



SLOVENSKI STANDARD

SIST EN 1612-2:2000

01-december-2000

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Rubber and plastics machines - Reaction moulding machines - Part 2: Safety requirements for reaction moulding plant

Gummi- und Kunststoffmaschinen - Reaktionsgießmaschinen - Teil 2: Sicherheitsanforderungen an Reaktionsgießanlagen

Machines pour le caoutchouc et les matières plastiques - Machines de moulage par réaction - Partie 2: Prescriptions de sécurité relatives aux installations de moulage par réaction

Ta slovenski standard je istoveten z: EN 1612-2:2000

ICS:

83.200	Oprema za gumarsko industrijo in industrijo polimernih materialov	Equipment for the rubber and plastics industries
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EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN 1612-2

June 2000

ICS 83.200

English version

**Rubber and plastics machines - Reaction moulding machines -
Part 2: Safety requirements for reaction moulding plant**

Machines pour le caoutchouc et les matières plastiques -
Machines de moulage par réaction - Partie 2: Prescriptions
de sécurité relatives aux installations de moulage par
réaction

Gummi- und Kunststoffmaschinen -
Reaktionsgießmaschinen - Teil 2:
Sicherheitsanforderungen an Reaktionsgießanlagen

This European Standard was approved by CEN on 23 April 1999.

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 145 "Rubber and plastics machines - Safety", 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 December 2000, and conflicting national standards shall be withdrawn at the latest by December 2000.

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.

This standard deals with metering and mixing units.

0 Introduction

This European Standard is a type C standard as defined in EN 292.

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 standard covers the essential health and safety requirements for the design of reaction moulding plant with the exception of metering and mixing units (for these see part 1).

The significant and specific hazards are listed in clause 4 and are dealt with in this standard.

This standard does not cover completely the hazards arising from the use of highly flammable additives, for example pentane used as a blowing agent (see 4.3), because these hazards depend to a large extent on the additives and process used.

This standard does not cover the hazards due to noise generated by the cutting unit, which is the only significant source of noise at such plant.

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

This standard does not cover the hazards arising from the assembly of separate units not supplied at the same time by the same manufacturer.

This standard applies to reaction moulding plant manufactured after the date of publication of 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 is not intended to provide means of complying with the essential health and safety requirements of Directive 94/9/EC.

2 Normative references

This European Standard incorporates provisions from other publications by dated or undated references. These normative references are cited at the appropriate places in the text and the publications are listed below. For dated references, subsequent amendments or revisions 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+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 349:1993	Safety of Machinery - Minimum gaps to avoid crushing of parts of the human body
EN 418: 1992	Safety of Machinery - Emergency stop equipment, functional aspects - Principles for design
EN 574:1996	Safety of Machinery - Two-hand control devices - Functional aspects - Principles for design
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
prEN 999: 1997	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 1088: 1995	Safety of Machinery - Interlocking devices associated with guards - Principles for design and selection
EN 1127-1:1997	Explosive atmospheres – Explosion prevention and protection – Part 1: Basic concepts and methodology

EN 1612-1: 1997	Rubber and plastics machines - Reaction moulding machines - Part 1: Safety requirements for metering and mixing units
EN 1760	Safety of machinery - Pressure sensitive protective devices
EN 60079-10: 1996	Electrical apparatus for explosive gas atmospheres - Classification of hazardous areas
EN 60079-14: 1997	Electrical apparatus for explosive gas atmospheres – Electrical installations in hazardous areas (other than mines)
EN 60204-1:1997	Safety of Machinery - Electrical equipment of machines - Part 1: General requirements
EN 60529:1991	Degrees of protection provided by enclosures (IP code)
EN 61496-1:1997	Safety of Machinery – Electro-sensitive protective equipment - Part 1: General requirements and tests

3 Definitions

For the purposes of this standard, the following definitions apply:

3.1 reaction moulding plant

A complex installation for reaction moulding which consists of one or more metering and mixing units (see part 1), moulding equipment and ancillary equipment.

3.1.1 continuous moulding equipment

Equipment for continuous moulding of semi-finished products which may be for example slabs, blocks or continuous sandwich composites (see figures 1 and 2).

3.1.2 moulding equipment for individual components

Equipment for production of individual components. This may be:

- fixed moulding equipment with a fixed mixing head (see figure 3)
- fixed moulding equipment with a mobile mixing head (see figure 4)
- mobile moulding equipment with a fixed mixing head (see figure 5)
- mobile moulding equipment with a mobile mixing head (see figure 6).

3.2 ancillary equipment

Additional equipment necessary for operation of the reaction moulding plant.

In the case of continuous moulding equipment, ancillary equipment may be:

- equipment for feeding cover sheets
- equipment for manipulating the mixing head
- a cutting unit.

In the case of moulding equipment for individual components, ancillary equipment may be:

- equipment for manipulating the mixing head
- mould transport equipment
- a pick-and-place device for handling inserts and/or moulded components
- equipment for the application of release agents
- cell-crushing equipment.

