



## SLOVENSKI STANDARD

### SIST EN 1678:2000

01-junij-2000

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**Stroji za predelavo hrane - Stroji za rezanje zelenjave - Varnostne in higienske zahteve**

Food processing machinery - Vegetable cutting machines - Safety and hygiene requirements

Nahrungsmittelmaschinen - Gemüseschneidemaschinen - Sicherheits- und Hygieneanforderungen

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

**Ta slovenski standard je istoveten z: EN 1678:1998**

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**ICS:**

67.260

Tovarne in oprema za  
živilsko industrijo

Plants and equipment for the  
food industry

**SIST EN 1678:2000**

**en**

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EUROPEAN STANDARD

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Descriptors: agro-industry facilities, food industry equipment, cutting machines, vegetables, safety requirements, accident prevention, hygiene, hygiene conditions, hazards, safety measures, dangerous areas, verification, information, utilization, marking

English version

## Food processing machinery - Vegetable cutting machines - Safety and hygiene requirements

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

Nahrungsmittelmaschinen - Gemüseschneidemaschinen -  
Sicherheits- und Hygieneanforderungen

This European Standard was approved by CEN on 28 February 1998.

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.

CEN members are the national standards bodies of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

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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 1998, and conflicting national standards shall be withdrawn at the latest by September 1998.

It is one of a series of standards on the design and construction of machines used in catering.

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.

## 0 Introduction

The use of vegetable cutting machines involves various mechanical and other hazards.

Their extensive use justifies the need of a standard covering both safety and the hazards to food hygiene arising from machine design.

This European standard is a type C standard as stated in clause 0 of EN 292:1991.

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

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## 1 Scope

This standard specifies the safety and hygiene requirements for the design and manufacture of vegetable cutting machines which are transportable and have a maximum rated power less than 3 kW.

It does not apply to domestic machines.

It applies when such machines are used to operate under the intended conditions of use as defined in 3.12 of EN 292-1:1991 and stated in the instruction handbook (see 7.1), including cleaning, removal of jammed food, feeding and changing the cutting device.

**NOTE** : If the machine is not used under the above conditions, the manufacturer should, when informed of such a situation, check by a new risk analysis that the preventive measures remain valid.

All types of vegetable cutting machines are contained within the scope of this standard including all machines carrying out the function of cutting, shredding, dicing, chipping and grating food products according to the specification of the manufacturer whatever the cutting motion. In particular, this standard covers those vegetable cutting machines consisting of a chamber in which a knife or cutting disc rotates, machines of rotating drum type in which the cutting is done by fixed knives and potato chipping machines with a horizontal reciprocating motion. It applies to all such machines in which the product passes through the machines.

This standard does not cover those machines as food processors or peelers which are covered by specific standards. The hazards of automatic feeding devices are not covered by this standard.

This standard excludes vegetable cutting attachments which are mounted onto machines having an auxiliary drive hub such as planetary mixers, and which are dealt with in a specific Standard.

It covers all significant hazards at such machines, as identified by risk assessment (see EN 1050), which are listed in clause 4 of this standard.

Noise can be a significant hazard for some large machines. At the present time, there is insufficient information of emission value and noise attenuation measures to enable an achievable noise emission level to be set nor requirement specified. In the meantime noise measurements shall be made according to annex A and information given to users and where the noise is significant makers have to comply with Directive requirements to reduce noise emission as far as possible.

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This standard does not deal ~~(with the hazard of vibrations)~~.

This standard applies primarily to machines which are manufactured after its date of issue.

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**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 292-2:1991	Safety of machinery - Basic concepts, general principles for design - Part 2 : Technical principles and specifications
EN 292-2/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 614-1:1995	Safety of machinery - Ergonomic design principles - Part 1 : Terminology and general principles
EN 954-1:1996	Safety of machinery - Safety related parts of control systems - Part 1 : General principles for design
EN 1088:1995	Safety of machinery - Interlocking devices with guards - Principles associated for design and selection
EN 1672-2:1997	Food processing machinery - Basic concepts - Part 2 : Hygiene requirements
EN 60204-1:1992	Safety of machinery - Electrical equipment of machines - Part 1 : General requirements (IEC 204-1:1992, modified)
EN 60529:1991	Degrees of protection provided by enclosures (code IP)
EN ISO 3744:1995	Acoustics - Determination of sound power levels of noise sources - Engineering method employing an enveloping measurement surface 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
ENV 1070:1993	Safety of machinery - Terminology.
ISO 468:1982	Surface roughness - Parameters, their values and general rules for specifying requirements
EN 953:1997	Safety of machinery - General requirements for the design and construction of guards (fixed, movable)

### **3 Definitions - Description**

#### **3.1 Definitions**

For the purposes of this standard, the definitions given in ENV 1070 and the following apply.

