



SLOVENSKI STANDARD

SIST EN 289:2000

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Rubber and plastics machinery - Compression and transfer moulding presses - Safety requirements for the design

Rubber and plastics machinery - Compression and transfer moulding presses - Safety requirements for the design

Gummi- und Kunststoffmaschinen - Formpressen und Spritzpressen - Sicherheitstechnische Anforderungen für die Gestaltung

Machines du caoutchouc et des matières plastiques - Presses de moulage par compression et par transfert - Prescriptions de sécurité pour la conception

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83.200	Oprema za gumarsko industrijo in industrijo polimernih materialov	Equipment for the rubber and plastics industries

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en

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EUROPEAN STANDARD

EN 289

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Descriptors: Moulding equipment, compressing moulding, plastics, rubber, safety of machines, accident prevention, hazards, hazardous areas, safety measures, safety devices, marking

English version

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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.

The European Standards exist 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, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

CEN

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 CEN/TC 145 "Rubber and Plastics Machines - Safety", the secretariat of which is held by DIN. The original drafting (which started in 1986) was carried out by CEN/TC 118 which by Resolution BT 42/1988 was redesignated as a Working Group (WG2) of TC145.

This European Standard has been prepared under a Mandate given to CEN by the Commission of the European Communities and the Secretariat of the European Free Trade Association, and supports essential requirements of EC Directive(s).

This Standard does not fully conform to EN414:1992, "Safety of Machinery" - Rules for The Drafting and Preparation of Safety Standards", because it was prepared before EN414:1992 was available. It is intended to rewrite the standard in accordance with the rules when it is re-examined.

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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 1994, and conflicting national standards shall be withdrawn at the latest by April 1994.

The Standard was approved and in accordance with the CEN/CENELEC Internal Regulations, the following countries are bound to implement this European Standard: Austria, Belgium, Denmark, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Switzerland, United Kingdom.

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 European Standard specifies safety requirements for the design of hydraulic machines with a vertical closing movement for the compression and transfer moulding of plastics and rubber.

The following machines are excluded:

- a) injection moulding machines (see EN 201);
- b) presses for curing pneumatic tyres;
- c) presses for curing conveyor belting;
- d) presses for curing inner tubes and curing bags;

Technical safety requirements for the design of ancillary equipment and exhaust ventilation are not covered by this standard.

2. NORMATIVE REFERENCES

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This Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at 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 292:1991 Safety of machinery - Basic concepts, general principles for design.

Part 1: Basic terminology, methodology
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 60 204-1:1985 Electrical equipment of industrial machines - Part 1: General requirements.

ISO 3744 Acoustics - Determination of sound power levels of noise sources - Engineering methods for free-field conditions over a reflecting plane.

ISO 4413 Hydraulic fluid power - General rules for the application of equipment to transmission and control systems

3 DEFINITIONS

For the purposes of this Standard the following definitions apply:-

3.1 Moulding Press

A semi-automatic or automatic machine which produces mouldings discontinuously from moulding material; a distinction should be made between compression and transfer moulding.

NOTE: If the moulding material is injected into the mould through a nozzle, see EN201.

3.2 Compression Moulding

A process in which the moulding material is placed into the open mould. When the press is closed, the moulding process is carried out under the influence of pressure and heat (see figures 1a and 1b).

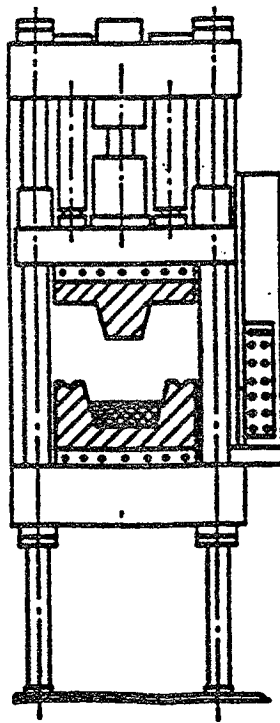


Figure 1a: Press for compression moulding shown with mould open and loaded with moulding material.

