



**SLOVENSKI STANDARD**  
**SIST EN 13389:2006**

**01-marec-2006**

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**Stroji za predelavo hrane – Mešalniki z vodoravno gredjo – Varnostne in higienske zahteve**

Food processing machinery - Mixers with horizontal shafts - Safety and hygiene requirements

Nahrungsmittelmaschinen - Mischmaschinen mit horizontalen Wellen - Anforderungen an die Sicherheit und Hygiene

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

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food industry

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**en**

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EUROPEAN STANDARD

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NORME EUROPÉENNE

EUROPÄISCHE NORM

October 2005

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English Version

## Food processing machinery - Mixers with horizontal shafts - Safety and hygiene requirements

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

Nahrungsmittelmaschinen - Mischmaschinen mit  
waagerechten Wellen - Anforderungen an die Sicherheit  
und Hygiene

This European Standard was approved by CEN on 1 August 2005.

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 Central Secretariat 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 Central Secretariat has the same status as the official versions.

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## Foreword

This European Standard (EN 13389:2005) has been prepared by Technical Committee CEN/TC 153 “Food processing machinery — Safety and hygiene specifications”, 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of an identical text or by endorsement, at the latest by April 2006, and conflicting national standards shall be withdrawn at the latest by April 2006.

This European Standard 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(s).

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

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

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EN 13389:2005 (E)

## Introduction

This European Standard is a type C standard as stated in EN ISO 12100-1.

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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## 1 Scope

This European Standard specifies requirements for the design, installation, operation and maintenance of batch production fixed or tilting horizontal bowl type mixers with one or two rotating shafts with or without movable blades. These mixers are used to mix, knead and homogenise food for animal or human consumption in powder, paste or liquid form. The mixers can be floor mounted or transportable (with or without castors). They are intended to be used when stationary.

These machines are used in feed mills and factories which produce, work on or process foodstuff, for example biscuits, bread, chocolate, cereal products.

This European Standard does not deal with the use of the machine in potentially explosive atmospheres.

This European Standard deals with the significant hazards, hazardous situations and events relevant to mixers with horizontal shafts, when used as intended and under the conditions foreseen by the manufacturer.

This European Standard also specifies food hygiene requirements.

The feeding equipment, the dosing equipment, and the requirements of equipment for the supply of inert gases, and for heating and cooling, are excluded from the scope of this European Standard.

The hazards due to the unloading equipment (container, discharge belt, etc.) are not dealt with in this European Standard.

When drafting this European Standard, it has been assumed that the machines are not intended to be cleaned with a water jet.

This European Standard is not applicable to mixers with horizontal shafts which are manufactured before the date of publication of this European Standard by CEN.

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## 2 Normative references

The following referenced documents are indispensable for the application of this European Standard. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

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

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

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

EN 574:1996, *Safety of machinery — Two-hand control devices — Functional aspects — Principles for design.*

EN 953, *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 999, *Safety of machinery — The positioning of protective equipment in respect of approach speeds of parts of the human body.*

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

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EN 1127-1, *Explosive atmospheres — Explosion prevention and protection — Part 1: Basic concepts and methodology.*

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

EN 13478, *Safety of machinery — Fire prevention and protection.*

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

EN 60529, *Degrees of protection provided by enclosures (IP code) (IEC 60529:1989).*

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 4287, *Geometrical Product Specifications (GPS) — Surface texture: Profile method — Terms, definitions and surface texture parameters (ISO 4287:1997).*

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

EN ISO 11201, *Acoustics — Noise emitted by machinery and equipment — Measurement of emission sound pressure levels at a work station and at other specified positions — Engineering method in an essentially free field over a reflecting plane (ISO 11201/AC1:1995).*

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

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

EN ISO 12100-1:2003, *Safety of machinery — Basic concepts, general principles for design — Part 1: Basic terminology, methodology (ISO 12100-1:2003).*

EN ISO 12100-2:2003, *Safety of machinery — Basic concepts, general principles for design — Part 2: Technical principles (ISO 12100-2:2003).*

EN ISO 13732-3, *Ergonomics of the thermal environment - Touching of cold surfaces - Part 3: Ergonomics data and guidance for application (ISO/DIS 13732-3:2002).*

### **3 Terms, definitions, mode of operation and description**

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

For the purposes of this European Standard, the terms and definitions given in EN ISO 12100-1:2003 and the following apply.

