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Stroji za predelavo gume in plastike - Stroji za brizgalno vlivanje - Varnostne zahteve

Plastics and rubber machines - Injection moulding machines - Safety requirements

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Kunststoff- und Gummimaschinen - Spritzgießmaschinen - Sicherheitsanforderungen

Machines pour les matières plastiques et le caoutchouc - Machines à mouler par injection - Prescriptions de sécurité

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Plastics and rubber machines - Injection moulding machines - Safety requirements

Machines pour les matières plastiques et le caoutchouc -
Machines de moulage par injection - Prescriptions de
sécurité

Kunststoff- und Gummimaschinen - Spritzgießmaschinen -
Sicherheitsanforderungen

This European Standard was approved by CEN on 12 September 2009.

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EN 201:2009 (E)**Foreword**

This document (EN 201:2009) 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of an identical text or by endorsement, at the latest by April 2010, and conflicting national standards shall be withdrawn at the latest by April 2010.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

This document supersedes EN 201:1997.

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(s).

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

A transition period of one year is permitted following the publication of this document during which the manufacturer may choose to apply either version of the standard.

In addition to EN 201:1997, requirements for machines with electrical axes, machines with L-type configuration, cellular foam injection moulding machines, machines with fluid injectors, and machines safeguarded by light curtains or two-hand control devices are included.

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 the United Kingdom.

Introduction

This document is a type C standard as stated in EN ISO 12100.

The machinery concerned and the extent to which hazards, hazardous situations and hazardous 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 and 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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EN 201:2009 (E)**1 Scope**

This European Standard specifies the essential safety requirements for injection moulding machines for the processing of plastics and/or rubber.

All hazards listed in Clause 4 are covered by this standard.

The following machines are not covered:

- machines on which the clamping unit can only be operated by the physical force of the operator;
- injection moulding machines with pneumatic drives for the platen movement;
- injection moulding machines with vertical platen movements driven by an electrical axis;
- blow moulding machines associated with an injection process (EN 422);
- machines for reaction injection moulding (RIM) (EN 1612-1);
- presses (EN 289);
- footwear moulding machines covered by EN 1845.

The safety requirements for the interaction between injection moulding machines and ancillary equipment are specified.

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This standard covers magnetic clamping systems only if:

- machines have horizontal clamping units; and SIST EN 201:2009
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- the mould area is protected by guards; and
- such systems are delivered at the same time as the injection moulding machine by the machine manufacturer.

This standard does not cover requirements for the design of an exhaust system.

This standard is not applicable to injection moulding machines which are manufactured before the date of its publication as an EN.

2 Normative references

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 amendment) applies.

EN 349:1993+A1:2008, *Safety of machinery — Minimum gaps to avoid crushing of parts of the human body*

EN 574:1996+A1:2008, *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 982:1996+A1:2008, *Safety of machinery — Safety requirements for fluid power systems and their components — Hydraulics*
- EN 983:1996+A1:2008, *Safety of machinery — Safety requirements for fluid power systems and their components — Pneumatics*
- EN 999:1998+A1:2008, *Safety of machinery — The positioning of protective equipment in respect of approach speeds of parts of the human body*
- EN 1088:1995+A2:2008, *Safety of machinery — Interlocking devices associated with guards – Principles for design and selection*
- EN 1760-1:1997+A1:2009, *Safety of machinery — Pressure sensitive protective devices — Part 1: General principles for the design and testing of pressure sensitive mats and pressure sensitive floors*
- EN 1760-2:2001+A1:2009, *Safety of machinery — Pressure sensitive protective devices — Part 2: General principles for the design and testing of pressure sensitive edges and pressure sensitive bars*
- EN 60204-1:2006, *Safety of machinery — Electrical equipment of machines — Part 1: General requirements (IEC 60204-1:2005, modified)*
- EN 60529:1991, *Degrees of protection provided by enclosures (IP Code) (IEC 60529:1989)*
- EN 61000-6-2:2005, *Electromagnetic compatibility (EMC) — Part 6-2: Generic standards — Immunity for industrial environments (IEC 61000-6-2:2005)*
- EN 61000-6-4:2007, *Electromagnetic compatibility (EMC) — Part 6-4: Generic standards — Emission standard for industrial environments (IEC 61000-6-4:2006)*
- EN 61496-1:2004, *Safety of machinery — Electro-sensitive protective equipment — Part 1: General requirements and tests (IEC 61496-1:2004, modified)*
- CLC/TS 61496-2:2006, *Safety of machinery — Electrosensitive protective equipment — Part 2: Particular requirements for equipment using active opto-electronic protective devices (AOPDs) (IEC 61496- 2:2006)*
- CLC/TS 61496-3:2008, *Safety of machinery — Electro-sensitive protective equipment — Part 3: Particular requirements for Active opto-electronic protective devices responsive to diffuse reflection (AOPDDR) (IEC 61496-3:2008)*
- EN ISO 3744:2009, *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 3746:2009, *Acoustics — Determination of sound power levels of noise sources using sound pressure — Survey method employing an enveloping measurement surface over a reflecting plane (ISO 3746:1995, including Cor 1:1995)*
- EN ISO 3747:2009, *Acoustics — Determination of sound power levels of noise sources using sound pressure — Comparison method for use in situ (ISO 3747:2000)*
- EN ISO 4871:2009, *Acoustics — Declaration and verification of noise emission values of machinery and equipment (ISO 4871:1996)*
- EN ISO 11201:2009, *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 11201:1995, including Cor 1:1997)*
- EN ISO 11202:2009, *Acoustics — Noise emitted by machinery and equipment — Measurement of emission sound pressure levels at a work station and at other specified positions — Survey method in situ (ISO 11202:1995)*