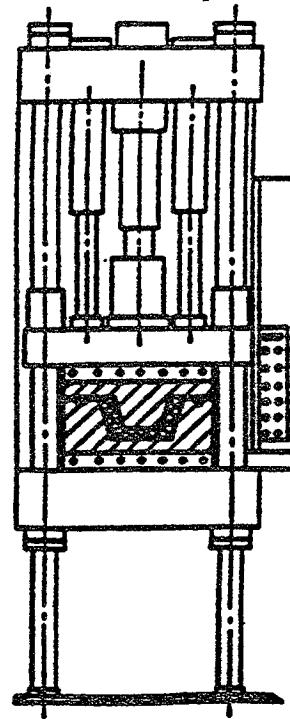


Figure 1b: Press for compression moulding shown with mould closed and moulding material formed into shape.

3.3 Transfer moulding

A process in which the moulding material is fed into a separate cavity (transfer cavity) in the mould and is pressed into the moulding cavity by the pressure of the transfer plunger. The force for the transfer plunger can be provided directly by the clamping force (see figures 2a and 2b) or by a separate power cylinder (see figures 3a and 3b).

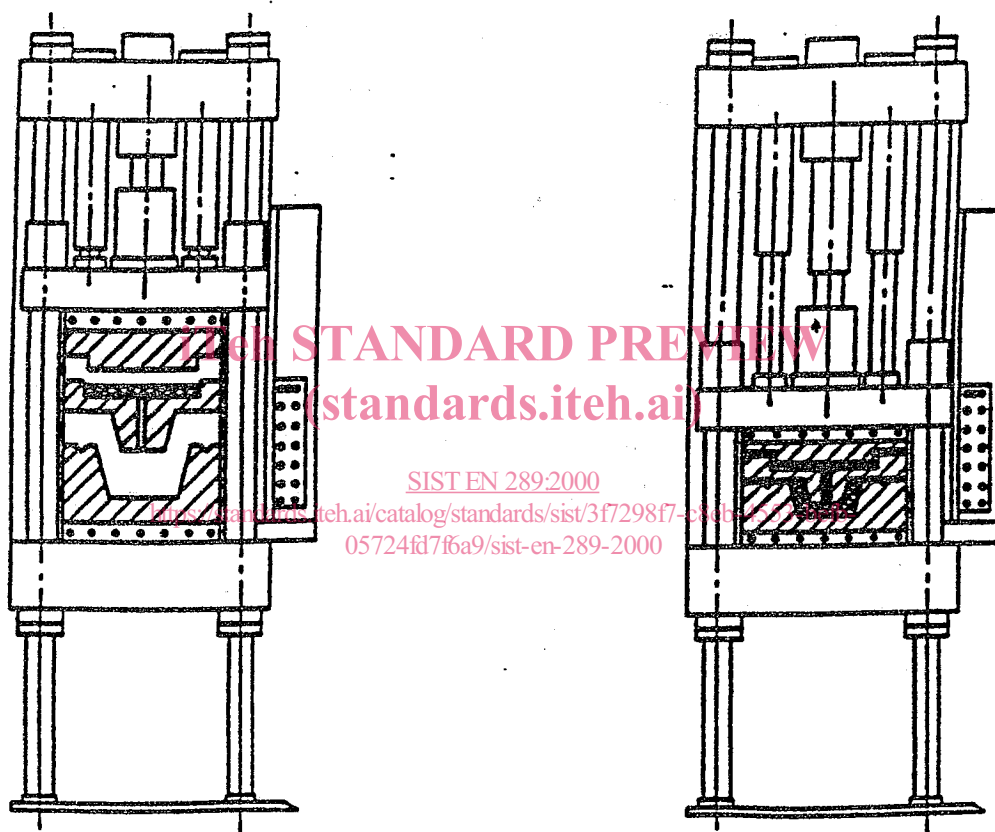


Figure 2a: Press for transfer moulding shown with moulding material in transfer cavity

Figure 2b: Press for transfer moulding shown with moulding material fed into moulding cavity