**3.1.1 pusher device** : Device assisting feeding, hinged to the hopper and interlocked so when withdrawn from the hopper the machine stops. It prevents access to the danger zone when in the working position.

**3.1.2 plunger device** : Device assisting feeding, which is removable.

#### **3.2 Description**

##### **3.2.1 Machines covered by the standard**

This standard covers the three following types of machine including combinations of them :

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### 3.2.1.1 Machines with rotating cutting devices

Such machines contain the rotating cutting devices in a fixed chamber. Product is fed into the top of the chamber, typically through a feed hopper and assisted by a pusher or plunger device (see figure 1).

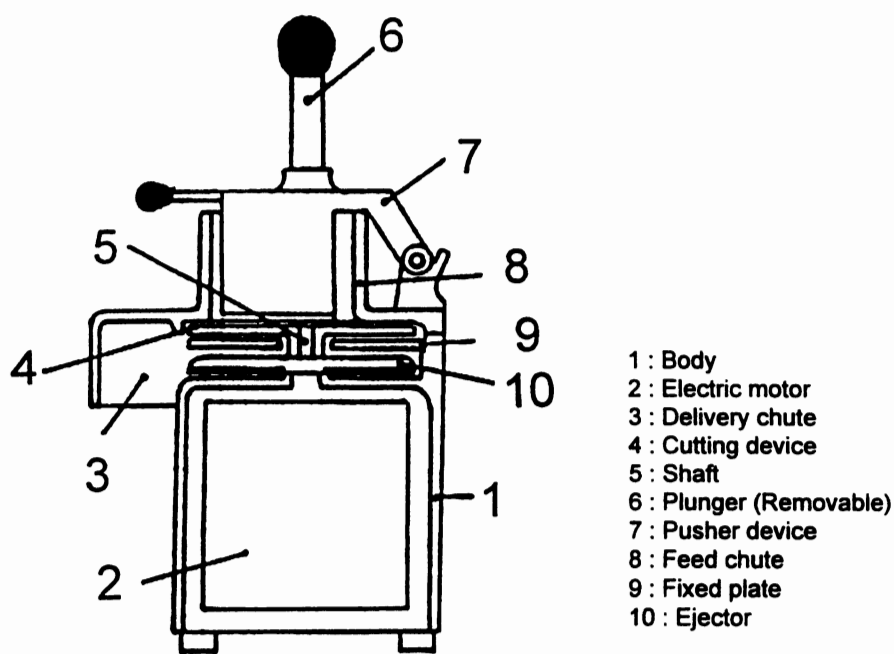


Figure 1

### 3.2.1.2 Machines with rotary drum

These machines generally have a hopper method of feeding product to a rotating drum. As the product is held against the outside wall by the spinning drum so it comes into contact with a fixed cutting device (see figure 2).

