



# SLOVENSKI STANDARD

## SIST EN 454:2001

01-september-2001

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### Stroji za predelavo hrane - Planetarni mešalniki - Varnostne in higienske zahteve

Food processing machinery - Planetary mixers - Safety and hygiene requirements

Nahrungsmittelmaschinen - Planetenrühr- und -knetmaschinen - Sicherheits- und Hygieneanforderungen

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

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#### **ICS:**

67.260	Tovarne in oprema za živilsko industrijo	Plants and equipment for the food industry
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**SIST EN 454:2001**

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ICS 67.260

English version

## Food processing machinery - Planetary mixers - Safety and hygiene requirements

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

Nahrungsmittelmaschinen - Planetenrühr- und -knetmaschinen - Sicherheits- und Hygieneanforderungen

This European Standard was approved by CEN on 22 December 1999.

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

Central Secretariat: rue de Stassart, 36 B-1050 Brussels

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## Foreword

This European Standard 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of an identical text or by endorsement, at the latest by September 2000, and conflicting national standards shall be withdrawn at the latest by September 2000.

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 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, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

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## 0 Introduction

The extent to which hazards are covered is indicated in the scope of this standard. In addition, machinery shall comply as appropriate with EN 292 for hazards which are not covered by this standard.

## 1 Scope

This standard specifies safety and hygiene requirements for the design and manufacture of fixed bowl planetary mixers of capacity greater than or equal to 5 l<sup>1)</sup> and less than 500 l used to process various ingredients e.g. cocoa, flour, sugar, oils and fat, minced meat, eggs, and other ingredients, in the food industry and shops.

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

The following machines are excluded :

- accessory planetary mixers ;
- continuously fed machines ;
- dough mixers<sup>2)</sup> ;
- experimental and testing machines under development by the manufacturers ;
- domestic appliances.

The intended use of the machine, as defined in 3.12 of EN 292-1:1991 and in the manufacturer's instruction handbook is loading various ingredients, processing them in a stationary bowl by means of appropriate beaters, unloading and cleaning.

Processing is carried out in cycles of variable duration.

It can be either manually or automatically-controlled, in individual cycles or on a cycle repeat basis, etc.

Manual operations are sometimes necessary to add ingredients without stopping the beater.

On machines fitted with a bowl lifting and lowering device or with a device for moving the bowl/head/beater vertically the working position is that when the beater is nearest to the bottom of the bowl.

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The significant hazards covered by this standard are mechanical (shearing, trapping, loss of stability), electrical, thermal, ergonomic and also hazards resulting from gas accumulation, noise, inhalation of dust, and lack of hygiene.

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<sup>1)</sup> Note : Below 5 l, EN 60335-1 and EN 60335-2 are applicable.

<sup>2)</sup> EN 453.

This standard does not deal with noise reduction.

The standard applies only to machines manufactured after the date of its issue.

## 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.

EN 292-1	1991	Safety of machinery - Basic concepts - General principles for design - Part 1 : Basic terminology, methodology
EN 292-2 + A1	1991 1995	Safety of machinery - Basic concepts - General principles for design - Part 2 : Technical principles and specifications
EN 298	1993	Automatic gas burner control systems for gas burners and gas burning appliances with or without fans
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 - Part1 : Terminology and general principles
EN 954-1	1996	Safety of machinery - Safety related parts of control systems - Part 1 : General principles for design
EN 1050	1996	Safety of machinery -Principles for risk assessment
EN 1088	1995	Safety of machinery - Interlocking devices associated with guards - Principles for design and selection
EN 1672-2	1997	Food processing machinery - Common requirements - Part 2 : Hygiene requirements
EN 60204-1	1997	Safety of machinery - Electrical equipment of machines - Part 1 : General requirements
EN 60529	1991	Degrees of protection provided by enclosures
EN 60651	1994	Sound level meters
EN ISO 3743-1	1995	Acoustics - Determination of sound levels of noise sources - Engineering methods for small, movable sources in reverberant fields - Part 1 : Comparison method for hard-walled test rooms
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
EN ISO 4871	1996	Acoustics - Declaration and verification of noise emission values of machinery and equipment



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
EN ISO 11688-1	1998	Acoustics - Recommended practice for the design of low-noise machinery and equipment - Part 1 : Planning
EN ISO 12001	1996	Acoustics - Noise emitted by machinery and equipment - Rules for the drafting and presentation of a noise test code
ISO 468	1982	Surface roughness - Parameters values and general rules for specifying requirements