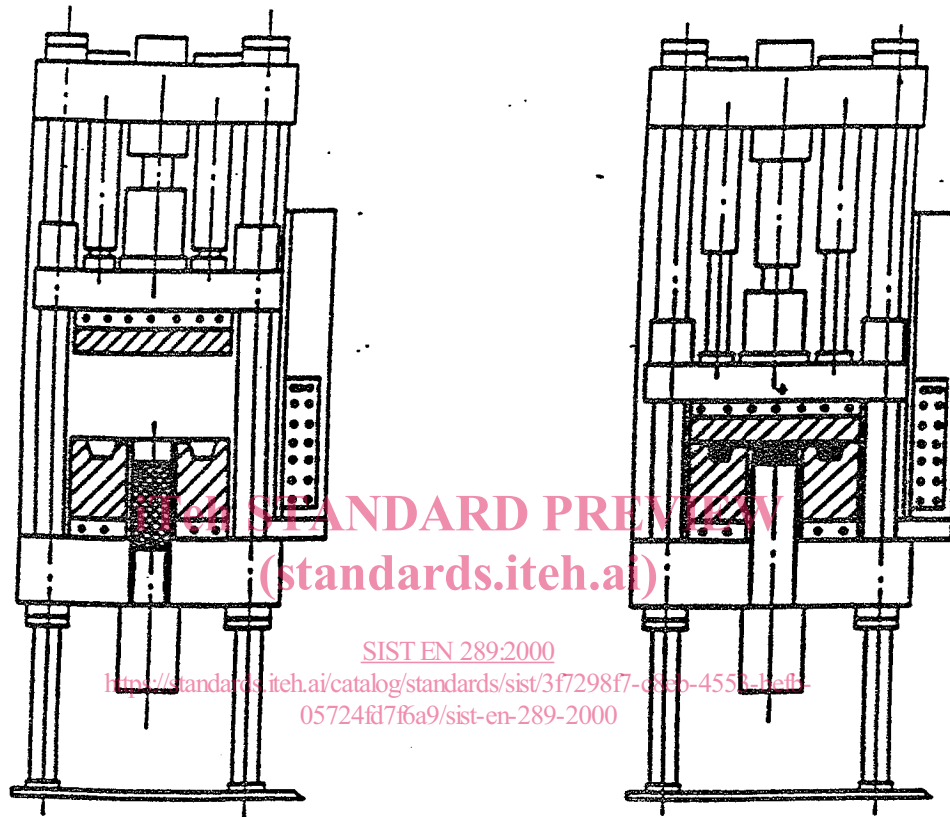


Figure 3a: Press for transfer moulding shown with separate power cylinder and with moulding material in transfer cavity.

Figure 3b: Press for transfer moulding shown with separate power cylinder and with moulding material fed into moulding cavity.

3.4 Semi-automatic machine

A machine with manual loading or unloading.

3.5 Fully automatic machine

A machine which has no manual loading or unloading.

3.6 Mould area

The zone between the platens.

3.7 Clamping unit

The part of the machine comprising fixed and mobile platens and the mould area.

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3.8 Control circuit

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The circuit providing the collection, processing and transmission of the information necessary to govern the operation of a machine.

3.9 Power circuit

The circuit used for supplying energy for the operation of the machine.

3.10 Position sensor

A device which detects the location of a guard and produces a signal which is used in the control and/or power circuits.

4 HAZARDS AND PRINCIPAL AREAS OF DANGER

Suitable measures shall be taken in the design of presses for compression and transfer moulding to eliminate or reduce hazards during the operation of the machine. Consideration shall also be given to the direct consequences of potential failures of machine components or the control and power circuits.

