

# **SLOVENSKI STANDARD**

## **SIST EN 12012-3:2002+A1:2008**

**01-november-2008**

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### **Stroji za predelavo gume in plastike - Drobilni stroji - 3. del: Varnostne zahteve za drobilnike**

Plastics and rubber machines - Size reduction machines - Part 3: Safety requirements for shredders

Kunststoff- und Gummimaschinen - Zerkleinerungsmaschinen - Teil 3:  
Sicherheitsanforderungen für Walzenzerkleinerer

Machines pour les matières plastiques et le caoutchouc - Machines à fragmenter - Partie  
3 : Prescriptions de sécurité relatives aux déchiqueteurs

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**Ta slovenski standard je istoveten z: EN 12012-3:2001+A1:2008**

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#### **ICS:**

83.200

Oprema za gumarsko  
industrijo in industrijo  
polimernih materialov

Equipment for the rubber and  
plastics industries

**SIST EN 12012-3:2002+A1:2008**

**en**

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EUROPEAN STANDARD  
NORME EUROPÉENNE  
EUROPÄISCHE NORM

**EN 12012-3:2001+A1**

September 2008

ICS 83.200

Supersedes EN 12012-3:2001

English Version

**Plastics and rubber machines - Size reduction machines - Part  
3: Safety requirements for shredders**

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Zerkleinerungsmaschinen - Teil 3:  
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This European Standard was approved by CEN on 18 January 2001 and includes Amendment 1 approved by CEN on 8 June 2008.

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 CEN Management Centre 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 CEN Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

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

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## Foreword

This document (EN 12012-3:2001+A1:2008) has been prepared by Technical Committee CEN/TC 145 "Plastics and rubber machines", the secretariat of which is held by UNI.

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 March 2009, and conflicting national standards shall be withdrawn at the latest by December 2009.

This document includes Amendment 1, approved by CEN on 2008-06-08. The main changes compared to the previous version are:

- modification of the main element of the title
- editorial modification of Annex ZA
- addition of Annex ZB
- editorial changes of EN 292-1:1991 to EN ISO 12100-1:2003 and of EN 292-2:1991 to EN ISO 12100-2:2003 in the following clauses and sub-clauses: 2, 5, 7.1.1, Annex A, A.3.1
- minor changes of Foreword, sub-clause 7.2, second and third indents, Annex A, A.7, third indent.

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This document supersedes EN 12012-3:2001.

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The start and finish of text introduced or altered by amendment is indicated in the text by tags **A1** **A1**

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 EC Directives.

**A1** For relationship with EU Directive(s), see informative Annexes ZA and ZB, which are integral parts of this document. **A1**

This is the third in a series of standards on the safety of size reduction machines.

— Part 1 deals with blade granulators;

— Part 2 deals with strand pelletisers.

Annex A is 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, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

## 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 the essential safety requirements applicable to the design and construction of shredders used for plastic and rubber.

The machine begins with the outer edge of the feed hopper and ends with the discharge area.

This standard does not deal with equipment for feeding material or discharging shredded material.

This standard does not deal with safety measures to reduce the risk from ignition of flammable residues in material to be shredded

This standard does not deal with requirements for local exhaust ventilation systems.

Only the significant hazards listed in clause 4 and dealt with in clause 5 are subject to this standard.

**NOTE** Directive 94/9/EC concerning equipment and protective systems intended for use in potentially explosive atmospheres can be applicable to the type of machine or equipment covered by this European Standard. The present standard does not necessarily comply with Directive 94/9/EC. Additional safety requirements in a future revision of this standard may be necessary to satisfy Directive 94/9/EC.

This standard applies to machines which are manufactured after the date of approval of this standard 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).

**[A<sub>1</sub>]** *deleted text* **[A<sub>1</sub>]**

EN 294:1992, *Safety of Machinery - Safety distances 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 626-1:1994, *Safety of Machinery - Reduction of risk to health from hazardous substances emitted by machinery – Part 1: Principles and specifications for machinery manufacturers*