### 3 Description

A planetary mixer (see figure 1) usually consists of a frame supporting :

- a) a casing containing the beater(s) drive mechanism ;
- b) control devices ;
- c) a bowl, in which ingredients are processed ;
- d) interchangeable beaters designed to process ingredients and which move around a fixed or mobile axis (planetary motion). Their rotation speed may be either constant or variable ;
- e) a power connection for attachments such as meat mincers, vegetable slicers, etc. ;
- f) a device for vertically moving the bowl or the head of the mixer to allow beater removal ;
- g) a device for handling the bowl, for example a trolley.

The following features may also be included :

- bowl heating ;
- bowl cooling ;
- bowl gravity discharge.

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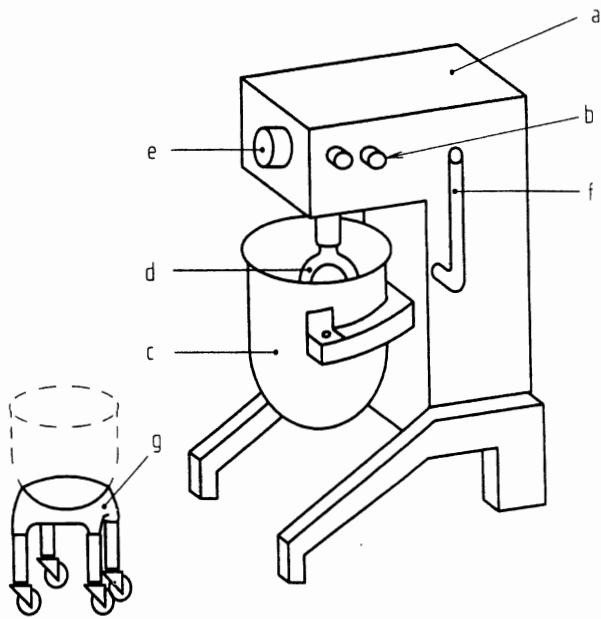


Figure 1 a)

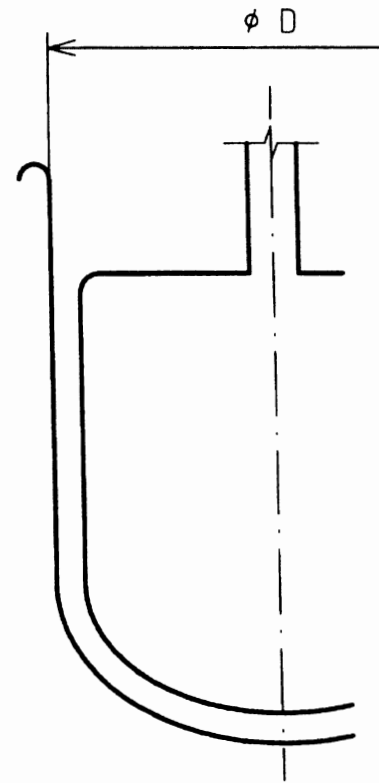


Figure 1 b)

Figure 1 : Main parts of a planetary mixer (with guard removed)  
and illustration of bowl diameter

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## 4 Classification

Planetary mixers shall be divided into the following three categories according to their bowl volume and/or diameter :

- class 1 shall have a volume equal to or greater than 5 l and less than 10 l and/or a diameter less than or equal to 260 mm ;
- class 2 shall have a volume equal to or greater than 10 l and less than 150 l and/or a diameter greater than 260 mm and less than or equal to 510 mm ;
- class 3 shall have a volume greater than or equal to 150 l and less than 500 l and/or a diameter greater than 510 mm ;

Where :

- the bowl volume is the maximum volume of water in litres that the bowl can contain ;
- the bowl diameter is the inside diameter D measured at the bowl upper edge (figure 1).

When a mixer is supplied with several bowls of different capacities, the mixer classification shall be determined by the size of the bowl with the greatest volume.

## 5 List of hazards

This clause contains all hazards identified by risk assessment (see EN 1050) as specific and significant for planetary mixers and which require action to reduce risk.

