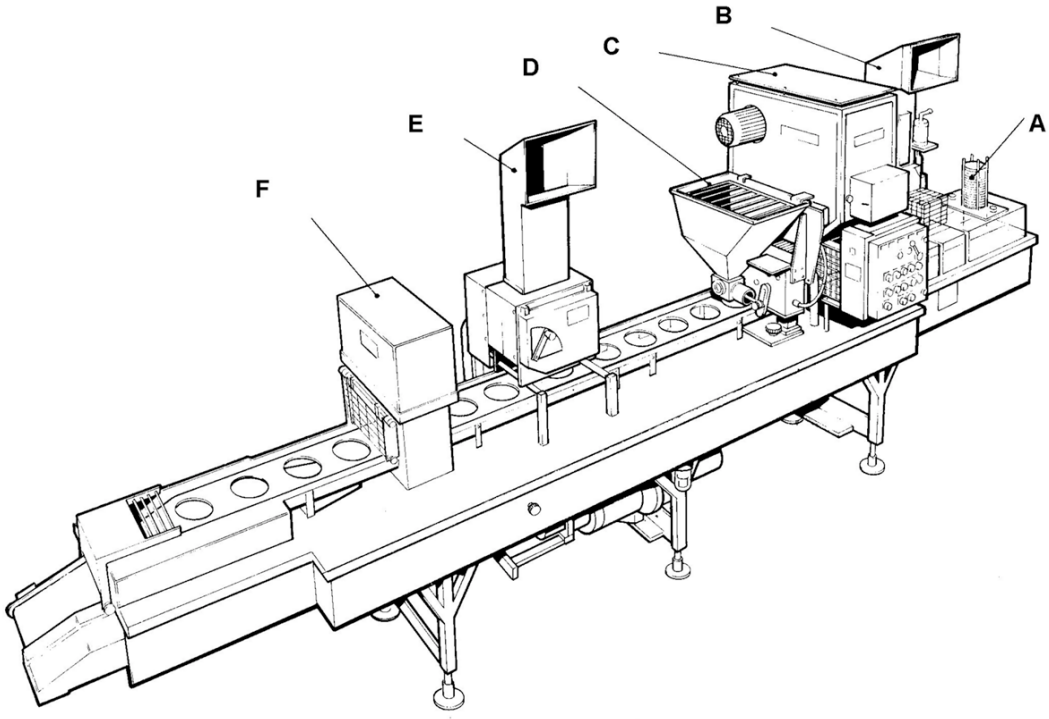
Key
A – Safety frame
B – Trip flap
C – Roller tab
D – Trip flap interlock device
E – Emergency stop button
F – Main guard interlock device

Figure 5 - Safeguarding a class II machine using a safety frame



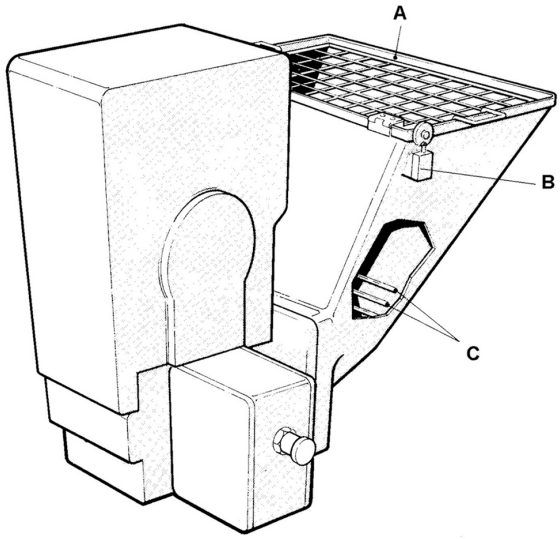
Key
A – Interlocked guard
B – False table

Figure 6 - Safeguarding a class II machine using a false table



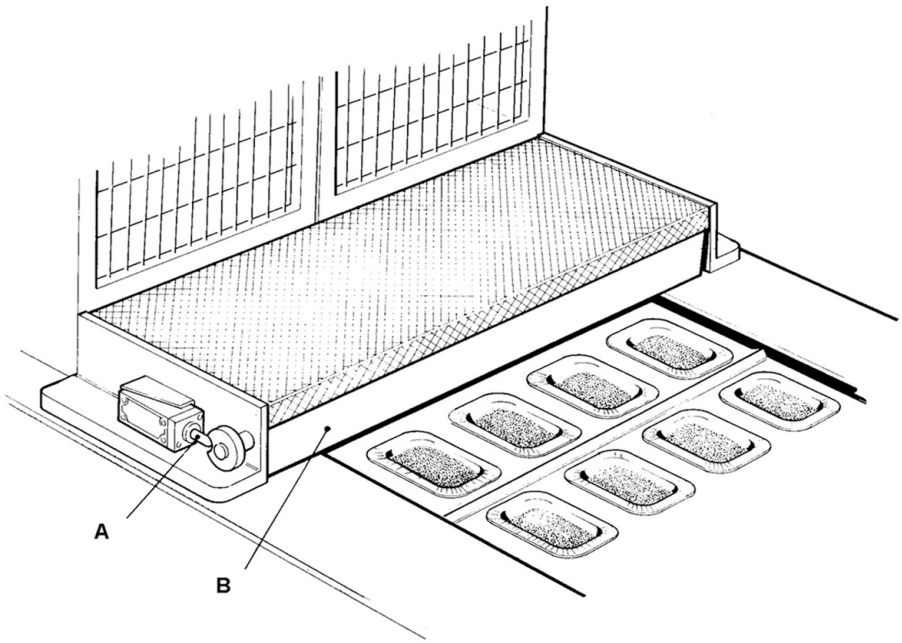
Key
A – Foil dispenser
B – Swan neck guard over dough depositor
C – Interlocked guard over blocking unit
D – Mesh guard over filling depositor hopper
E – Swan neck guard over pastry sheeter
F – Interlocked guard over lid crimping unit

Figure 7 - Safeguarding measures on a class III machine



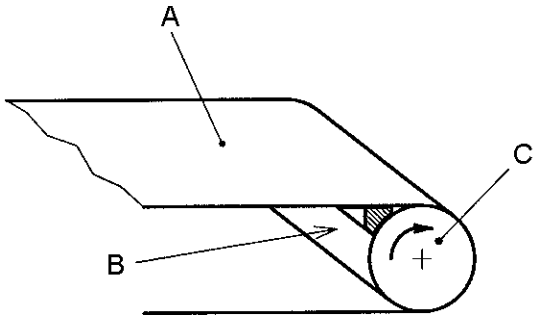
Key
A – Hinged interlocked mesh guard
B – Interlocking device
C – Fixed bars fitted inside hopper

Figure 8 - Alternative safeguarding measures on a depositor hopper



Key
A – Interlocking device
B – Trip flap

Figure 9 - Safeguarding a class III machine with a trip flap



Key
A – Input or output conveyor
B – Inrunning nip guard
C – Roller

Figure 10 - Inrunning nip guard

Annex A
(normative)

Principle of design to ensure the cleanability of pie and tart machines

A.1 Terms and definitions

For the purposes of this annex, the following terms and definitions apply.