- 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 999:1998, *Safety of machinery – The positioning of protective equipment in respect of approach speeds of parts of the human body*
- EN 1037:1995, *Safety of machinery - Prevention of unexpected start-up*
- EN 1070, *Safety of machinery - Terminology*
- EN 1088:1995, *Safety of Machinery - Interlocking devices associated with guards - Principles for design and selection*
- EN 50014, *Electrical apparatus for potentially explosive atmospheres – General requirements*
- EN 50015, *Electrical apparatus for potentially explosive atmospheres - Oil-immersion "o"*
- EN 50016, *Electrical apparatus for potentially explosive atmospheres - Pressurised apparatus "p"*
- EN 50017, *Electrical apparatus for potentially explosive atmospheres - Powder filling "q"*
- EN 50018, *Electrical apparatus for potentially explosive atmospheres - Flameproof enclosures "d"*
- EN 50019, *Electrical apparatus for potentially explosive atmospheres - Increased safety "e"*
- EN 50020, *Electrical apparatus for potentially explosive atmospheres - Intrinsic safety "i"*
- EN 60204-1:1997, *Safety of Machinery - Electrical equipment of machines - Part 1: General requirements (IEC 60204-1:1997)*
- EN 60529:1991, *Degrees of protection provided by enclosures (IP Code) (IEC 60529:1989)*
- EN ISO 3741:1999, *Acoustics -Determination of sound power levels of noise sources using sound pressure - Precision methods for reverberation rooms (ISO 3741:1999)*
- EN ISO 3743-1:1995, *Acoustics - Determination of sound power levels of noise sources - Engineering methods for small movable sources in reverberant fields - Part 1: Comparison method for hard-walled test rooms (ISO 3743:1994)*
- EN ISO 3743-2:1996, *Acoustics - Determination of sound power levels of noise sources using sound pressure - Engineering methods for small movable sources in reverberant fields - Part 2: Methods for special reverberation test rooms (ISO 3743-2:1994)*
- 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 3746:1995, *Acoustics - Determination of sound power levels of noise sources using sound pressure - Survey method using an enveloping measurement surface over a reflecting plane (ISO 3746:1995)*
- EN ISO 3747:2000, *Acoustics - Determination of sound power levels of noise sources using sound pressure – comparison method for use in-situ (ISO 3747:2000)*
- EN ISO 4871:1996, *Acoustics - Declaration and verification of noise emission values of machinery and equipment (ISO 4871:1996)*

**EN 12012-3:2001+A1:2008 (E)**

EN ISO 9614-1:1995, *Acoustics - Determination of sound power levels of noise sources using sound intensity - Part 1: Measurement at discrete points (ISO 9614-1:1993)*

EN ISO 9614-2:1996, *Acoustics - Determination of sound power levels of noise sources using sound intensity - Part 2: Measurement by scanning (ISO 9614-2:1996)*

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 11202:1995, *Acoustics - Noise emitted by machinery and equipment - Measurement of emission sound pressure levels at the work station and at other specified positions - Survey method in situ (ISO 11202:1995)*

EN ISO 11203:1995, *Acoustics - Noise emitted by machinery and equipment - Determination of emission sound pressure levels at the work station and at other specified positions from the sound power level (ISO 11203:1995)*

EN ISO 11204:1995, *Acoustics - Noise emitted by machinery and equipment - Measurement of emission sound pressure levels at the work station and at other specified positions - Method requiring environmental corrections (ISO 11204:1995)*

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)*

<sup>[A1]</sup> EN ISO 12100-1:2003, *Safety of machinery - Basic concepts, general principles for design - Part 1: Basic terminology, methodology (ISO 12100-1:2003)* <sup>[A1]</sup>

<sup>[A1]</sup> EN ISO 12100-2:2003, *Safety of machinery - Basic concepts, general principles for design - Part 2: Technical principles (ISO 12100-2:2003)* <sup>[A1]</sup>

ISO 3745:1977, *Acoustics - Determination of sound power levels of noise sources - Precision methods for anechoic and semi-anechoic rooms*

### 3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 1070 and the following terms and definitions apply:

**3.1 shredder**  
machine with one or more low speed rotating shafts on which cutting tools are fitted which shred the material between the tools on the revolving shaft(s) or between the tools on one shaft and a stationary cutting tool

**3.2 shredding chamber**  
part of the machine where shredding takes place

**3.3 rotor**  
one or more rotating devices including the shaft(s), tools and/or cutting tools inside the shredding chamber

**3.4 stationary cutting tool**  
single or multiple tools fixed inside the shredding chamber



**3.5****feeding device**

part of the machine used for feeding the material into the shredding chamber. The feeding device can be fixed, e.g. a hopper or similar device, or moveable, e.g. a conveyor belt(s)

**3.6****feeding area**

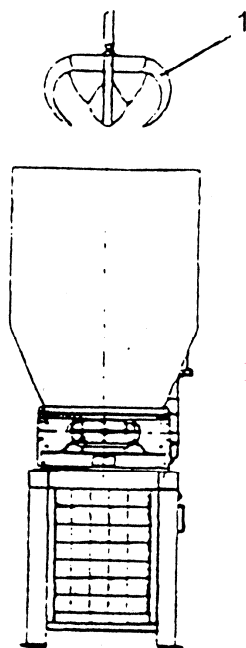
area of the machine where the feeding of material takes place