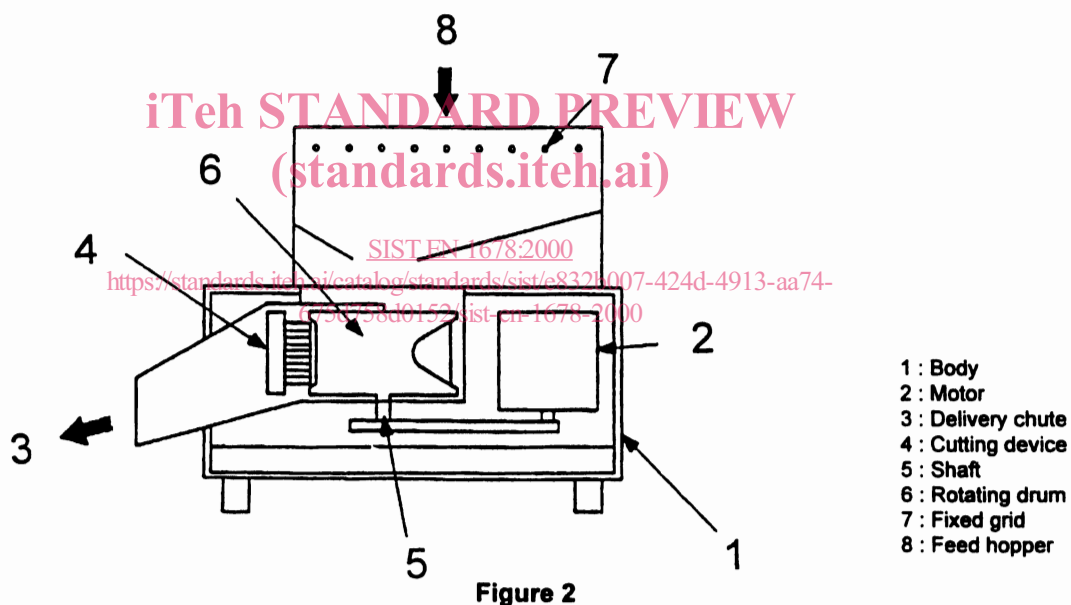
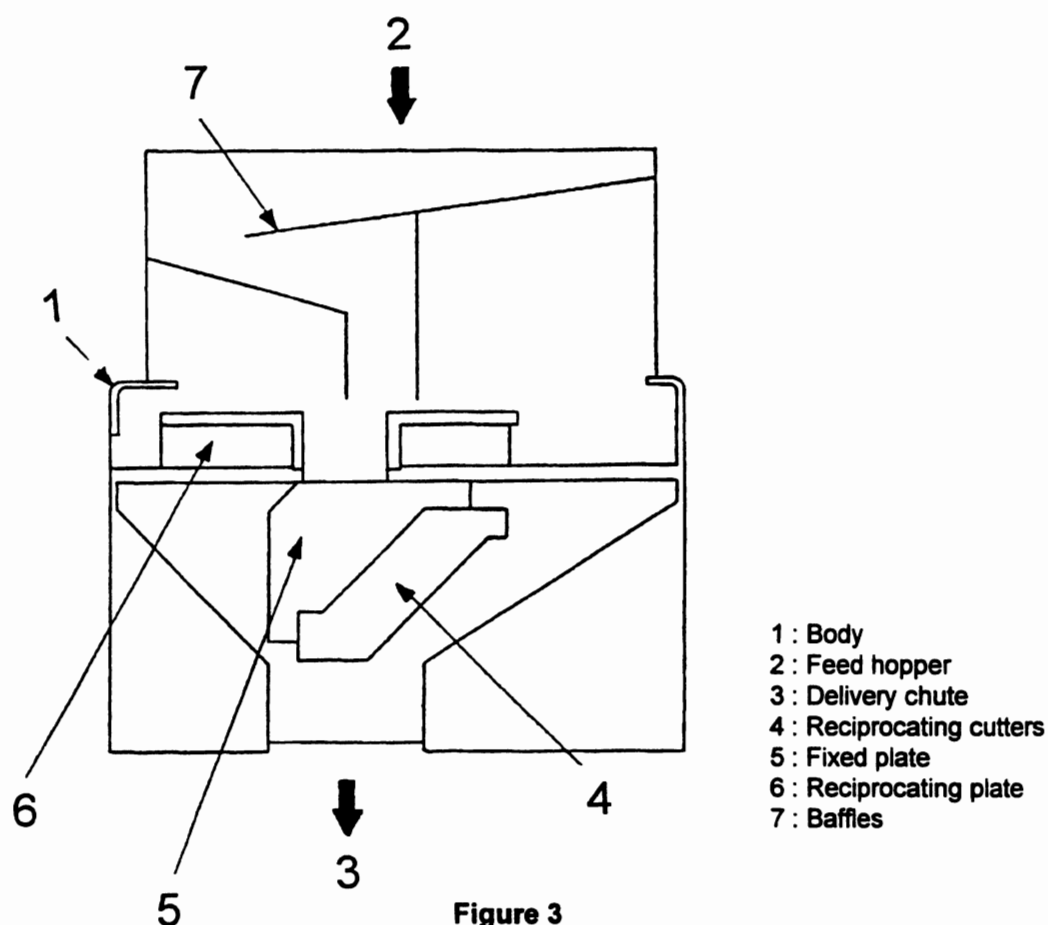


Figure 2

### 3.2.1.3 Machines with horizontal reciprocating cutters

These machines are used extensively for chipping potatoes. Raw potatoes are fed from a hopper into the cutting chamber containing fixed plates and reciprocating plates and cutting devices (see figure 3).