##### **3.1.1**

##### **fixed bowl mixer**

mixer with a bowl which is fixed during filling, mixing and discharge

##### **3.1.2**

##### **tilting bowl mixer**

mixer with a bowl that tilts to allow filling and/or discharging of the mixer

##### **3.1.3**

##### **mixing element**

blade, plough, Z blade or other device attached to the main horizontal shafts used to mix the product



### 3.1.4

#### **movable blade(s)**

knife (knives) fixed inside the bowl

### 3.1.5

#### **side cutter**

mixing device independently driven from the main drive shaft(s)

## 3.2 Mode of operation and normal operational use

The range of machines covered by this European Standard are designed to batch mix powdered, paste and liquid products, the primary ingredient usually being flour.

When the mixing bowl is in its loading position, the machine receives the dry or wet ingredients, weighted or metered. This operation is controlled by either the operator of the machine or automatically.

The machine mixes and/or melts ingredients during a time or with an energy based measurement.

When the mixing cycle is over, the product is unloaded into a mobile container, or into a fixed hopper or onto a discharge belt, e. g. by tilting the mixing bowl.

The machine may be manually operated or completely automatic. The bowl may be heated or cooled.

## 3.3 Description

Typical mixers with horizontal shafts are shown in Figures 1a and 1b, with the following main elements:

- a) rigid machine frame;
- b) mixing bowl;
- c) rotating mixing shafts;
- d) main drive motor and gearbox;
- e) bowl tilting mechanism;
- f) electrical controls;
- g) delivery device: discharge hopper, discharge belt or mobile container;
- h) movable blades if any.

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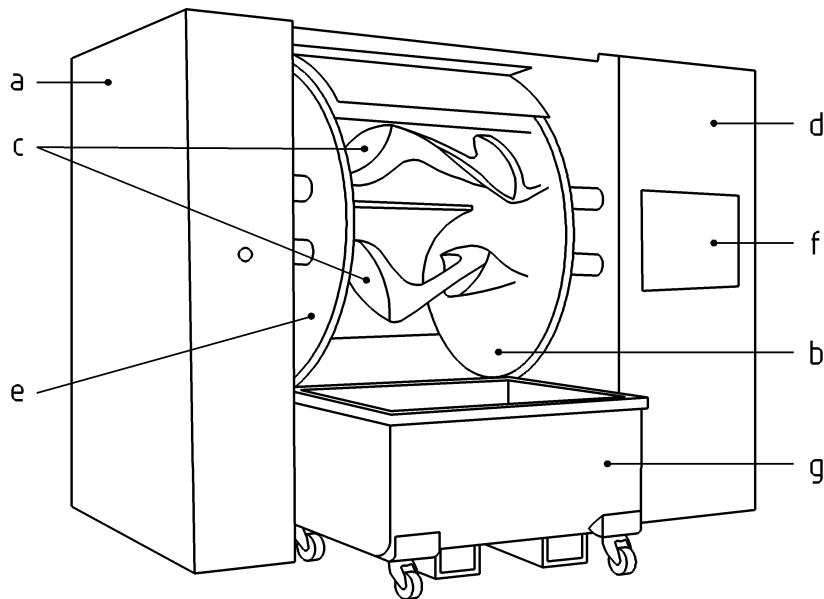


