



**SLOVENSKI STANDARD**  
**SIST EN 12012-4:2007**

**01-maj-2007**

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**Stroji za predelavo gume in plastike - Drobilni stroji - 4. del: Varnostne zahteve za aglomeratorje**

Plastics and rubber machines - Size reduction machines - Part 4: Safety requirements for agglomerators

Kunststoff- und Gummimaschinen - Zerkleinerungsmaschinen - Teil 4: Sicherheitsanforderungen für Agglomeratoren

Machines pour les matières plastiques et le caoutchouc - Machines à fragmenter - Partie 4: Prescriptions de sécurité relatives aux agglomérateurs

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English Version

## Plastics and rubber machines - Size reduction machines - Part 4: Safety requirements for agglomerators

Machines pour les matières plastiques et le caoutchouc -  
Machines à fragmenter - Partie 4: Prescriptions de sécurité  
relatives aux agglomérateurs

Kunststoff- und Gummimaschinen -  
Zerkleinerungsmaschinen - Teil 4:  
Sicherheitsanforderungen für Agglomeratoren

This European Standard was approved by CEN on 11 October 2006.

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 document (EN 12012-4:2006) 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of an identical text or by endorsement, at the latest by May 2007, and conflicting national standards shall be withdrawn at the latest by May 2007.

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.

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

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

Part 1 deals with blade granulators.

Part 2 deals with strand pelletisers.

Part 3 deals with shredders.

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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, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

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## Introduction

This European Standard is a type C standard as stated in EN ISO 12100:2003.

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 that 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 in accordance with the provisions of this type C standard.

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## 1 Scope

This European Standard specifies the essential safety requirements applicable to the design and construction of agglomerators used to densify plastic scrap, reducing its size and/or volume.

The limits of the agglomerator are as follows:

- the outer edge of the feed opening, or outer edge of the fixed feed device (e.g. hopper) or the interface between the feed system (e.g. conveyor) and the agglomerator chamber and
- the outer edge of the discharge opening of the agglomerator chamber or the interface between the agglomerator chamber and the discharge system.

Only the significant hazards listed in Clause 4 and dealt with in Clause 5 are subject to this European Standard.

This European Standard does not deal with hazards caused by processing materials (such as Expanded Polystyrene (EPS) and Polyurethane (PU) foam) which, when heated, may lead to a risk of fire and release of toxic gases.

This European Standard does not deal with hazards caused by upstream and/or downstream equipment.

This European Standard is not applicable to agglomerators manufactured before the date of its approval as EN.

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## 2 Normative references

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The following referenced documents are indispensable for the application of this document. 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 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 811:1996, *Safety of machinery — Safety distances to prevent danger zones being reached by the lower limbs*

EN 953:1997, *Safety of machinery — Guards — General requirements for the design and construction of fixed and moveable guards*

EN 954-1:1996, *Safety of machinery — Safety-related parts of control systems — Part 1: General principles for design*

EN 1037:1995, *Safety of machinery — Prevention of unexpected start-up*

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

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



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

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 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 13732-1:2006, *Ergonomics of the thermal environment - Methods for the assessment of human responses to contact with surfaces - Part 1: Hot surfaces (ISO 13732-1:2006)*

EN ISO 14122-1:2001, *Safety of machinery — Permanent means of access to machinery — Part 1: Choice of fixed means of access between two levels (ISO 14122-1:2001)*

EN ISO 14122-2:2001, *Safety of machinery — Permanent means of access to machinery — Part 2: Working platforms and walkways (ISO 14122-2:2001)*

EN ISO 14122-3:2001, *Safety of machinery — Permanent means of access to machinery — Part 3: Stairs, stepladders and guard-rails (ISO 14122-3:2001)*

EN ISO 14122-4:2004, *Safety of machinery — Permanent means of access to machinery — Part 4: Fixed ladders (ISO 14122-4:2004)*

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### 3 Terms and definitions

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

#### 3.1

##### **agglomerator**

machine (sometimes called densifier) for reducing the size and volume of thermoplastic scrap in a chamber. The material is cut or kneaded, mixed, heated by friction and, thus, densified, if required by using water. Feeding the scrap can be by hand or by feed system