- 1 : Body
- 2 : Feed hopper
- 3 : Delivery chute
- 4 : Reciprocating cutters
- 5 : Fixed plate
- 6 : Reciprocating plate
- 7 : Baffles

### 3.2.2 Elements of a machine (see figures 1, 2 and 3)

All machines generally contain the following elements of design :

- a device for feeding product into the machine ;
- one or several tools : cutting plates or blades, hereafter called "cutting devices". A cutting plate or blade consists of one or more cutting edges fixed to a frame. Fixed cutting blades may be installed in conjunction with moving plates ;
- an ejector ;
- a delivery chute ;
- control devices.

### 3.2.3 Devices for feeding

Three devices for feeding product are used :

### 3.2.3.1 Hopper feed

The product is fed to the cutter from the hopper generally by gravity and/or by feeding devices.

### 3.2.3.2 Pusher feed

Here a smaller amount of product is fed into a feed chute and assisted to the cutters by pressure on the pusher device.

### 3.2.3.3 Plunger feed

Here product is manually fed to the cutting device. It is assisted with a plunger. Typically the feeding is done through a narrow feed chute.

Often machines have both pusher and plunger feed so that the operator can select the most suitable operation according to the food product being cut.

## 4 List of hazards

This standard covers the significant hazards related to intended conditions of use.

### 4.1 Mechanical hazards

#### 4.1.1 Access to the danger zones

Mechanical hazards arise from the risk of contact with the cutting devices and the associated rotating parts.

The hazards may be reached by :

- Zone 1 : access down the feed chute/hopper ;

Hazard of cutting and drawing-in,

- Zone 2 : access when opening the machine to expose the cutter or drum. Typically this is when cleaning the machine or changing the cutting device.

Hazard of cutting and drawing-in ;

- Zone 3 : access through the delivery chute ;

Hazard of crushing and drawing-in ;

- Zone 4 : access to the driving mechanism ;

Hazard of crushing and drawing-in.

#### 4.1.2 Loss of stability

Hazards of crushing and impact.

#### 4.1.3 Incorrect assembly and fitting

Hazard of cutting and impact for fingers or hands.

#### 4.1.4 Handling, cleaning and storage of cutting devices.

Hazard of cutting and impact.

#### 4.2 Electrical hazards

Hazard of shock by direct or indirect contact with live parts.

#### 4.3 Hazards generated by neglecting hygiene principles in the machine design

Inability to clean food contact and splash areas effectively and thoroughly.

Contamination of the food by undesirable materials including residues of food, microbiological causes as well as residues of cleaning and disinfecting fluids.

#### 4.4 Hazards generated by neglecting ergonomic principles in machine design

Lack of ergonomic principles can be anything that causes wrong operation of controls, physical damage due to over-reaching, heavy loads, awkward posture, etc.

#### 4.5 Noise

Noise may be hazard resulting in :

- permanent loss of hearing acuteness ;
- tinnitus ;
- tiredness, stress, etc.

## 5 Safety and hygiene requirements and/or measures

### 5.1 Mechanical hazards

All the interlocking devices associated with guards shall comply with 5.7 of EN 1088:1995. Safety related parts of control systems shall comply with category 1 of EN 954-1:1996.

#### 5.1.1 Access to the danger zones

##### 5.1.1.1 Zone 1

###### 5.1.1.1.1 Objective

The safeguarding objective is to prevent contact by the operator (or other person) reaching down the feed openings and coming into contact and being injured by the cutting device.

###### 5.1.1.1.2 General

All three devices for feeding (hopper, plunger and pusher) consist of an opening which could give access to the cutting devices. The level of hazard is in relationship with the size of each feeding device. Requirements of table 4 of EN 294:1992 should be fulfilled to prevent any access to the cutting devices with the upper limbs.