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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 13732-1:2008, *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 13849-1:2008, *Safety of machinery — Safety-related parts of control systems — Part 1: General principles for design (ISO 13849-1:2006)*

EN ISO 13850:2008, *Safety of machinery — Emergency stop — Principles for design (ISO 13850:2006)*

EN ISO 13857:2008, *Safety of machinery — Safety distances to prevent hazard zones being reached by upper and lower limbs (ISO 13857:2008)*

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)*

EN ISO/IEC 17025:2005, *General requirements for the competence of testing and calibration laboratories (ISO/IEC 17025:2005)*

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3 Terms and definitions

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For the purpose of this document, the following terms and definitions apply.

3.1 injection moulding machine
machine for the discontinuous production of moulded parts from plastics and/or rubber. The plasticised material is injected through a nozzle into a mould containing one or more cavities in which the article is formed.

NOTE If the plasticised material is not injected through a nozzle into the mould then EN 289 refers.

An injection moulding machine essentially consists of one or more clamping units, one or more plasticising and/or injection units, drive and control systems.

3.2 mould area
area between the platens

3.3 clamping mechanism area
area which comprises mechanisms for the movement of the mobile platen and/or the application of the clamping force

3.4 plasticising and/or injection unit
unit for plasticising and subsequently injecting material through a nozzle

NOTE On some machines the plasticising unit(s) may be separate from the injection unit(s).

3.5**rubber**

for the purpose of this document: any material which generates no splashing hazards during processing

3.6**carousel machine**

machine consisting of two or more clamping units mounted on a carousel in either a vertical or horizontal configuration to index to one or more fixed plasticising and/or injection units (see Figure 1)