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

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

A.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

A.2 Materials of construction

A.2.1 Type of materials

A.2.1.1 Materials for food area

Materials in contact with food and foods intended for human consumption shall comply with the relevant directives (e.g. plastics and articles in contact with food, 90/128/EEC modified).

A.2.1.2 Materials for splash area

See 5.2.2 in EN 1672-2:1997.

A.2.1.3 Non food area

See 5.2.3 in EN 1672-2:1997.

A.2.2 Surface conditions

The surface finish of materials used on surfaces shall permit easy cleaning under satisfactory conditions. The roughness values (R_z) shall comply with the values given in Tables A.1 and A.2 (see ISO 468).

A.2.2.1 Surface condition for food area

Table A.1

Technique of construction	Roughness R_z (in µm)
Drawn - rolled – spun	≤ 25
Moulded – cast	≤ 30
Machined	≤ 25
Injected - metal - plastics	 ≤ 25 ≤ 25
Coating - paint (test reservation) - plastics (test reservation) - glass - metal (test reservation)	 ≤ 16 ≤ 16 ≤ 16

A.2.2.2 Surface condition for splash area

Table A.2

Technique of construction	Roughness R_z (in µm)
Drawn - rolled – spun	≤ 30
Moulded – cast	≤ 40
Machined	≤ 40
Injected - metal - plastics	 ≤ 40 ≤ 40
Coating - paint (test reservation) - plastics - glass - metal	 ≤ 30 ≤ 30 ≤ 30

A.3 Design

A.3.1 Connections of internal surfaces

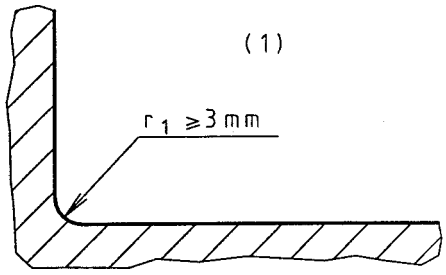
Connections shall have the same roughness as the connected surfaces. These shall be designed to avoid any dead space, see EN 1672-2.

A.3.1.1 Connections of internal surfaces for food area

Two surfaces shall be connected such that :

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

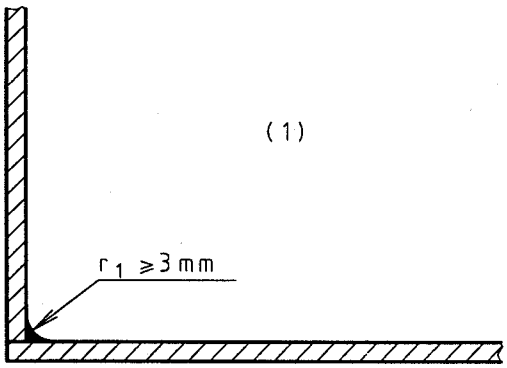
  - machining (cutting into material mass) ;
  - bending the sheet metal (bending and forming) ;
  - design (in moulds, foundry patterns, injection and blasting ...) (see Figure A.1.1).



(1) Food area

Figure A.1.1

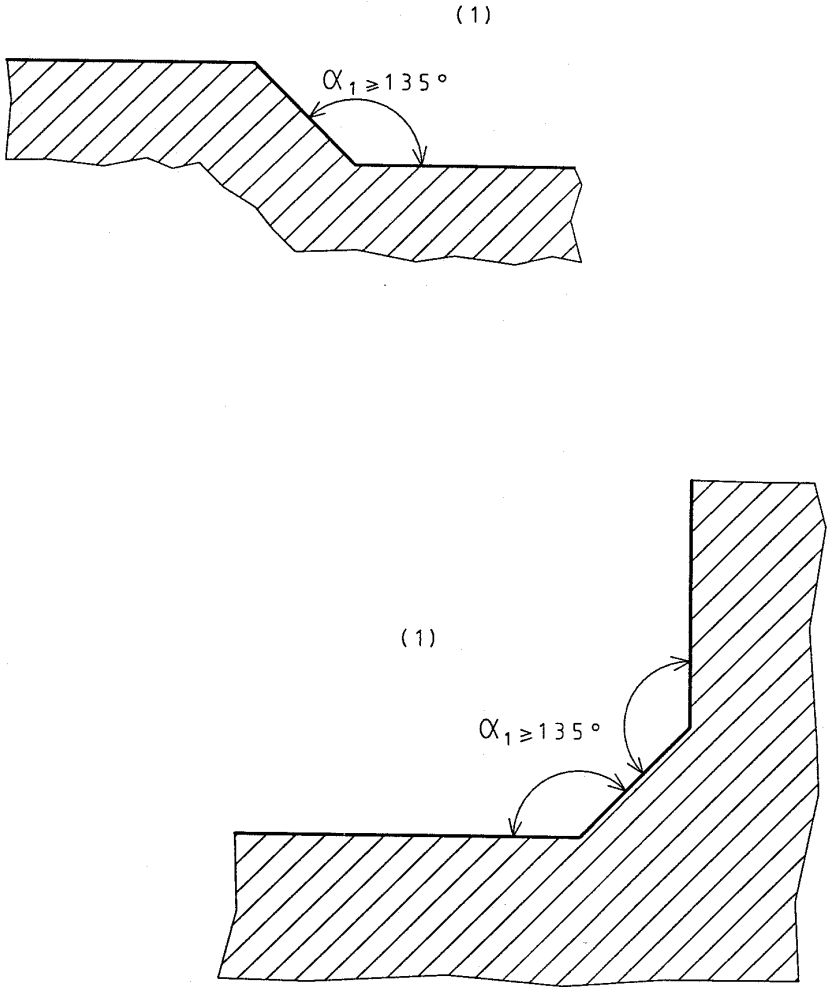
- or by ground and polished welded assembly (see Figure A.1.2).



(1) Food area

Figure A.1.2

- for an internal angle (α_1) greater than or equal to 135°, there are no special requirements for the radius (see Figure A.1.3).



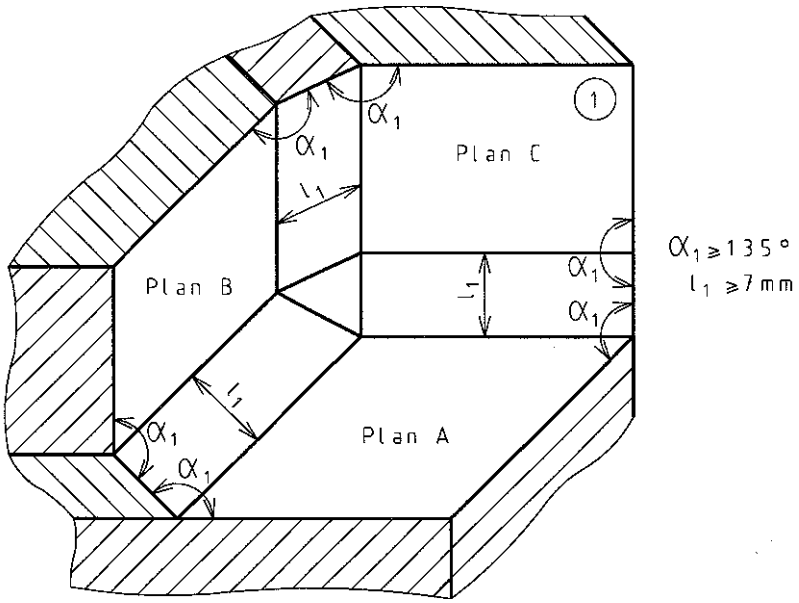
(1) Food area

Figure A.1.3

Three surfaces shall be connected :

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

- by angles of 135° (α_1) so that the dimension (l_1) between two bends is then equal to or greater than 7 mm (see Figure A.1.4).