See also 5.1.1.1.4.

Nevertheless, in order to comply with particular specificities of use, like :

- dimensions and diversity of food products to be processed (vegetable, fruits, ...);
- height of loading and of discharge chute ;
- ratio performance/compactness ;
- cleanability ;

and taking into account risk assessment, one of the solutions given in 5.1.1.1.3 and 5.1.1.1.4 shall be taken.

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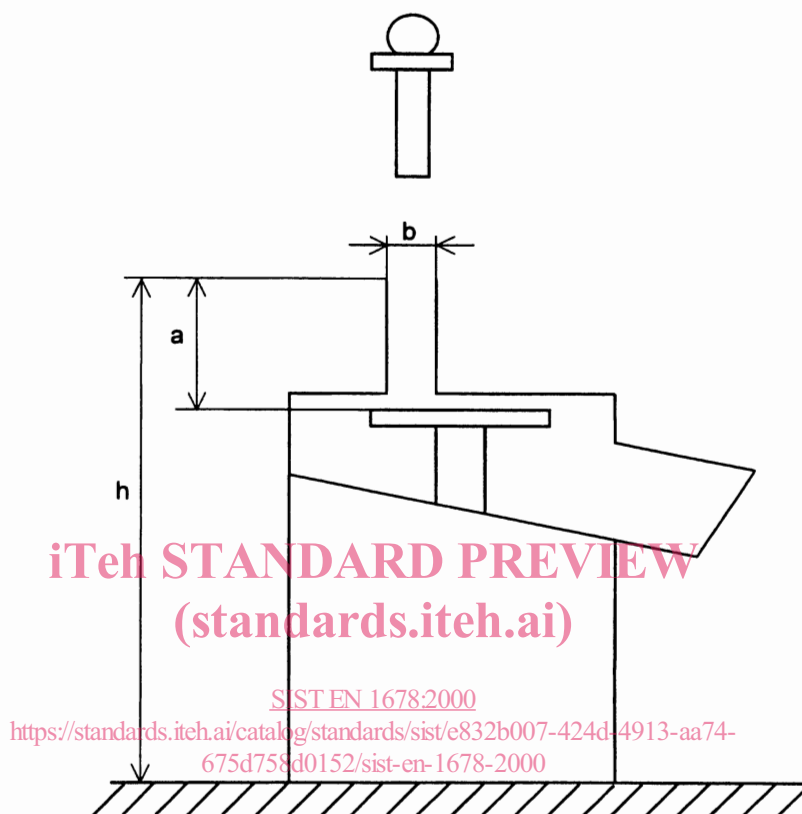
**5.1.1.1.3 Feeding by plunger or pusher**

The dimensions of the feed chute shall conform to the table 1 :

**Table 1**

Dimensions in millimetres

Maximum dimension of the opening of feed tube (b)	Safety reach distance between the edge of the hopper and the blade (a)	
	For cutting gap depth $\leq 10$	For cutting gap depth $> 10$
$\leq 55$	$\geq 120$	$\geq 120$
$\leq 60$	$\geq 130$	$\geq 130$
$\leq 70$	$\geq 150$	$\geq 230$
$\leq 80$	$\geq 150$	$a \geq 230$ with $h \geq 1400$ (see figure 4)
$> 80$	Pusher device with interlocking device	



**5.1.1.1.3.1** In all cases where  $b$  is less than or equal to 80 mm and where the table 1 is used :

- a plunger shall be supplied, with all machines having a feed tube ;
- where machines are not dedicated to be used with cutting devices the height of which is greater than 10 mm, a notice in the instruction handbook shall be given.



5.1.1.1.3.2 For the case where  $b > 80$  mm machines shall have an interlocking control guard pusher device, the interlocking switch shall be designed to meet the opening and closing and stopping time required as below.

Where a pusher device is used, this can restart the machine without operating the on/off switch. For those machines the stopping time shall be less than 2 s.

It shall be measured when the machine is running without product at its maximum speed and equipped with the heaviest cutting device.