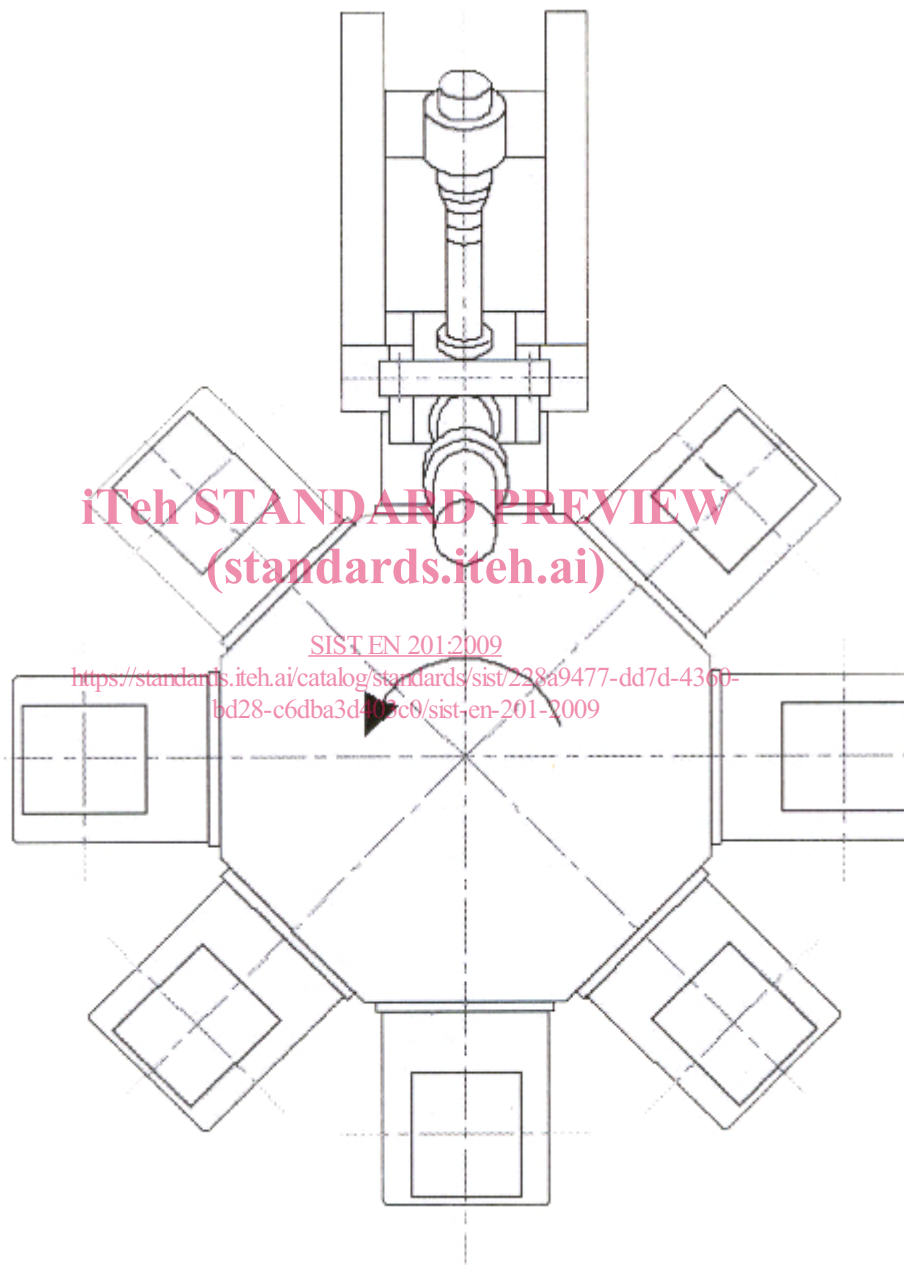


Figure 1 — Example of a carousel machine

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3.7 shuttle-table machine/machine with a sliding lower platen and turn-table machine
machines designed to contain one or more lower parts of moulds attached to a table/sliding lower platen. The table indexes the lower parts of the mould by a sliding or rotary motion between the loading/unloading station and the injection position (see Figures 2 and 3).