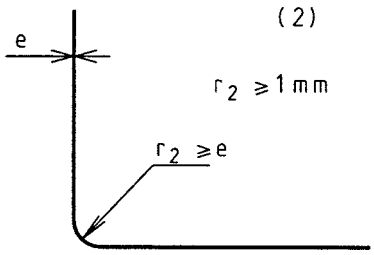


(1) Food area

Figure A.1.4

A.3.1.2 Connections of internal surfaces for splash area

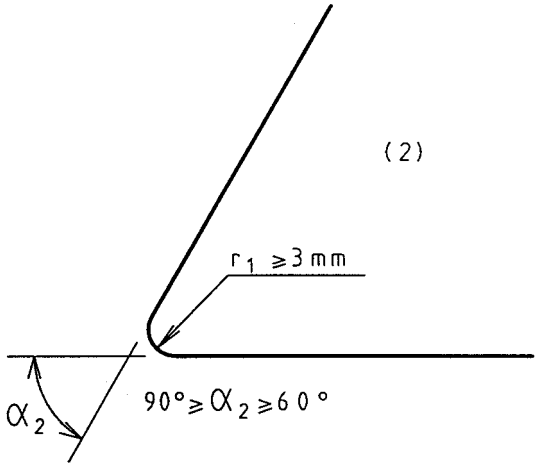
If two surfaces are perpendicular, the radius (r_2) shall be greater than 1 mm (see Figure A.2.1).



(2) Splash area

Figure A.2.1

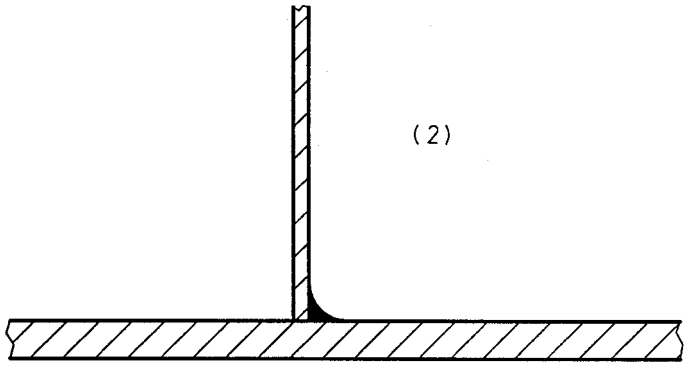
If the internal angle (α_2) is between 60° and 90°, the radius (r_1) shall be greater than or equal to 3 mm (see Figure A.2.2) :



(2) Splash area

Figure A.2.2

When two perpendicular surfaces are welded together, the weld shall be watertight (see Figure A.2.3). A ground finish is acceptable.



(2) Splash area

Figure A.2.3

A.3.1.3 Connections of internal surfaces for non food area

No particular requirement

A.3.2 Surface assemblies and overlaps

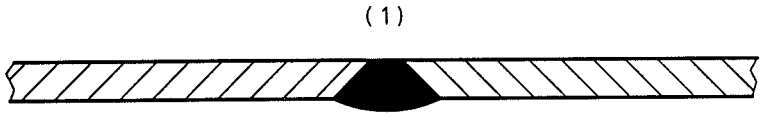
The sheet metal assembly methods shall take into account the expanding or contracting due to temperature variations.

A.3.2.1 Surface assemblies and overlaps for food area

A.3.2.1.1 Surface assembly

Assembled surfaces are considered to be joined either :

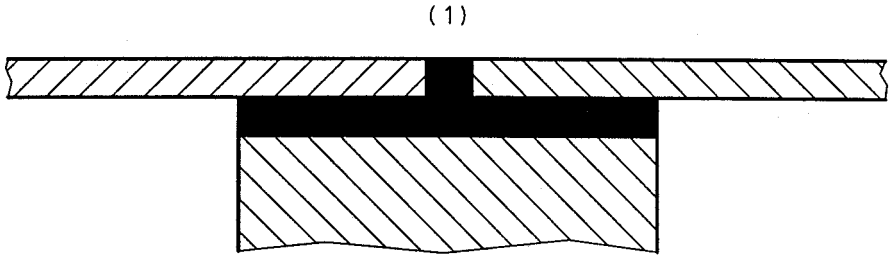
- by a continuous weld (see Figure A.3.1) ;



(1) Food area

Figure A.3.1

- or by a continuous sealed and flushed joint (see Figure A.3.2).



(1) Food area

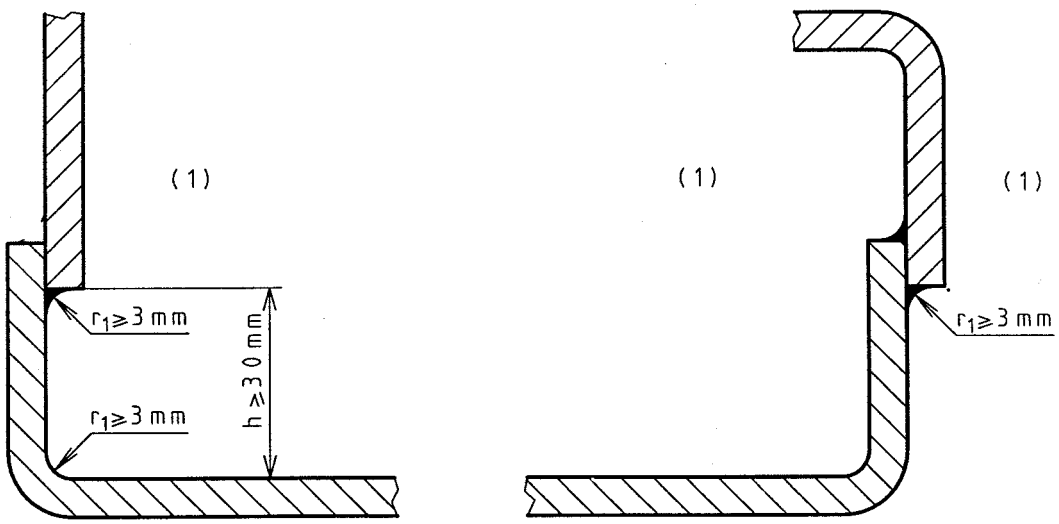
Figure A.3.2

A.3.2.1.2 Surface overlapping

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

- either by a continuous weld ;