### 5.1 Mechanical hazards

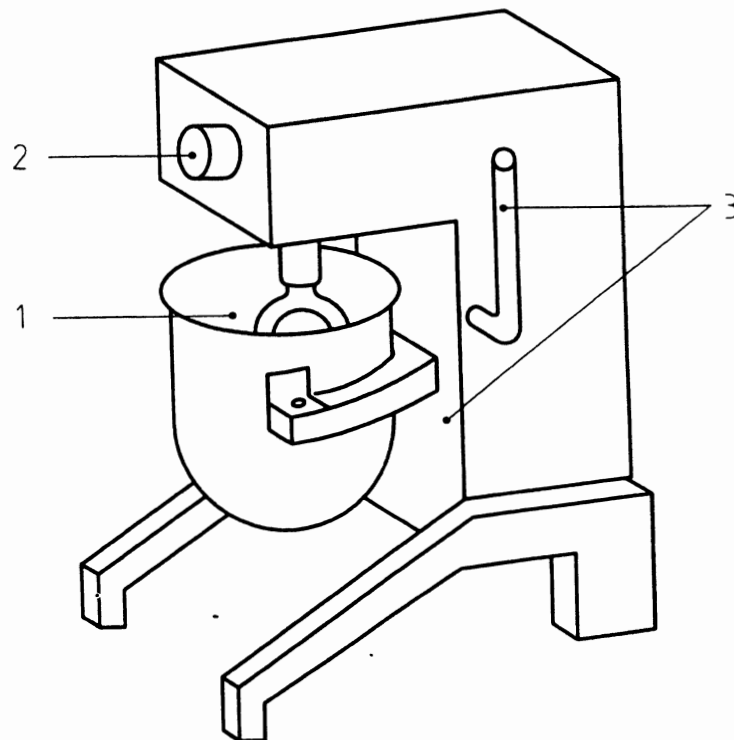
The significant mechanical hazards are :

- shearing hazard ;
- trapping hazard ;
- loss of stability.

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The example shown in figure 2 illustrates 3 danger zones associated with these hazards :

- zone 1 : volume covered by the moving beater ; hazard of trapping ;  
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- zone 2 : mechanical power connection for attachments, if any ; hazard of shearing, trapping ;
- zone 3 : space between bowl lifting system and frame ; hazard of trapping during bowl lifting/lowering.



**Figure 2 : Danger zones of a planetary mixer (with guard removed)**

## 5.2 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).

## 5.3 Thermal hazards

Where a bowl heating device is fitted, there is a hazard of burns by contact with the heating device or with the bowl.

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## 5.4 Hazards generated by gas accumulation

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Where open flame heating devices are used as bowl heating, there is a hazard of gas accumulation.

## 5.5 Hazards generated by noise

Especially class 3 planetary mixers generate airborne noise which can result in hearing damage, in accidents due to interference with speech communication and interference with the perception of acoustic signals.

## 5.6 Hazards resulting from inhalation of dust

Because of the larger volume of ingredients processed, the use of class 3 planetary mixers particularly 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.

## 5.7 Lack of hygiene

Lack of hygiene can create a risk to human health and unacceptable modification of foodstuff e.g. contamination by microbial growth or foreign materials.

## 5.8 Hazards generated by neglecting ergonomic principles

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

Movement of the bowl between different working stations, or filling or emptying of the bowl can create a risk of injury or chronic damage to the body from lifting, pushing and pulling of heavy loads.

## 6 Safety and hygiene requirements and/or measures

This clause states the requirements and/or measures to be met to reduce the effect of the hazards detailed in clause 5.

### 6.1 Mechanical hazards

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

Safety related control systems shall be category 1 as defined in clause 6 of EN 954-1 : 1996.

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### 6.1.1 Zone 1 - Volume covered by the movement of the beater

#### 6.1.1.1 Class 1 planetary mixers

Because of their low power and small size, access to the volume covered by the beater need not be prevented but shall be at least restricted in the following ways :

- a) there shall be a minimum distance of 120 mm between the upper edge of the bowl and the upper limit of the volume covered by the beater (see figure 3 a) ;
- b) a bowl extension shall be provided. This may be fixed or associated with an interlocking device and movable so that the beater will not operate unless it is in position (see figure 3 b)).