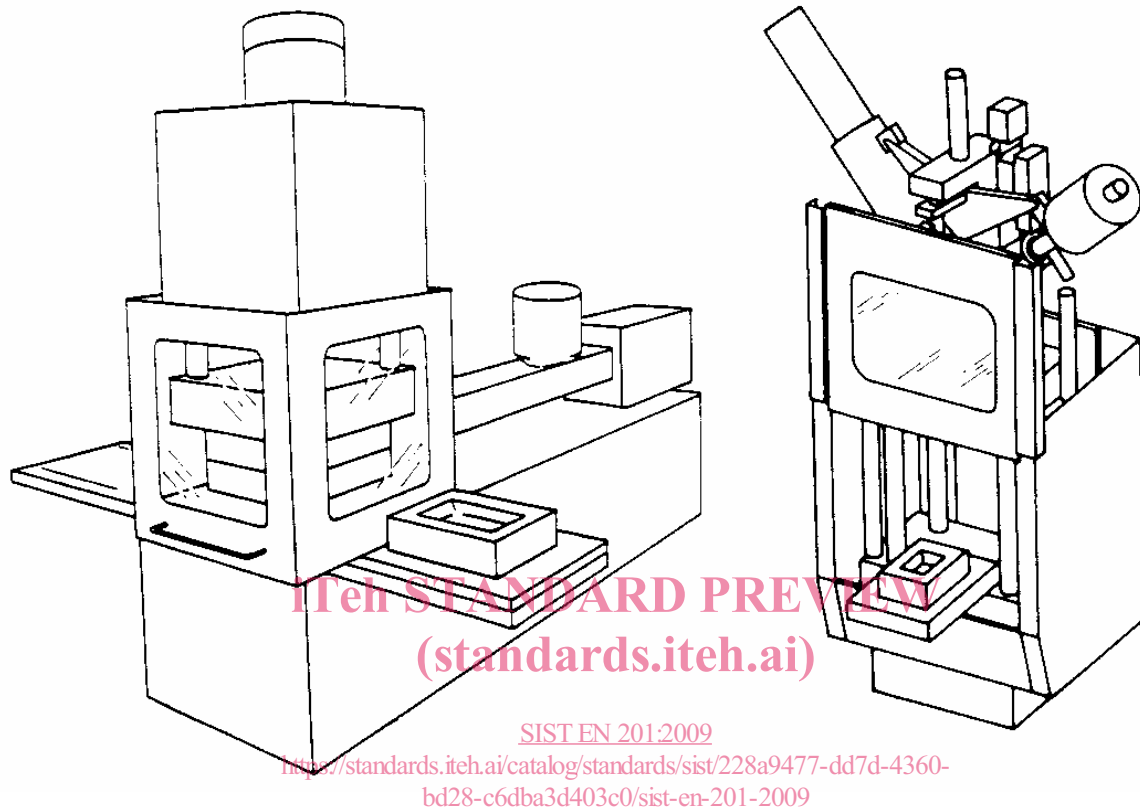
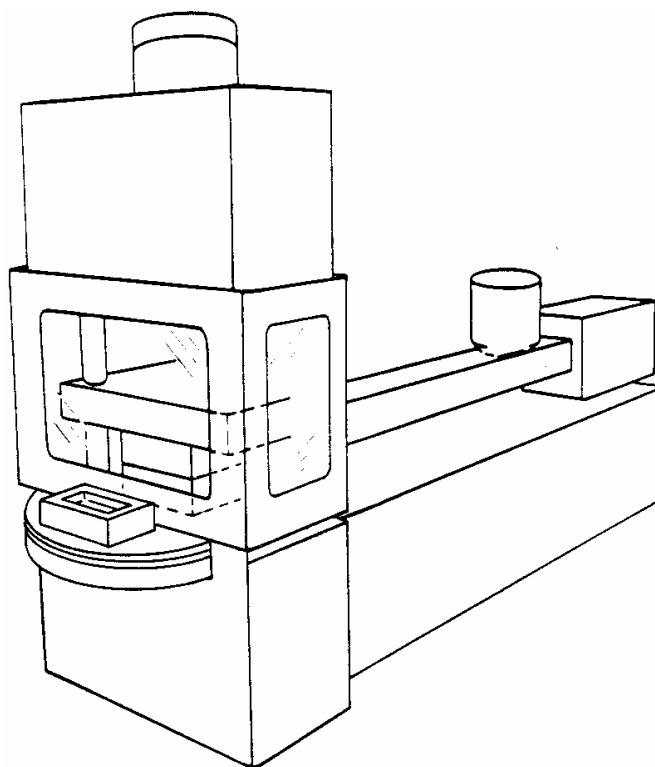


Figure 2 — Examples of shuttle-table machines (two stations left; single station right), shown without guards for the movements of the table



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Figure 3 — Example of a turn-table machine, shown without guards for the movements of the table

3.8

multi-station machine with mobile injection unit

machine consisting of a mobile plasticising and/or injection unit which indexes between two or more stationary clamping units (see Figures 4 and 5)

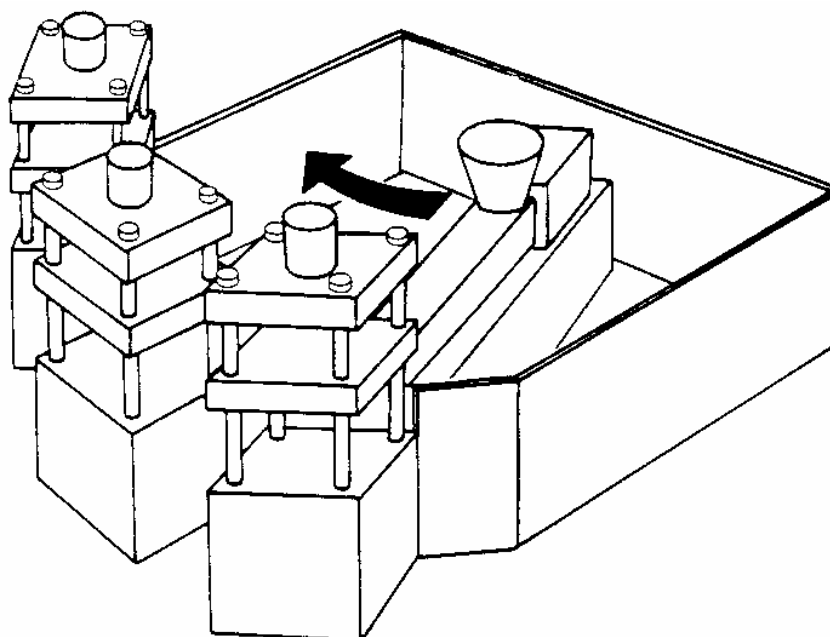


Figure 4 — Example of multi-station machine with mobile plasticising and injection unit, shown without guards for the clamping units