3.3 highly flammable additive

While there is no European directive or standard in existence, an additive with a flash point $\leq 21^{\circ}\text{C}$.

4 List of hazards

4.1 Reaction moulding plant using continuous moulding equipment

4.1.1 Hazards due to cutting and/or crushing when feeding the front edge of cover sheets into moulding equipment during start-up

4.1.2 Hazards due to impact with the mixing head when it returns to the rest position

4.1.3 Hazards due to ejection of materials at the mixing head which may result in impact, burns and/or contact with materials hazardous to health

4.1.4 Hazards due to inhalation of gases hazardous to health given off by reaction components, additives or a mixture thereof

4.1.5 Hazards due to shearing, crushing and/or drawing-in due to moving parts of moulding equipment side walls at its entry and exit openings (see figure 2)

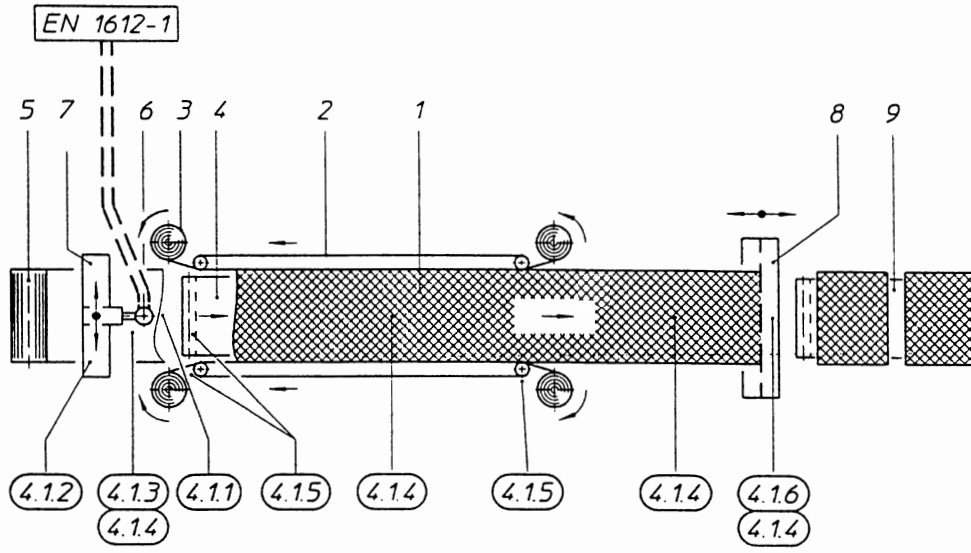
4.1.6 Hazards due to the cutting process

4.1.6.1 Cutting by the cutting device SIST EN 1612-2:2000
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4.1.6.2 Shearing and/or crushing due to movement of the cutting unit

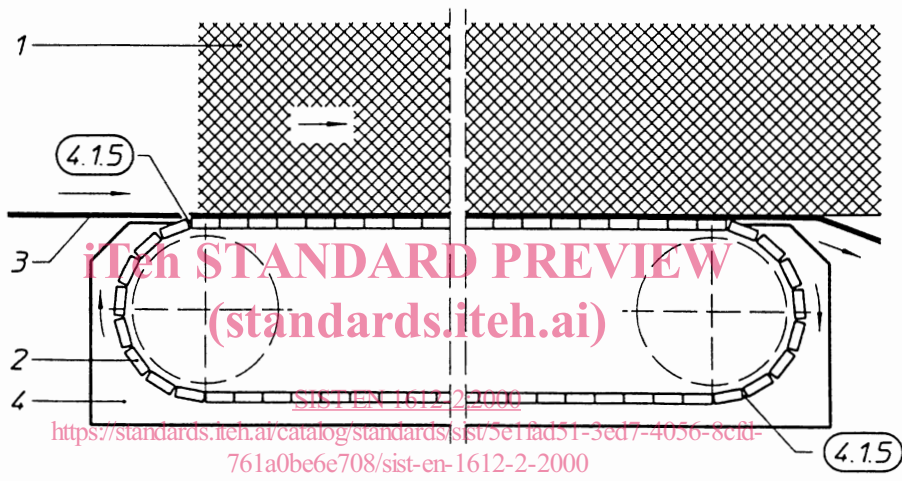
4.1.6.3 Ejection of metal swarf

4.1.6.4 Inhalation of dust hazardous to health



- 1 Product
- 2 Side wall of moulding equipment
- 3 Equipment for feeding side cover sheet
- 4 Moulding equipment lower cover sheet
- 5 Equipment for feeding lower cover sheet
- 6 Mixing head
- 7 Equipment for manipulating mixing head
- 8 Cutting unit
- 9 Equipment for delivery of cut product

Figure 1: Continuous moulding equipment



- 1 Product
- 2 Moving parts of moulding equipment side walls
- 3 Cover sheet
- 4 Side wall enclosure