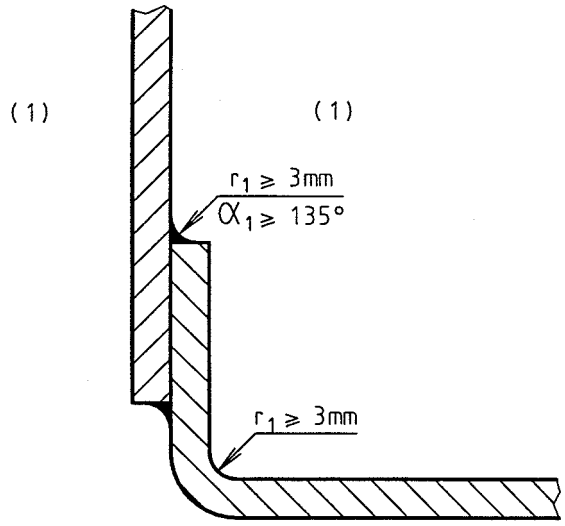
The upper surfaces shall overlap the lower surfaces in the direction of liquid flow. The end of the overlapping and the corner shall be separated by a distance (*h*) more than or equal to 30 mm (see Figure A.4.1) :



(1) Food area

Figure A.4.1

If this is impossible to construct, connections shall comply with the requirements concerning rounded areas in the food area (see A.3.1.1 and Figure A.4.2).

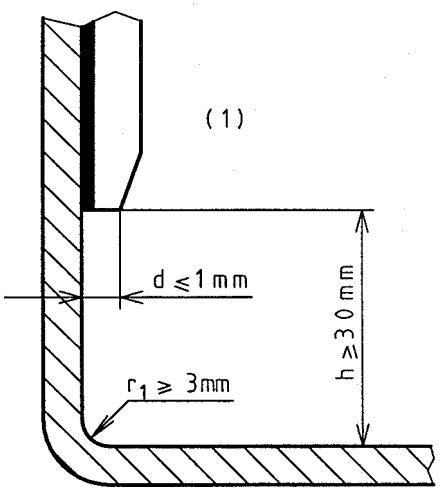


(1) Food area

Figure A.4.2

- 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 A.4.3).



(1) Food area

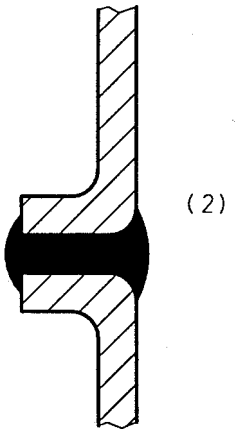
Figure A.4.3

A.3.2.2 Surface assemblies and overlaps for splash area :

The surfaces may be :

- either grouted :

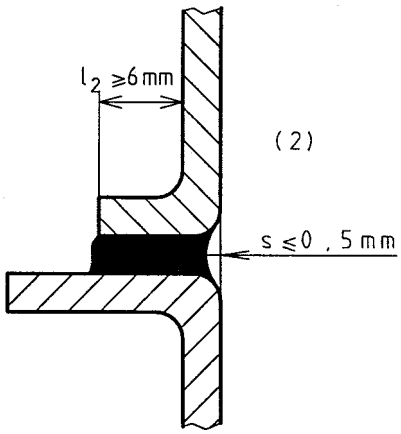
  • by means of a profile which cannot be pulled away and which is installed before assembly (see Figure A.5.1) :



(2) Splash area

Figure A.5.1

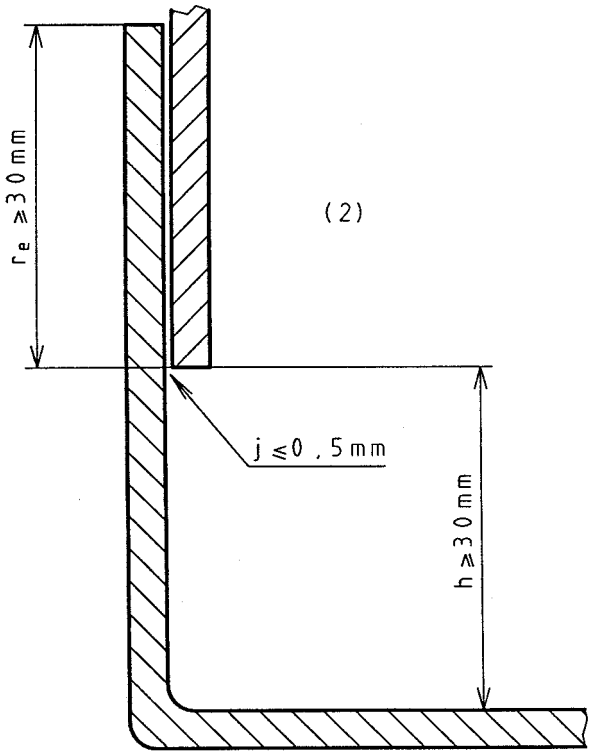
• by flush bonding (the returns of the part used for bonding shall have a flange length (l_2) greater than 6 mm and the flush of the bond shall not have a shrinkage (s) more than 0,5 mm), see Figure A.5.2.



(2) Splash area

Figure A.5.2

- or assembled and fitted (maximum clearance (j) less than or equal to 0,5 mm) with the upper surfaces overlapping the lower surfaces in the direction of product flow. An overlapping distance (r_e) of at least 30 mm is essential to prevent liquid rising by capillary action (see Figure A.5.3).



(2) Splash area

Figure A.5.3

A.3.2.3 Surface assemblies and overlaps for non food area

No particular requirements.

A.3.3 Fasteners

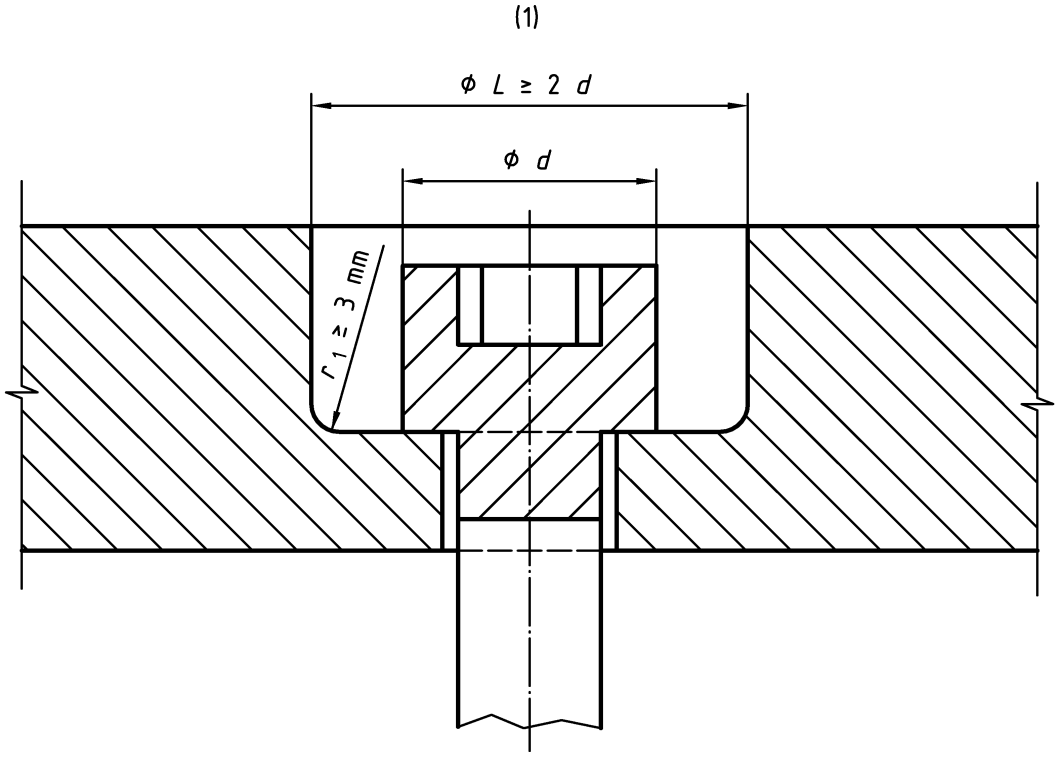
A.3.3.1 Fasteners for food area

See 5.2.1.3 in EN 1672-2:1997.