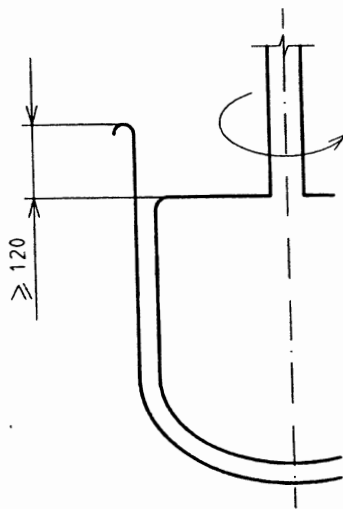


Figure 3 a)

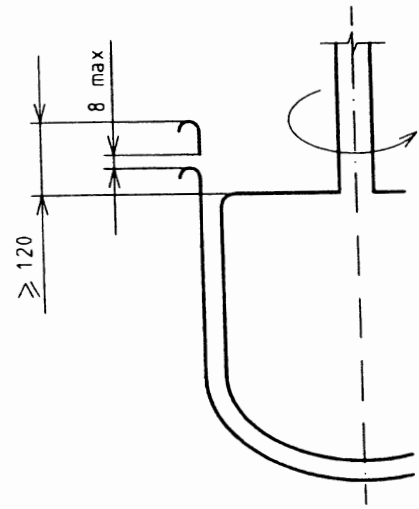


Figure 3 b)

Figure 3: Class 1 planetary mixers

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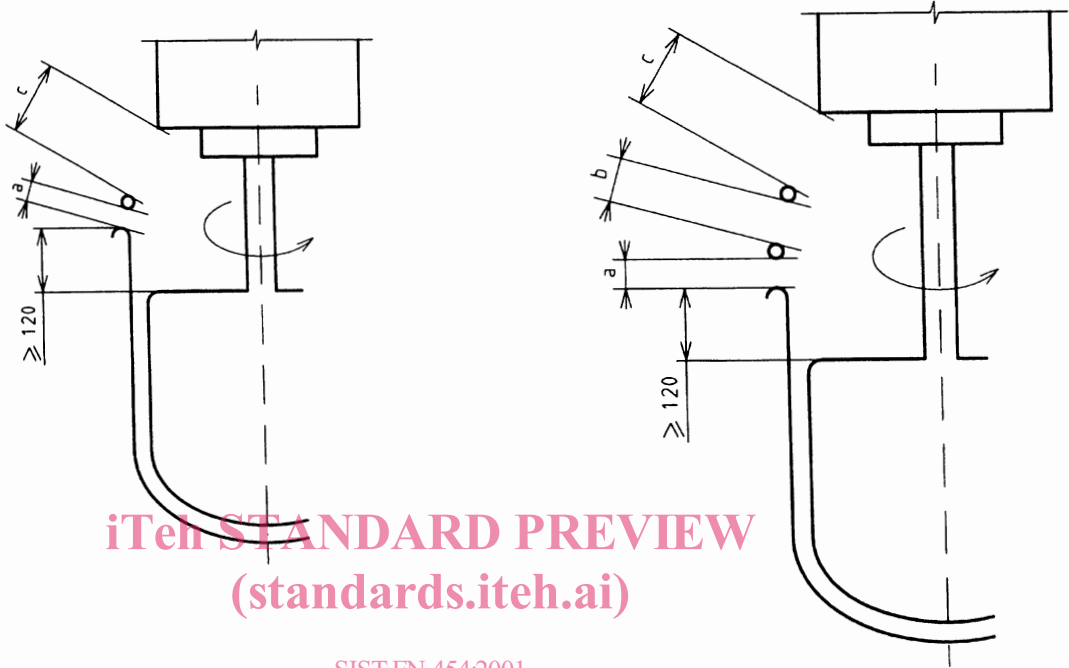
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**6.1.1.2 Class 2 planetary mixers**

A class 2 planetary mixer shall be fitted either with a guard as specified in 6.1.1.3 or with one or more sensitive bars complying with the following :

- the bars shall stop the beater rotation when a vertical upward or downward force of 30 N is applied to them ;
- movement to actuate the stopping device shall not exceed 5 mm ;
- there shall be a minimum distance of 120 mm between the upper limit of the volume covered by the beater and the upper edge of the bowl ;
- the distances between the trip bar (or bars), the bowl and the machine frame shall comply with the values shown in figure 4 ;
- the design of the trip bar shall minimize the risk that the accumulation of food between the trip bar and a fixed part prevents its operation.

Dimensions in millimetres



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a < 40 mm  
b < 60 mm  
c < 100 mm

Figure 4 a)

Figure 4 b)

Figure 4 : Class 2 planetary mixers with trip bars