The principal hazards are:

a) Crushing and shearing for example by:

- moulds or platens;
- ejectors;
- automatic loading system;
- parts in the clamping unit outside the mould area;
- cores;
- connected ancillary equipment

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b) Impact

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Parts which by their speed of movement, could cause injury if a person gets in the way.

c) Contact

Parts which could cause injury by contact because they are sharp, abrasive, hot or accidentally electrically live.

d) Ejection

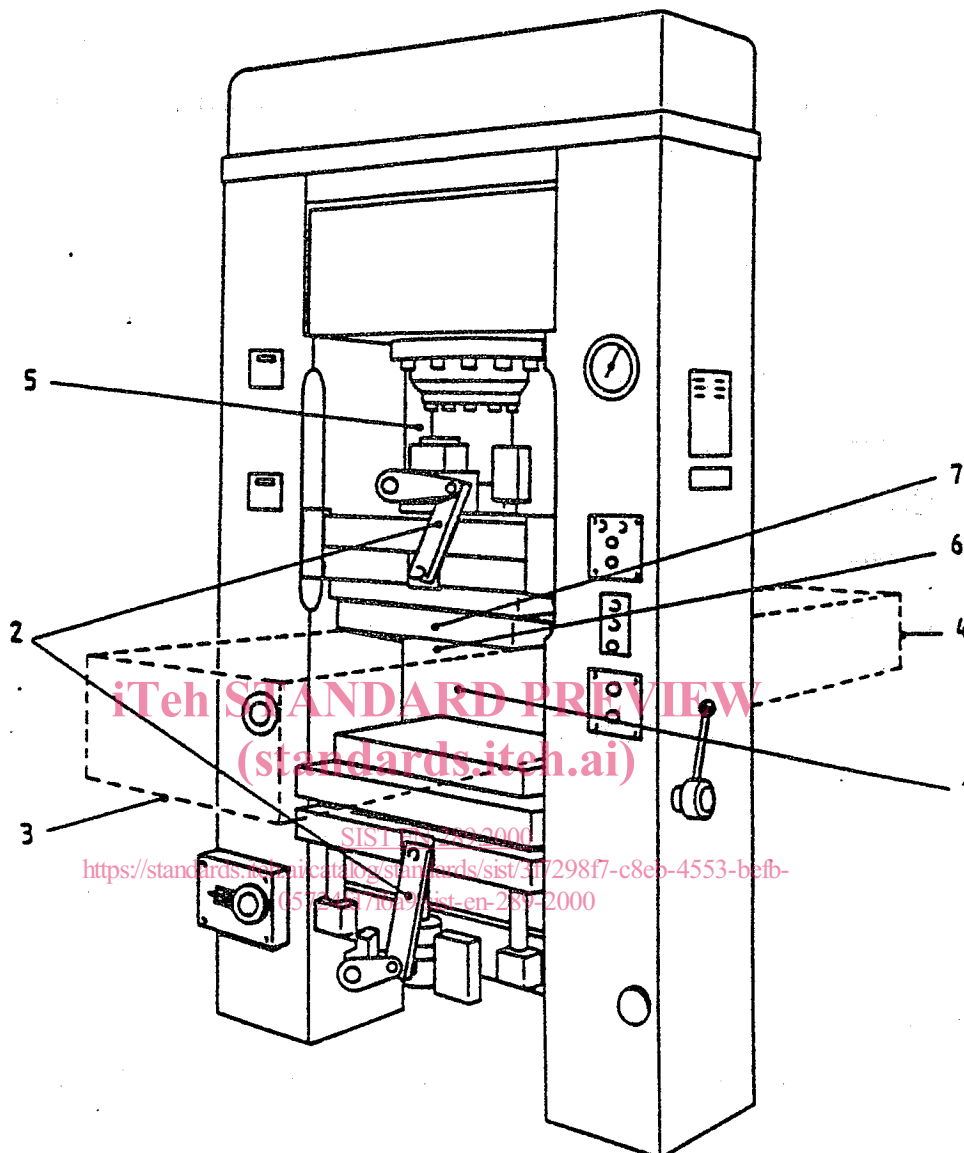
Machine components or material ejected from the machine

e) The results of leakage

f) Noise

g) Gases, dusts, vapours

Examples of areas of danger are shown in figures 4a and 4b



- 1 Between mould and platens
- 2 Ejector mechanism
- 3 Loading system
- 4 Unloading system
- 5 Above mobile platen
- 6 Cores
- 7 Hot mould and platen

Figure 4a - Examples of areas of danger on a frame construction downstroking compression press.