A.3.3.1.1 Spot-facing

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

- either the construction shall comply with the Figure A.6 and the manufacturer shall prescribe suitable cleaning facilities in the instruction handbook;



Key
1 Food area

Figure A.6

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

A.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.

A.3.3.2 Fasteners for splash area

Easily cleanable fasteners shall be chosen from those in Figure A.7.

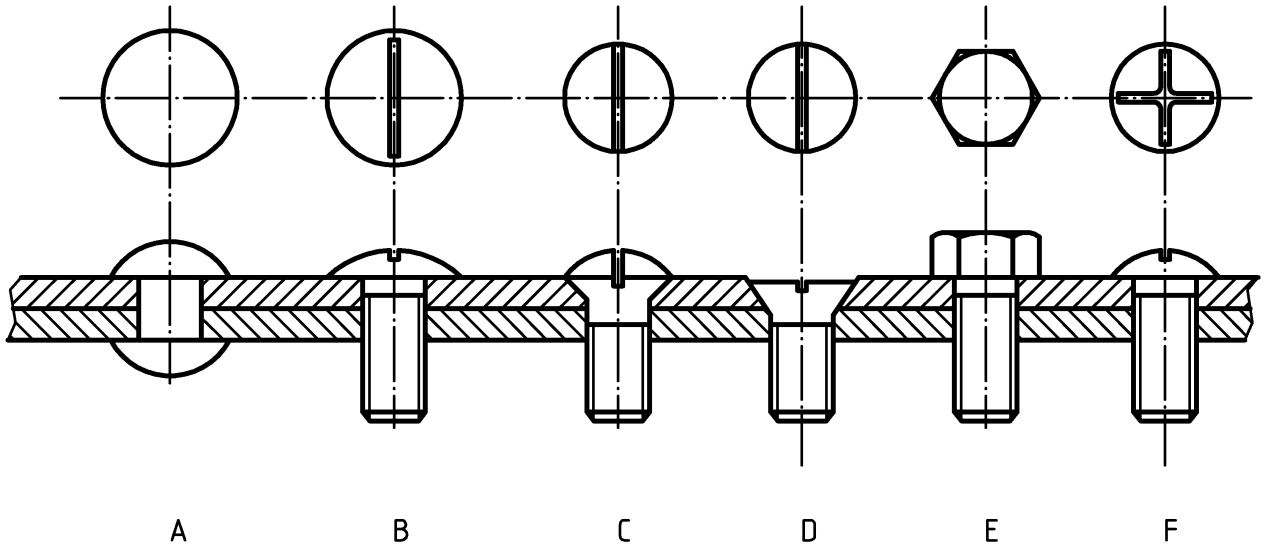


Figure A.7

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 A.6 for the food area whereby the manufacturer can specify in the instruction handbook the cleaning facilities that are required (e.g. high pressure jet) ;

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

A.3.3.3 Fasteners for non-food area

No particular requirement.

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

A.3.4.1 Table-top machines

Table-top machines may be :

A.3.4.1.1 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.

A.3.4.1.2 Tilting : There is no requirement if the force required for tilting is less than or equal to the minimum 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.) and the tilting procedure shall be clearly specified in the instruction handbook.

A.3.4.1.3 Non-portable and non-tilting

- 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 A.3 permitting the cleaning of the positioning surfaces shall be considered (see Figure A.8) :

Table A.3

Dimensions in millimetres

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

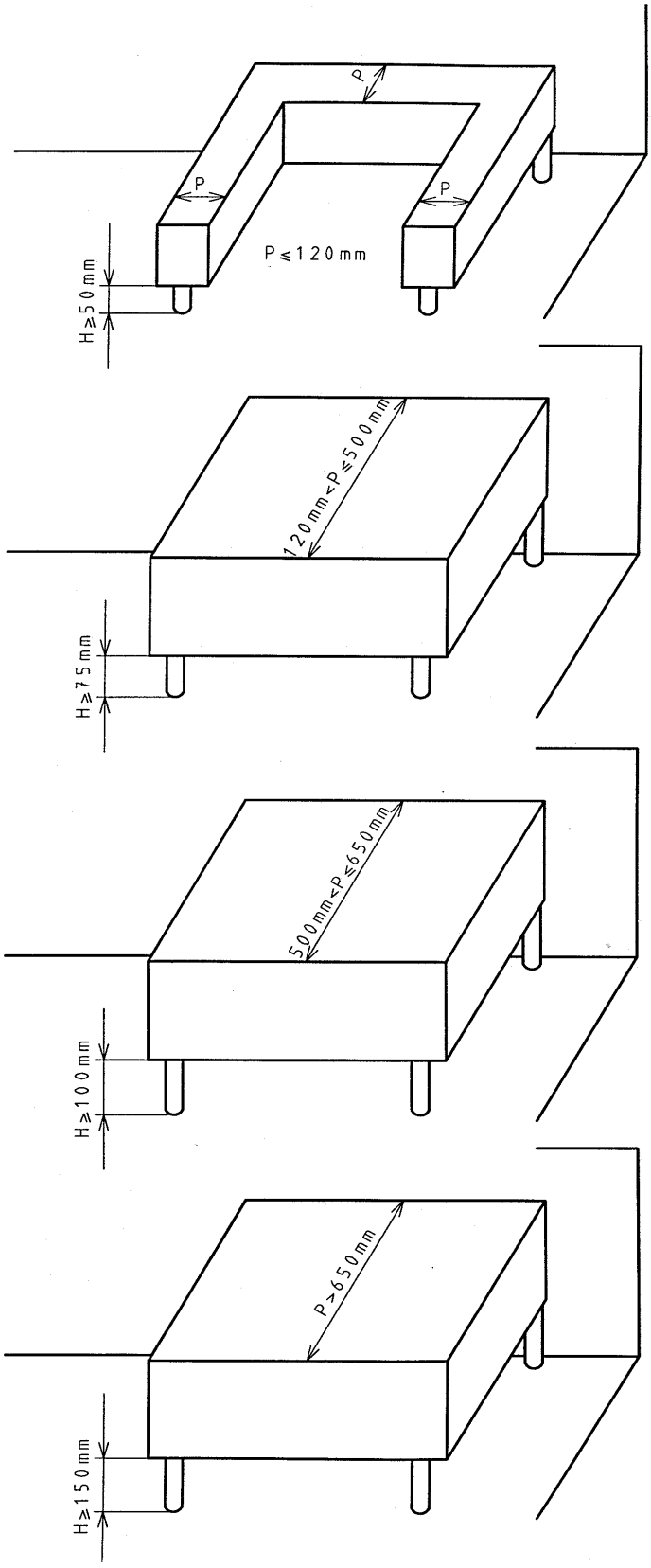


Figure A.8 - Tables to machines

- 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.