The safety interlocked switch shall be actuated when the gap ( $x$ ) between the top of the aperture and the edge of the pusher is as shown in figure 5, where :

$$x \leq 60 \text{ mm for } a \geq 150 \text{ mm}$$

$$x \leq 45 \text{ mm for } 130 \text{ mm} \leq a < 150 \text{ mm}$$

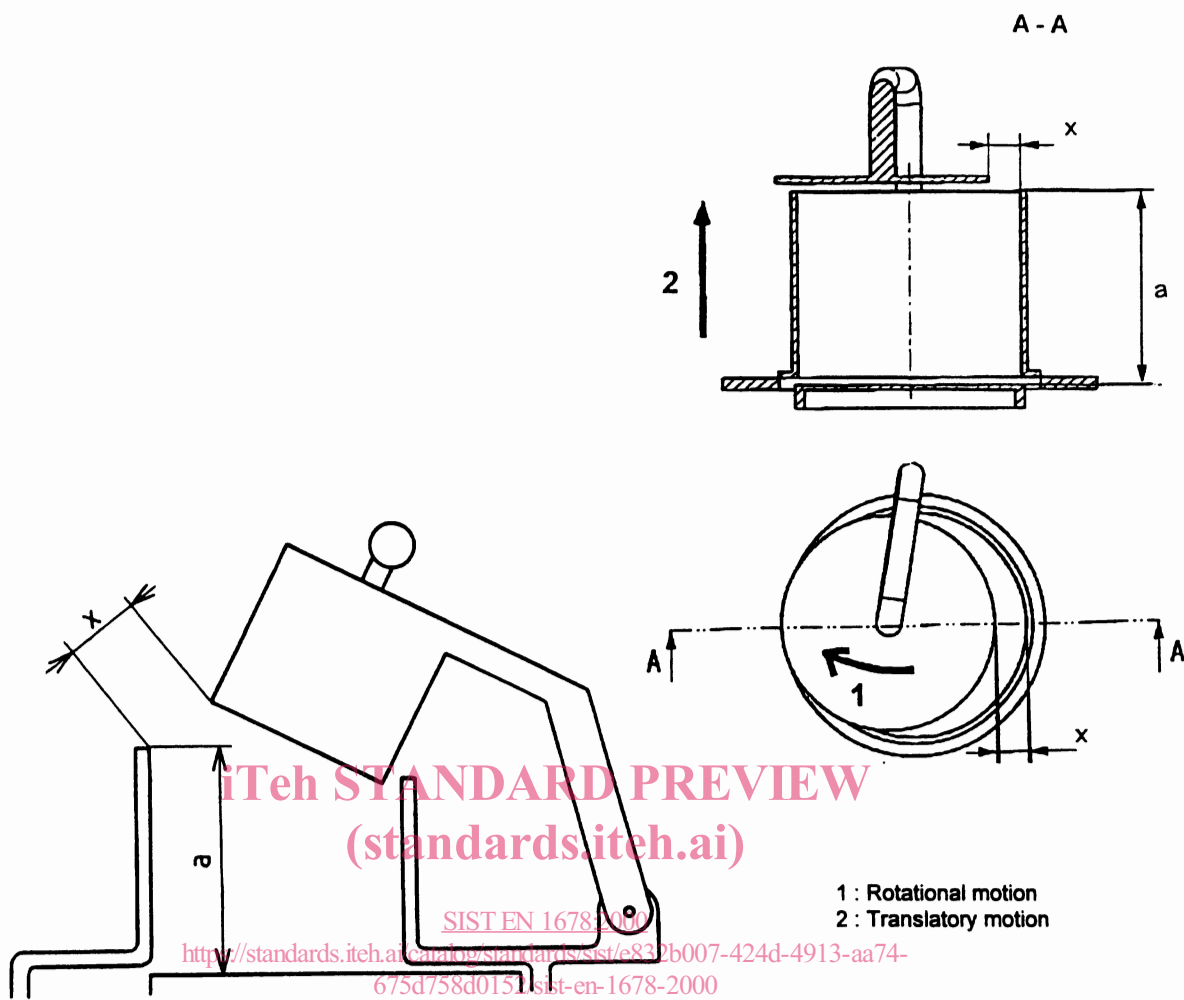


Figure 5a : Hinger pusher

Figure 5b : Sliding pusher

Figure 5