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Stroji za predelavo hrane - Mešalniki testa - Varnostne in higienske zahteve

Food processing machinery - Dough mixers - Safety and hygiene requirements

Nahrungsmittelmaschinen - Teigknetmaschinen - Sicherheits- und Hygieneanforderungen

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

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Tovarne in oprema za
živilsko industrijo

Plants and equipment for the
food industry

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EUROPEAN STANDARD
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**Food processing machinery - Dough mixers - Safety and
hygiene requirements**

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

Nahrungsmittelmaschinen - Teigknetmaschinen -
Sicherheits- und Hygieneanforderungen

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

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COMITÉ EUROPÉEN DE NORMALISATION
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EN 453:2014 (E)**Foreword**

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

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of an identical text or by endorsement, at the latest by April 2015 and conflicting national standards shall be withdrawn at the latest by April 2015.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

This document supersedes EN 453:2000+A1:2009.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive 2006/42/EC.

For relationship with EU Directive 2006/42/EC, see informative Annex ZA, which is an integral part of this document.

Significant changes:

The significant changes with respect to the previous edition EN 453:2000+A1:2009 are listed below:

- solid guard to protect against dust emission was added;
- table of verification of safety and hygiene requirements was completely revised.

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

Introduction

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

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

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

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EN 453:2014 (E)

1 Scope

1.1 This European Standard specifies safety and hygiene requirements for the design and manufacture of dough mixers with rotating bowls of capacity greater than or equal to 5 L¹⁾ and less than or equal to 500 L.

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

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

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

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

- planetary mixers (see EN 454);
- continuously fed machines;
- mixers with stationary vertical bowls;
- experimental and testing machines under development by the manufacturer;
- domestic appliances;
- automatic loading and unloading devices

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

2 Normative references

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

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

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

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

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

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

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

EN ISO 3743-1, *Acoustics — Determination of sound power levels and sound energy levels of noise sources using sound pressure — Engineering methods for small movable sources in reverberant fields — Part 1: Comparison method for a hard-walled test room (ISO 3743-1)*

EN ISO 3744:2010, *Acoustics — Determination of sound power levels and sound energy levels of noise sources using sound pressure — Engineering methods for an essentially free field over a reflecting plane (ISO 3744:2010)*

EN ISO 4287, *Geometrical product specifications (GPS) — Surface texture: Profile method — Terms, definitions and surface texture parameters (ISO 4287)*

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

EN ISO 11201:2010, *Acoustics — Noise emitted by machinery and equipment — Determination of emission sound pressure levels at a work station and at other specified positions in an essentially free field over a reflecting plane with negligible environmental corrections (ISO 11201:2010)*

EN ISO 12100:2010, *Safety of machinery — General principles for design — Risk assessment and risk reduction (ISO 12100:2010)*

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

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

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

3 Terms, definitions and description

3.1 Terms and definitions

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

3.2 Description

A dough mixer usually consists of:

- a frame, supporting or containing the drive mechanism and control devices;
- a bowl to contain the ingredients to be mixed. This bowl is driven either mechanically or through the action of the kneading tool on the dough, may be removable, and may tilt;
- one or more kneading tools on a vertical or inclined fixed axis or two special arms mixing the dough. In some cases these devices can be raised to allow bowl or food removal.