A.3.4.2 Machines on the floor

A.3.4.2.1 Fixed machines with or without a base

Fixed machines with on without a base shall either be based on the floor with an interposed continuous and sealed joint, the instruction handbook shall specify the jointing method (see Figure A.9.1), or shall have their feet (*H*) higher than or equal to 150 mm.

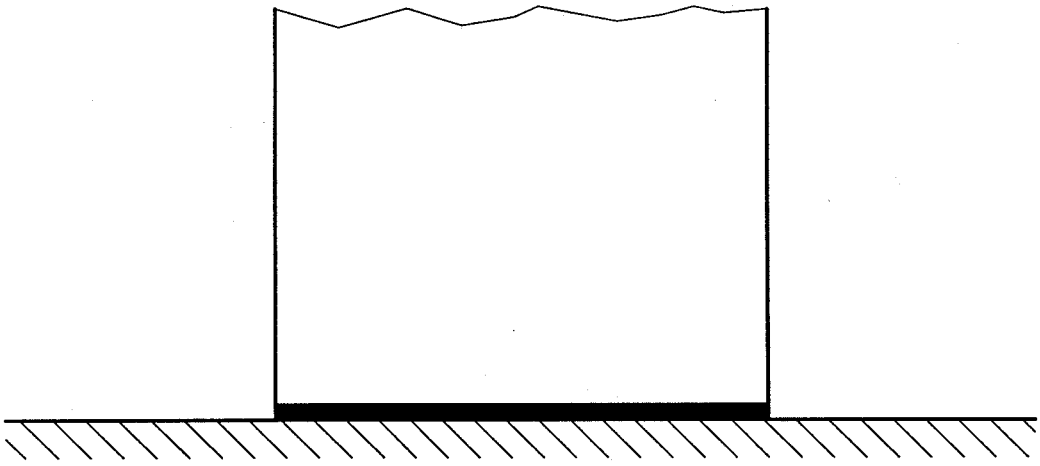


Figure A.9.1

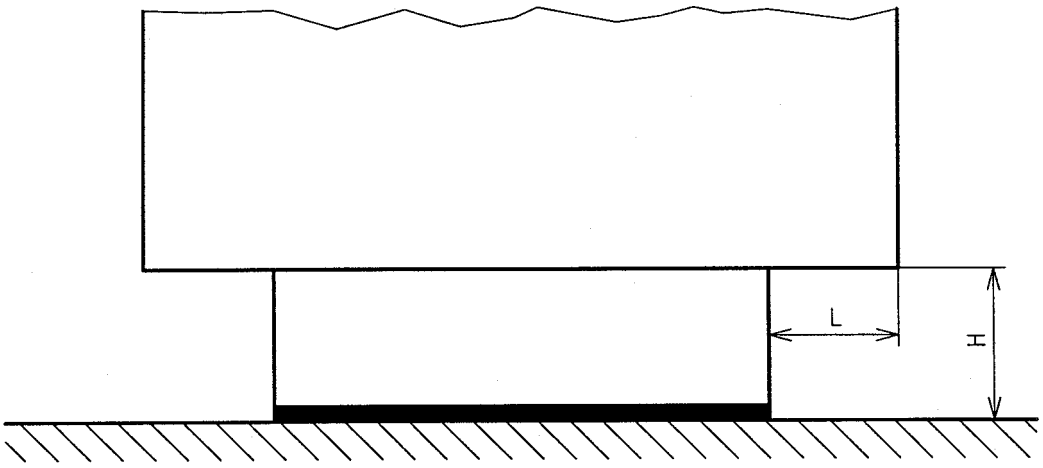


Figure A.9.2

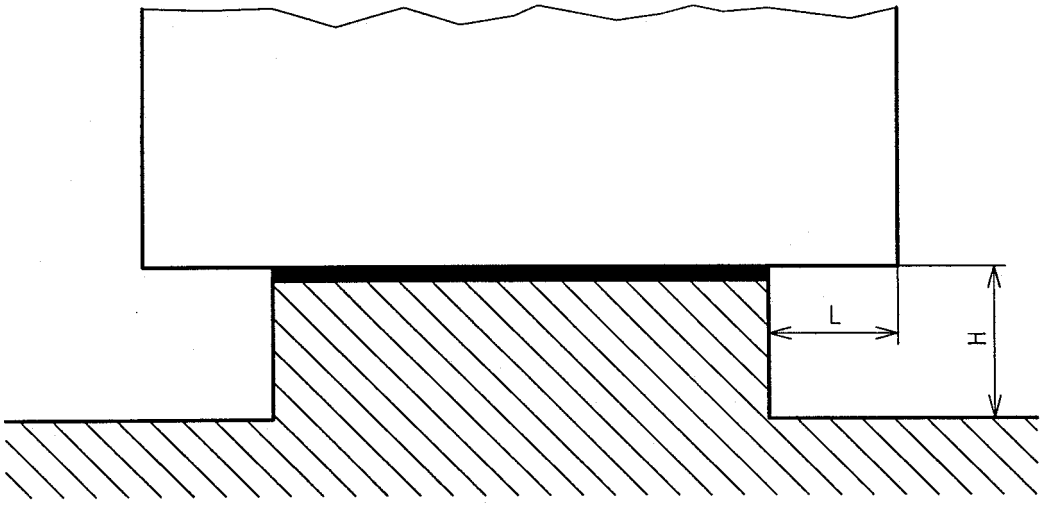


Figure A.9.3

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 A.9.2).

If the foot surface is greater than 1 dm^2 the feet shall be considered to be a base (with interposed seal) (see Figure A.9.3).

A.3.4.2.2 Mobile machines

The castors shall be cleanable. An example is given in Figure A.10, 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.