Figure 1a — "Z blade and tilting bowl" machine

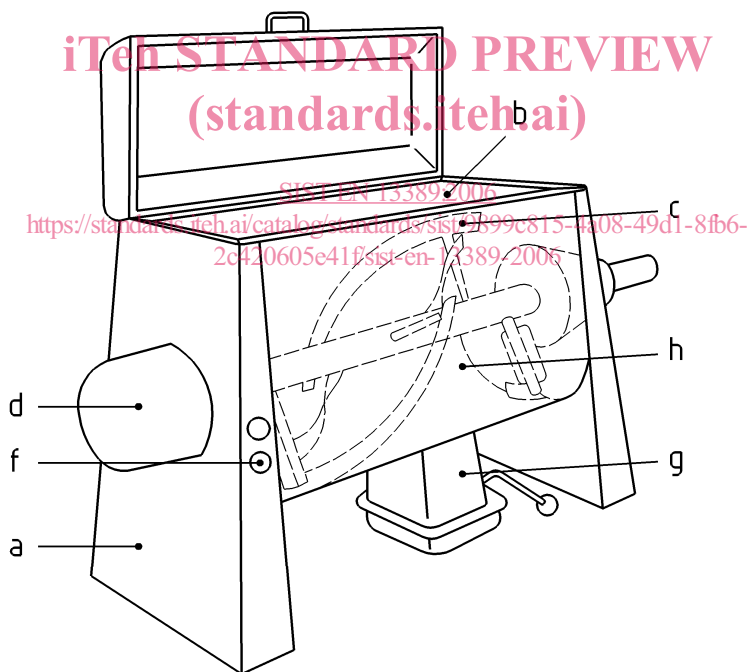


Figure 1b — "Fixed bowl" machine

Figure 1 — Mixers with horizontal shafts

## 4 List of significant hazards

### 4.1 General

This clause contains all the significant hazards, hazardous situations and events, as far as they are dealt with in this European Standard, identified by risk assessment as significant for this type of machinery and which require action to eliminate or reduce the risk.

Before using this European Standard it is important to carry out a risk assessment of the mixer with horizontal shafts to check that it has the hazards identified in this clause.

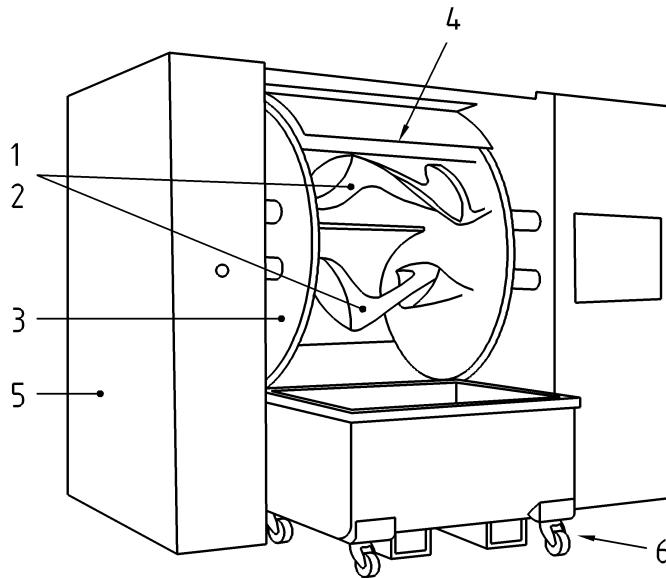
#### 4.2 Mechanical hazards

The significant mechanical hazards are:

- a) trapping points between the blades and the bowl;
- b) trapping points between the bowl and machine frame during tilting of the bowl on tilting bowl machines;
- c) trapping points between the mixer bowl and cover;
- d) drive mechanisms;
- e) loss of stability.