#### 3.2

##### **opening in the agglomerator chamber**

opening designed and constructed for feeding the material, discharging the material, inspecting the process inside the agglomerator chamber and/or maintaining the blades

#### 3.3

##### **blade**

cutting/kneading tool, that can be fixed or rotating and is used to cut/knead and heat by friction the material being processed

#### 3.4

##### **feed system**

power operated equipment (conveyor belts, nip roll feeders, feed screws etc.) used to feed the agglomerator

**3.5**

**fixed feed device**

non power operated equipment (hopper, feed table etc.) used to feed the agglomerator

**3.6**

**discharge system**

power operated equipment such as extruder, output slides etc. used to discharge the material from the agglomerator chamber

**4 List of significant hazards**

**4.1 Mechanical hazards**

The following can generate hazards:

- crushing/shearing between the rotating blades and fixed blades or housing;
- cutting/severing by the rotating and fixed blades;
- crushing/shearing by the moving discharge systems;
- crushing/shearing by the feed system;
- entanglement by the material and being drawn into the agglomerator chamber in the case of material that has not been pre-cut before being fed into the agglomerator;
- falling into the agglomerator chamber through the feed opening;
- ejection of materials from the agglomerator chamber.

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**4.2 Thermal hazards**

Contact with:

- hot materials ejected or falling out of openings;
- steam ejected from openings where water is used;
- hot materials inside the agglomerator chamber;
- hot external surfaces of the agglomerator chamber.

**4.3 Noise hazards**

Noise can result in deafness, physiological disorders, accidents due to interference with auditory signals and speech communication.

Main noise sources on agglomerators are the agglomerating process, motors and transmission components.

**4.4 Hazards generated by dust, fumes and gases**

Contact with, or inhalation of, dust, fumes or gases escaping from the openings.

#### 4.5 Hazards due to electrical energy

Electric shock or burns caused by direct contact with live conductive parts, or with parts that have become live due to electrical fault.

Electric shock due to accumulation of electrostatic charge.

#### 4.6 Hazards due to unexpected start-up

#### 4.7 Falls from height

Falling hazards due to slipping or tripping on working platforms, steps or walkways in accessible areas of the machine.

### 5 Safety requirements and/or protective measures

#### 5.1 General

Machinery shall comply with the safety requirements and/or protective measures of this clause. In addition, the machine shall be designed in accordance with the principles of EN ISO 12100-2:2003 for relevant but not significant hazards, which are not dealt with by this European Standard.

#### 5.2 Mechanical hazards

##### 5.2.1 Access through openings in the agglomerator chamber

Regardless of the location of the openings, access to the agglomerator chamber through openings shall be:

- prevented by ensuring that the dimensions of the openings are in accordance with the safety distances for upper and lower limbs as described in EN 294:1992, Tables 3 or 4 and EN 811:1996 or
- protected by an interlocking guard with guard locking in accordance with EN 953:1997, 3.6 and EN 1088:1995 such that the guard remains closed and locked until all motion of the blade has ceased.

Safety related parts of the control system shall be according to category 3 of EN 954-1:1996.

If the fixed feed device or feed system, or the part of the agglomerator chamber containing the feed opening, or the discharge system, is capable of being moved out of position and the resulting access to the agglomerator chamber does not comply with the safety distances for upper and lower limbs described in EN 294:1992, Tables 3 or 4 and EN 811:1996, then it shall act as an interlocking guard with guard locking in accordance with EN 953:1997, 3.6 and EN 1088:1995 such that it remains locked in position until all motion of the blade has ceased. Safety related parts of the control system shall be according to category 3 of EN 954-1:1996.

To avoid any motion of movable parts during the changing or adjusting of blades, appropriate devices and/or tools shall be provided.

See 7.1.3, 7.1.4, 7.1.5, 7.1.6 and 7.1.7.

##### 5.2.2 Feed material that is not pre-cut

If a power operated feed device is fitted to an agglomerator processing continuous films, fibres, strands or similar materials likely to cause entanglement, mechanically actuated sensitive protective equipment (e.g. pressure sensitive mat), in accordance with 3.26.5 of EN 12100-1:2003 shall be provided at the feed opening