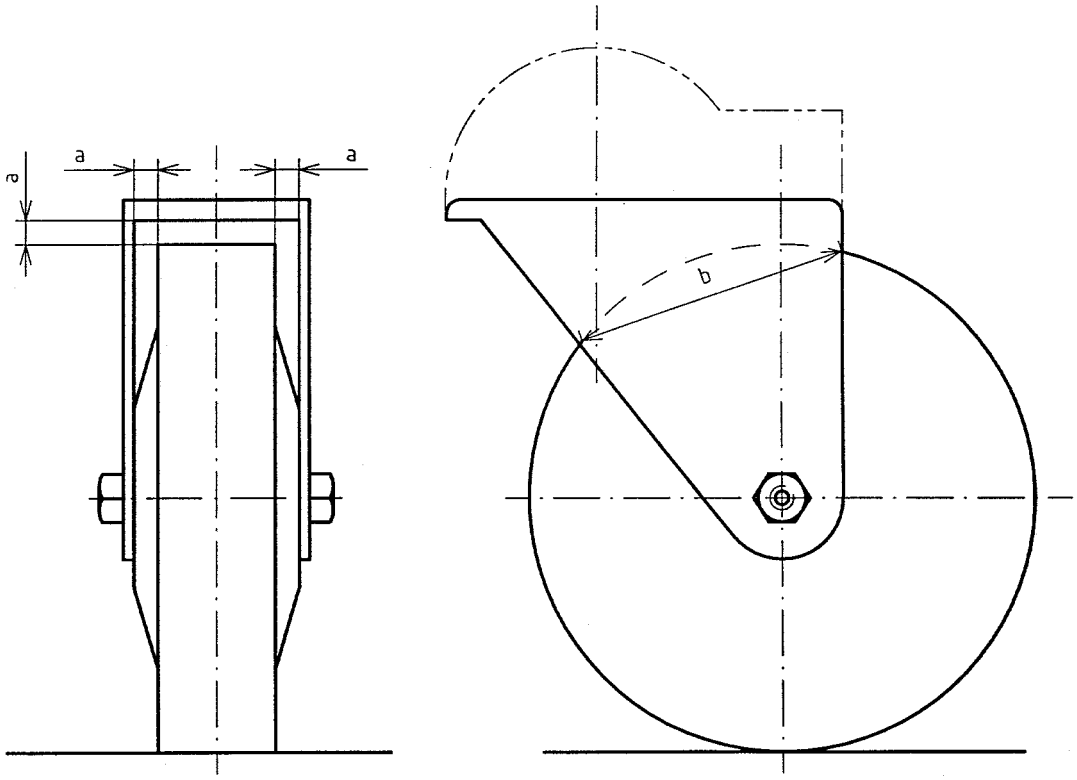


Figure A.10

A.3.5 Ventilation openings

A.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.

A.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.

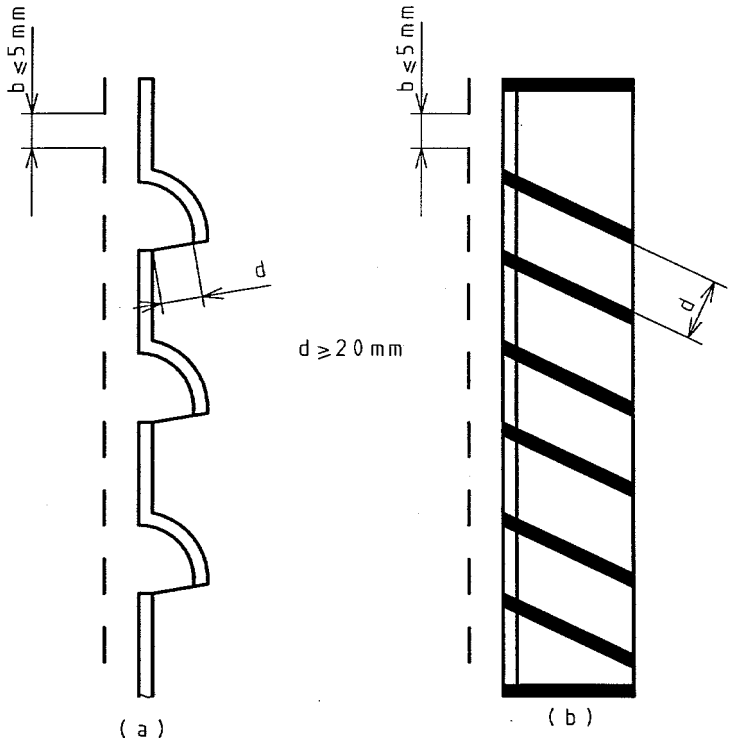


Figure A.11

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 A.11).

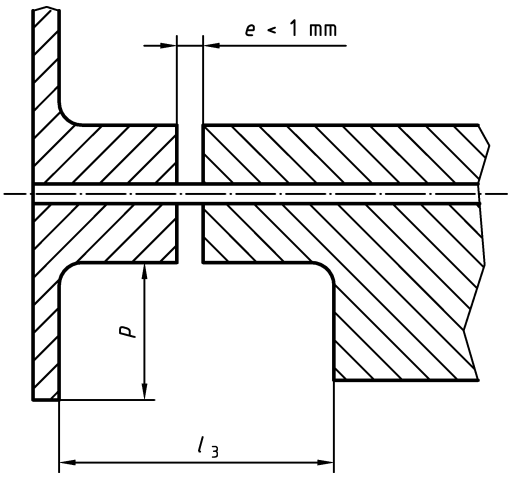
A.3.6 Hinges

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

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

- they shall be easily removed ;
- if they cannot be removed, all surfaces shall be accessible.

Assembly with a fixed part shall be made by a joint designed to prevent any infiltration. Access to all these areas is acceptable when the passage width (l_3) is greater than or equal to two times the depth (*p*). In no case this width (l_3) shall be less than 10 mm (see Figure A.12).



Key
$l_3 \geq 2p$
$l_3 \geq$ 10 mm

Figure A.12

A.3.7 Control panel

A.3.7.1 Control panel in the non-food area

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

A.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 A.13.1) ;

- 12,5 mm if their height *h* is less than or equal to 8 mm (see Figure A.13.2).

If the above requirements cannot be complied with, controls shall be protected by a cap (see Figure A.13.3).

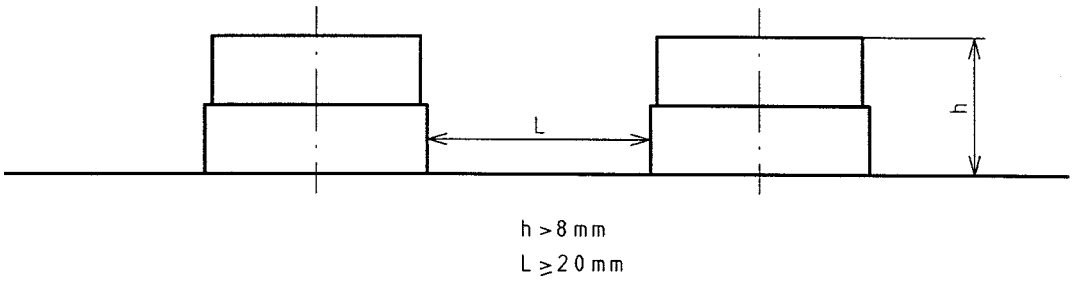


Figure A.13.1

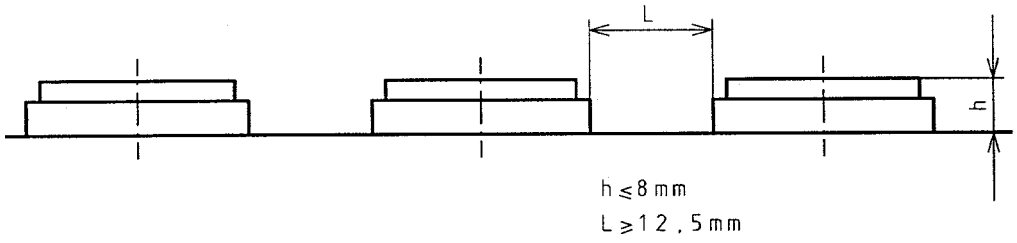


Figure A.13.2

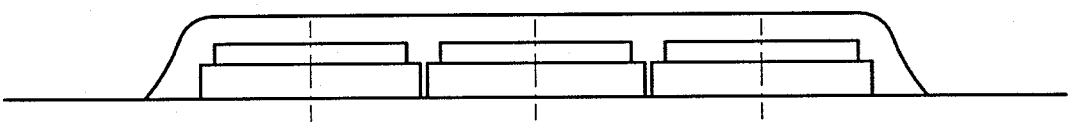


Figure A.13.3

Annex B
(normative)

Noise test code - Grade 2 accuracy

This noise test code applies to pie and tart machines.