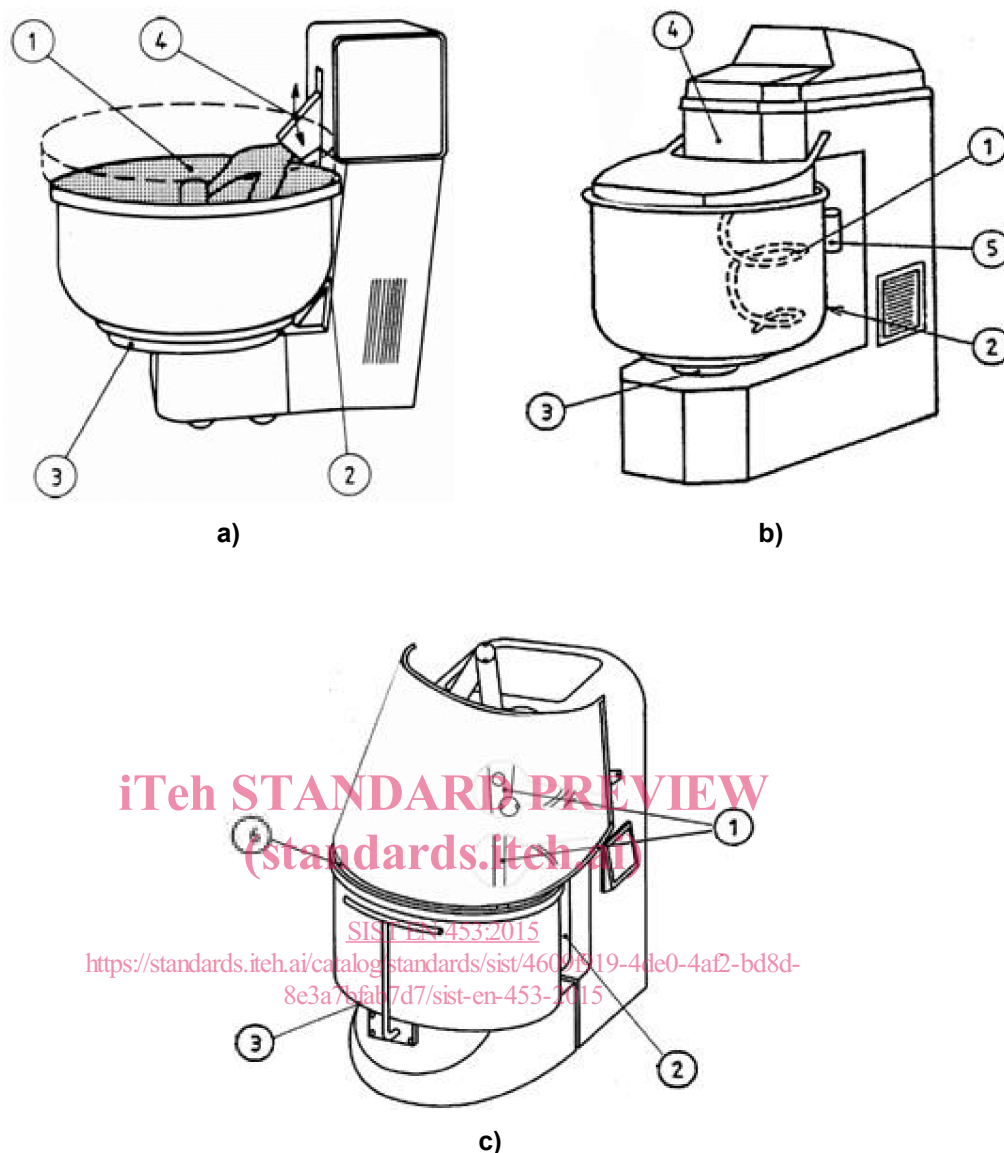
4 List of significant hazards

This clause contains all the significant hazards, hazardous situations and events, identified by risk assessment as significant for this type of machinery and which require measures to eliminate or reduce the risk associated with the identified hazards (see Table 1).

The danger zones are given in Figure 1.

Table 1

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



Key

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

Figure 1 — Danger zones of a dough mixer

5 Safety and hygiene requirements and/or protective measures

5.1 General

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

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

5.2 Mechanical hazards**5.2.1 General**

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

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

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

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

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

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

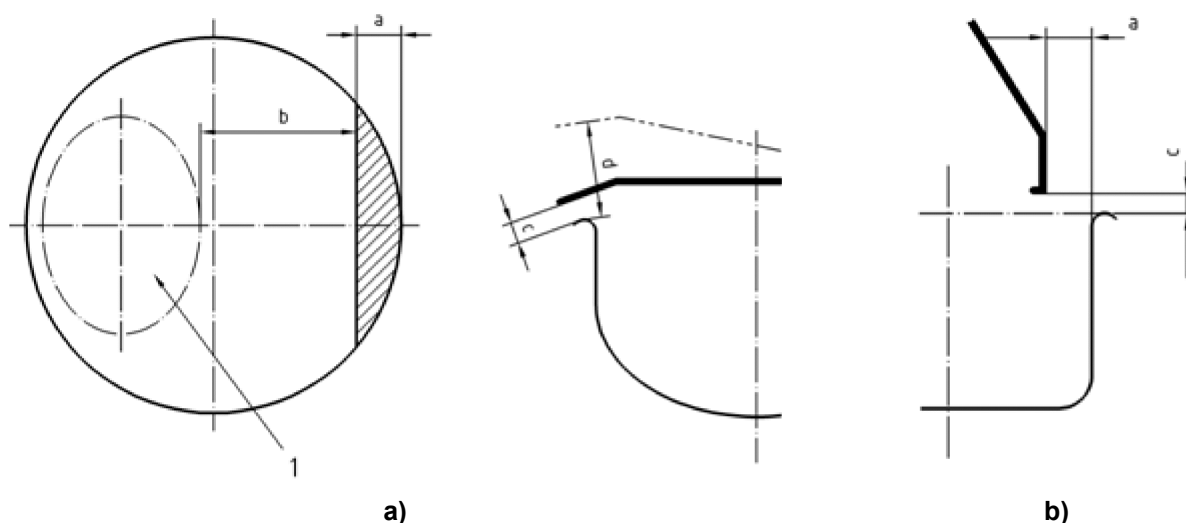
Guards may be, for example, hinged or move up and down vertically and be linked to suitable actuated position detectors functioning in the positive mode in compliance with EN ISO 14119:2013, 5.4. Position detectors themselves shall comply with EN ISO 14119:2013, 5.2 and 5.3.1, and any rotary or linear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

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

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

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

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

**Key**

- (1) volume covered by the kneading tool
- a distance between the internal rim of the bowl and the external part of the guard
- b horizontal distance between the external part of the guard and the nearest point of the danger zone, i.e. the volume covered by the movement of the kneading tool(s)
- c distance between the bowl guard and the rotating bowl rim
- d distance between the upper rim of the bowl and the position of the outer edge of the guard when the interlocking device is actuated

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Figure 2 — Dimensions of the guard

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Table 2 — Dimensions of the guard

Dimensions in millimetres

b	a	c	d
$b \leq 120$	$a = 0$	$c \leq 25$	$d < 25$
$120 < b \leq 230$	$a \leq 100$	$c \leq 25$	$d < 50$
$b > 230$	$a \leq 140$	$c \leq 25$	$d < 75$

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

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

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

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

5.2.3 Zone 2 – Space between bowl and frame

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