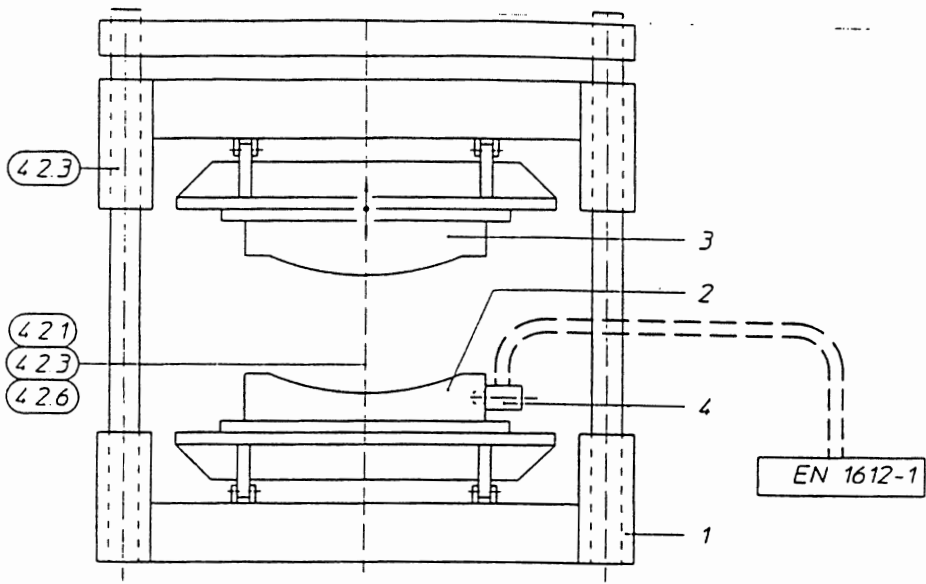
Figure 2: Moulding equipment entry and exit openings

4.2 Reaction moulding plant using moulding equipment for individual components

- 4.2.1 Hazards due to splashing of moulding material during mould filling which may result in impact, burns and/or contact with materials hazardous to health
- 4.2.2 Hazards due to crushing and/or impact at equipment for manipulating the mixing head
- 4.2.3 Hazards due to crushing, shearing and/or impact during closing, opening, turning or tilting of the mould at a stationary mould carrier or, in all other cases, during closing and opening of the mould
- 4.2.4 Hazards due to crushing, shearing, impact and/or drawing-in at mould transport equipment
- 4.2.5 Hazards due to crushing, shearing and/or drawing-in at cell-crushing equipment (see figure 7)
- 4.2.6 Hazards due to inhalation of gases hazardous to health given off by reaction components, additives or a mixture thereof
- 4.2.7 Hazards due to crushing, shearing and/or impact at pick-and-place devices for handling inserts and/or moulded components
- 4.2.8 Hazards due to equipment for application of the release agent
 - 4.2.8.1 Crushing and/or impact
 - 4.2.8.2 Inhalation of gases hazardous to health given off by the release agent

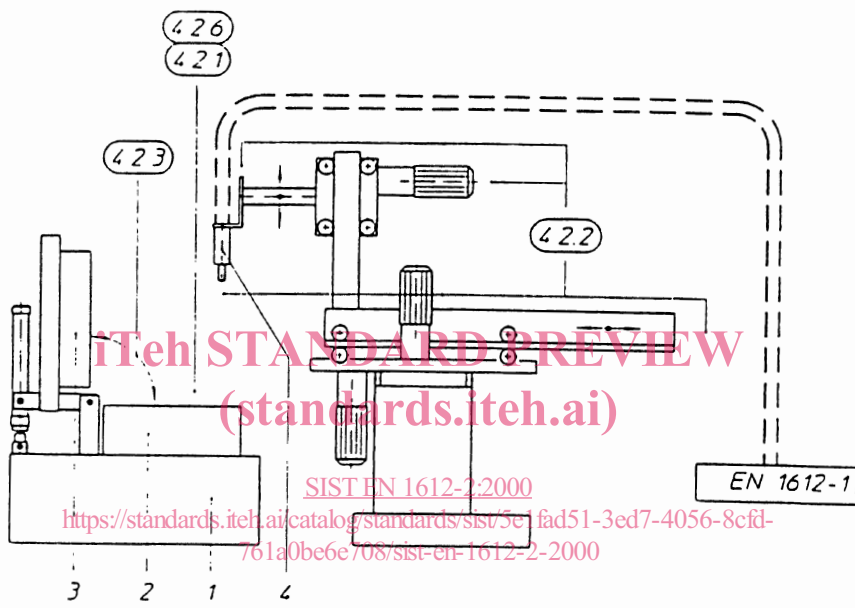
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- 1 Mould carrier frame
- 2 Lower mould
- 3 Upper mould
- 4 Mixing head

Figure 3: Fixed moulding equipment with fixed mixing head



- 1 Mould carrier frame
- 2 Fixed mould
- 3 Mobile mould
- 4 Mobile mixing head

Figure 4: Fixed moulding equipment with mobile mixing head