B.1 Terms and definitions

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

B.2 Installation and mounting conditions

The test environment suitable for the measurement of the emission sound pressure level shall be a flat outdoor area (for example a car park) or an indoor space that provides an essentially free field over a reflecting plane. This test environment shall be in accordance with the requirements given in annex A of EN ISO 3744:1995.
Care shall be taken to ensure that any electrical conduits, piping or air ducts which are connected to the machinery do not radiate significant amounts of sound energy thus influencing the determination of the noise emission values of the machine under test. This can be avoided by damping or partially encasing these parts.

B.3 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.

B.4 Emission sound pressure level determination

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

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

For class I and II machines, the measurement shall be done at the normal work station of the operator with the operator being absent. Where machines are intended to be put on a table, the measurement shall be done with the machine placed on a test table such as described in annex B of EN ISO 11201:1996. The microphones shall be placed at:

- 1,6 m height above the floor;

- 0,50 m ± 0,02 m in front of the control board of the machine.

For class III machines, emission sound pressure levels for all working stations identified by the manufacturer (loading, control, discharging, …) have to be determined. At each identified workstation, the microphone shall be placed at:

- 1,6 m height above the floor;

- 1,00 m ± 0,02 m in front of the frame of these machines.

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

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

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

B.5 Measurement uncertainties

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

B.6 Information to be recorded

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

B.7 Information to be reported

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

As a minimum, the following information shall be included :

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

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

3) description of the mounting and operating conditions used ;

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

5) the noise emission values obtained.

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

B.8 Declaration and verification of noise emission values

The declaration of the noise emission value shall be made as a dual number noise emission declaration according to EN ISO 4871:1996.

It shall declare the value of the emission sound pressure level L_{pA} and the respective uncertainty K_{pA} according to EN 292-2:1991, annex A, 1.7.4 f and annex B of this standard.
The uncertainty K_{pA} is expected to have a value of 2,5 dB.

The noise declaration shall state that the noise emission value at each workstation has been obtained according to this noise test code and the basic standard EN ISO 11201:1995. If this statement is not true, the noise declaration shall indicate clearly what the deviations are from this noise test code (annex B of this standard) and/or from basic standard.

If undertaken, verification shall be done according to EN ISO 4871:1996 by using the same mounting, installation and operating conditions as those used for the initial determination of the noise emission value.

Annex ZA
(informative)

Relationship of this document with EC Directives

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 EC Directive(s):

Machinery Directive 98/37/EC, amended by Directive 98/79/EC.

Compliance with this document provides one means of conforming with the specific essential requirements of the Directive concerned.

WARNING : Other requirements and other EC Directives may be applicable to the product(s) falling within the scope of this document.

Bibliography

EN 418:1992, *Safety of machinery - Emergency stop equipment, functional aspects, principles for design.*

EN 894-1, *Safety of machinery - Ergonomics requirements for the design of displays and control actuators – Part 1: Human interaction with displays and control actuators.*

EN 894-2, *Safety of machinery - Ergonomics requirements for the design of displays and control actuators – Part 2: Displays.*

EN 894-3, *Safety of machinery - Ergonomic requirement for the design of displays and control actuators – Part 3: Control actuators.*

EN 1005-1:2001, *Safety of machinery - Human physical performance - Part 1: Terms and definitions.*

EN 1005-2:2001, *Safety of machinery - Human physical performance- Part 2: Manual handling of machinery and component parts of machinery.*

EN 1005-3:2002, *Safety of machinery - Human physical performance- Part 3 : Recommended force limits for machinery operation.*

prEN 1005-4:1998, *Safety of machinery - Human physical performance- Part 4 : Evaluation of working postures in relation to machinery.*

EN 61310-1, *Safety of machinery - Indicating Marking and Actuating principles - Part 1 : Requirements for visual, audible and tactile signals (IEC 61310-1:1995).*

EN 60651:1994, Sound level meters (IEC 60651:1993).

EN 61496-1:1997, *Safety of machinery – Electro-sensitive protective equipment – Part 1 : General requirements and tests (IEC 61496-1:1997).*

ISO 468:1982[2], *Surface roughness – Parameters, their values and general rules for specifying requirements.*

[2] ISO 468 was withdrawn in 1998.

blank

BSI — British Standards Institution

BSI is the independent national body responsible for preparing British Standards. It presents the UK view on standards in Europe and at the international level. It is incorporated by Royal Charter.

Revisions

British Standards are updated by amendment or revision. Users of British Standards should make sure that they possess the latest amendments or editions.

It is the constant aim of BSI to improve the quality of our products and services. We would be grateful if anyone finding an inaccuracy or ambiguity while using this British Standard would inform the Secretary of the technical committee responsible, the identity of which can be found on the inside front cover. Tel: +44 (0)20 8996 9000. Fax: +44 (0)20 8996 7400.

BSI offers members an individual updating service called PLUS which ensures that subscribers automatically receive the latest editions of standards.

Buying standards

Orders for all BSI, international and foreign standards publications should be addressed to Customer Services. Tel: +44 (0)20 8996 9001. Fax: +44 (0)20 8996 7001. Email: orders@bsi-global.com. Standards are also available from the BSI website at http://www.bsi-global.com.

In response to orders for international standards, it is BSI policy to supply the BSI implementation of those that have been published as British Standards, unless otherwise requested.

Information on standards

BSI provides a wide range of information on national, European and international standards through its Library and its Technical Help to Exporters Service. Various BSI electronic information services are also available which give details on all its products and services. Contact the Information Centre. Tel: +44 (0)20 8996 7111. Fax: +44 (0)20 8996 7048. Email: info@bsi-global.com.

Subscribing members of BSI are kept up to date with standards developments and receive substantial discounts on the purchase price of standards. For details of these and other benefits contact Membership Administration. Tel: +44 (0)20 8996 7002. Fax: +44 (0)20 8996 7001. Email: membership@bsi-global.com.

Information regarding online access to British Standards via British Standards Online can be found at http://www.bsi-global.com/bsonline.

Further information about BSI is available on the BSI website at http://www.bsi-global.com.

Copyright

BSI
389 Chiswick High Road
London
W4 4AL