**3.7****discharge area**

area where the cut material leaves the shredding chamber

**3.8****working level**

surface on which the person who feeds the machine stands

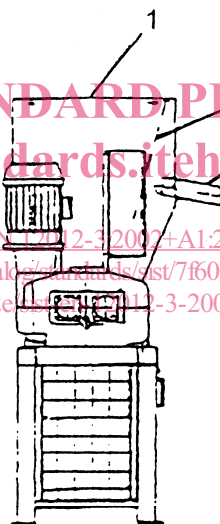


1 Grab

Figure 1a

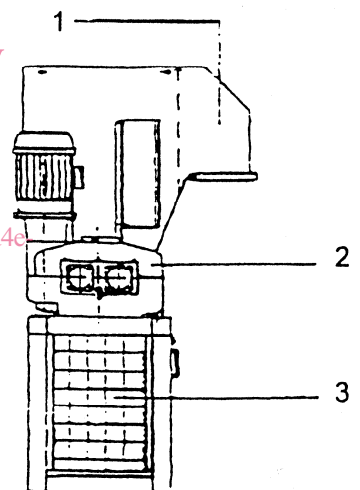
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1 Fixed guard  
2 Protective flap  
3 Conveyor belt

Figure 1b



1 Feeding area  
2 Shredding chamber  
3 Discharge area

Figure 1c

**Figure 1 — Examples of shredders**

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**4 List of significant hazards****4.1 Mechanical hazards****4.1.1 Shredding chamber**

- ejection of parts of the machine or materials through the chamber;
- crushing/shearing between the rotor and the housing;
- cutting/severing by the tools.

**4.1.2 Feeding area**

- entanglement by the material being fed;
- ejection of parts of the machine or material through the feed opening.

**4.1.3 Discharge area**

- ejection or fall of parts of the machine or material.

**4.2 Hazards due to noise**

Noise can cause:

- hearing damage;
- accidents due to interference with speech communication or
- accidents due to interference with the perception of acoustic signals.

**4.3 Hazards generated by the material processed**

- due to contact and/or inhalation of harmful residues where for example drums or containers are being shredded;
- due to ignition of flammable residues where for example drums or containers are being shredded.

**4.4 Electrical hazards**

- electric shock or burns due to direct contact with live conductive parts, or with parts that have become live due to electrical fault.

**5 Safety 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 ISO 12100** for hazards relevant but not significant, which are not dealt with by this document (e.g. sharp edges).

## 5.1 Mechanical hazards

### 5.1.1 Shredding chamber

#### 5.1.1.1 Strength

The chamber shall be able to resist stresses due to normal operation and which may result from foreign bodies in the material or other objects.

#### 5.1.1.2 Access to the shredding chamber

Access to the shredding chamber through openings shall be prevented by interlocking guards in accordance with 3.6 of EN 953:1997 and EN 1088:1995 such that the guards remain closed and locked until motion of the rotors and the feeding device has ceased. The safety related parts of the control system shall be category 3 of EN 954-1:1996.

#### 5.1.1.3 Access through the feed opening

The dimensions and the design of the hopper or other feeding device shall be such as to avoid the possibility of the upper limbs reaching the cutting chamber through the feed opening. The safety distances shall be in accordance with EN 294:1992, table 2.

#### 5.1.1.4 Access through the discharge opening

Access to the rotor(s) in the shredding chamber through the discharge opening shall be prevented until the motion of the rotor(s) has ceased. This shall be achieved by interlocking guards in accordance with 3.5 of EN 953:1997 and EN 1088:1995, if the minimum distances between the guards and the rotors are in accordance with EN 999:1998. If these minimum distances cannot be achieved, interlocking guards with guard locking in accordance with 3.6 of EN 953:1997 and EN 1088:1995 shall be provided; the safety related parts of the control system shall be category 3 of EN 954-1:1996.

### 5.1.2 Feeding area

#### 5.1.2.1 Entanglement by the material being fed

The manufacturer shall give advice to the user on precautions to be taken if the material being processed is likely to cause entanglement (see 7.1.5).

**NOTE** In shredding lines materials are usually pre-cut by, for example, guillotines if the hazard due to entanglement can occur.

#### 5.1.2.2 Ejection of parts of the machine or material

Measures shall be taken at the design stage to prevent the possibility of ejection of parts of the machine or of material through the feed opening. Examples of the measures which can be taken are:

- feeding devices designed in such a way that ejection of material or parts of the machine is prevented so far as possible, as shown in figure 1a;
- protective flaps as shown in figure 1b.

### 5.1.3 Discharge area

Access to the rotor(s) in the discharge area shall be prevented until the motion of the rotor(s) has ceased. This shall be achieved by fixed guards in accordance with 3.5 of EN 953:1997 and EN 1088:1995 if the minimum distances between the guards and the rotors are in accordance with EN 999:1998. If these minimum