The example shown in Figure 2 illustrates 6 danger zones associated with these hazards:

- Zone 1: Access to the rotating tools through the feed opening:  
hazards of trapping and shearing, between blades and bowl, to the whole or any part of the body;
- Zone 2: Access to the rotating tools through the discharge:  
hazards of trapping and shearing, between blades and bowl, to the whole or any part of the body;
- Zone 3: Access to trapping point between the bowl and machine frame on machines with tilting bowls:  
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hazard of trapping and shearing, between the bowl and machine frame during the tilting operation;  
to upper parts of the body;
- Zone 4: Access to trapping points between the mixer bowl and cover:  
hazard of trapping and shearing, between the bowl and cover, to upper parts of the body;
- Zone 5: Access to the drive mechanism for the rotating shafts or the tilting bowl:  
hazard of shearing and trapping to any part of the body;
- Zone 6: Loss of stability of machine - access to areas adjacent to the machine:  
hazard of trapping and crushing of whole or part of body if machine overturns.

**Key**

- 1 Zone 1
- 2 Zone 2
- 3 Zone 3
- 4 Zone 4
- 5 Zone 5
- 6 Zone 6

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**Figure 2 — Danger zones**  
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**4.3 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).

**4.4 Thermal hazards**

Where the mixing bowl has a double wall for heating or cooling during mixing, there is a hazard of burning when touching hot or cold surfaces of the jacket.

**4.5 Hazards generated by noise**

Mixers with horizontal shafts can generate an airborne noise being able to involve a deterioration of hearing or accidents due to the interferences with the oral communication and the perception of the acoustical signals.

**4.6 Hazards resulting from the inhalation of harmful mists and dusts**

Loading the products exposes operators to dust including flour and ingredients which may be harmful to their health, causing rhinitis (running noses), watering eyes and possibly occupational asthma (see also 4.7 below).

**4.7 Fire or explosion hazard**

When loading, mixing or discharging finely divided, dusty materials, a hazard of dust explosion exists when dust/air mixtures are present between the lower and upper explosive limits.

#### 4.8 Hazard generated by neglecting hygienic design principles

The neglect of hygienic principles can create unacceptable modification of foodstuff and therefore a risk to human health of the operator and consumer, i.e. through physical, chemical or microbial pollution.

#### 4.9 Hazards generated by neglecting ergonomic principles

During operation, cleaning and maintenance, there is a risk of injury to the body resulting from awkward body postures.

Movement or filling of the bowl especially at heights can create a risk of injury to the body from lifting, pushing and pulling of heavy loads.

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

#### 5.1 General

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

In addition, the machine shall be designed according to the principles of EN ISO 12100 for hazards relevant but not significant, which are not dealt with by this European Standard (e. g. sharp edges).

NOTE For hazards which are to be reduced by the application of type B standards such as EN ISO 12100, EN 294, EN 418, EN 563, EN 574, EN 953, EN 954-1, EN 999, EN 1088, EN 1127-1, EN 13478 and EN 60204-1, the manufacturer should carry out a risk assessment to establish the requirements of that standard which are to be applied. This specific risk assessment is part of the general risk assessment of the machine.

Where the means of reducing the risk is by the physical arrangement or positioning of the installed machine, the manufacturer shall include in the information for use a reference to the reduction means to be provided, and to any limiting value of the requirement, and, if appropriate, to the means of verification.

Where the means of reducing the risk is by a safe system of working the machinery, the manufacturer shall include in the Information for use details of the system and of the elements of training required by the operating personnel.

#### 5.2 Mechanical hazards

##### 5.2.1 General

Unless otherwise specified, interlocking devices shall be without guard locking and shall comply with 4.2.1, 5 and 6 of EN 1088:1995.

Safety related parts of control systems shall be not less than category 1 of EN 954-1:1996.

The guards shall comply with EN 953.

##### 5.2.2 Machines with fixed bowl

###### 5.2.2.1 Zone 1 – Access to the rotating mixing element through the in-feed opening

Access to the area where the mixing element moves shall be prevented by a solid, movable, interlocking guard with guard control locking (see clause 4.2.2 of EN 1088:1995).

Openings and/or feed chutes in the lid or bowl shall be in accordance with 4.5 in EN 294:1992. For small openings Table 4 of EN 294:1992 shall be used.

###### 5.2.2.2 Zone 2 – Access to the rotating mixing element during discharge

Access to the area where the mixing element moves shall be prevented in one of the following ways.