



SLOVENSKI STANDARD

SIST EN 1114-1:2000

01-april-2000

Rubber and plastics machines - Extruders and extrusion lines - Part 1: Safety requirements for extruders

Rubber and plastics machines - Extruders and extrusion lines - Part 1: Safety requirements for extruders

Gummi- und Kunststoffmaschinen - Extruder und Extrusionsanlagen - Teil 1: Sicherheitsanforderungen für Extruder

Machines pour le caoutchouc et les matières plastiques - Extrudeuses et lignes d'extrusion - Partie 1: Exigences de sécurité pour les extrudeuses

Ta slovenski standard je istoveten z: EN 1114-1:1996

ICS:

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

SIST EN 1114-1:2000

en

iTeh STANDARD PREVIEW
(standards.iteh.ai)

SIST EN 1114-1:2000

<https://standards.iteh.ai/catalog/standards/sist/ef784ef3-e792-4464-bccd-80f75faaf7c6/sist-en-1114-1-2000>

EUROPEAN STANDARD

EN 1114-1

NORME EUROPÉENNE

EUROPÄISCHE NORM

October 1996

ICS 83.200

Descriptors: safety of machines, plastic-working machines, rubber-working machines, extruding equipment, dangerous machines, accident prevention, hazards, hazardous areas, safety measures, information, utilization

English version

Rubber and plastics machines - Extruders and extrusion lines - Part 1: Safety requirements for extruders

Machines pour le caoutchouc et les matières plastiques - Extrudeuses et lignes d'extrusion - Partie 1: Exigences de sécurité pour les extrudeuses

Gummi- und Kunststoffmaschinen - Extruder und Extrusionsanlagen - Teil 1: Sicherheitsanforderungen für Extruder

This European Standard was approved by CEN on 1996-08-11. 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.

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.

80f75faaf7c6/sist-en-1114-1-2000

CEN

European Committee for Standardization
Comité Européen de Normalisation
Europäisches Komitee für Normung

Central Secretariat: rue de Stassart, 36 B-1050 Brussels

© 1996

Copyright reserved to CEN members

Ref. No. EN 1114-1:1996 E

Contents

	Page
Foreword	3
0 Introduction	4
1 Scope	5
2 Normative references	7
3 Definitions	10
4 Hazards and areas of danger	
4.1 List of hazards	14
4.2 Areas of danger	16
5 Safety requirements and/or measures	
5.1 Mechanical hazards	31
5.2 Electrical energy	50
5.3 Hot machine parts and hot plasticised material	51
5.4 Noise	52
5.5 Materials and substances processed used and/or exhausted by the machinery	54
5.6 Fire	55
5.7 Temperature control for heated areas	56
5.8 Emergency stop devices	57
5.9 Machine control systems	58
6 Verification of conformity with the safety requirements and/or measures	59
7 Information for users	
7.1 Minimum marking on the machine	61
7.2 Instruction manual	62
Annex ZA (informative) Clauses of this European Standard addressing essential requirements or other provisions of EU Directives	



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 April 1997, and conflicting national standards shall be withdrawn at the latest by April 1997.

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)

This is the first in a series of standards on the safety of extruders and extrusion lines.

Part 2 deals with die face pelletisers.

Part 3 deals with caterpillar, roller and belt take-offs.

Further parts are under discussion.

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

iTeh STANDARD PREVIEW **(standards.iteh.ai)**

[SIST EN 1114-1:2000](https://standards.iteh.ai/catalog/standards/sist/ef784ef3-e792-4464-bccd-80f75faaf7c6/sist-en-1114-1-2000)

<https://standards.iteh.ai/catalog/standards/sist/ef784ef3-e792-4464-bccd-80f75faaf7c6/sist-en-1114-1-2000>

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 should comply as appropriate with EN 292 for hazards which are not covered by this standard.

iTeh STANDARD PREVIEW
(standards.iteh.ai)

[SIST EN 1114-1:2000](https://standards.iteh.ai/catalog/standards/sist/ef784ef3-e792-4464-bccd-80f75faaf7c6/sist-en-1114-1-2000)

<https://standards.iteh.ai/catalog/standards/sist/ef784ef3-e792-4464-bccd-80f75faaf7c6/sist-en-1114-1-2000>

1 Scope

In respect of the hazards listed in 4.1 and dealt with in 5, this Standard specifies the safety requirements for the design and construction of the following kinds of screw type extruders for plastics and rubber:-

- single screw extruders
- twin screw extruders
- multi/multiple screw extruders
- hot feed extruders
- cold feed extruders
- vacuum extruders
- pin extruders

The Standard additionally covers the following feeding systems:

- hoppers
- single roller feeding systems
- double roller feeding systems
- crammer feeding systems

and the following ancillary equipment which form part of or are attached to the extruder:-

- screen changers
- melt/gear pumps
- melt ducts
- static mixers
- degassing equipment
- shear head devices
- extruder head

<https://standards.iteh.ai/catalog/standards/sist/ef784ef3-e792-4464-bccd-80f75faaf7c6/sist-en-1114-1-2000>

iTeh STANDARD PREVIEW
(standards.iteh.ai)

This standard only applies to extruder heads that give initial shape to the plasticised material.

This standard does not apply to extruders without screws eg:-

- piston extruders
- disc extruders
- roller extruders

This standard applies primarily to machines which are manufactured after the date of approval of this European Standard

iTeh STANDARD PREVIEW
(standards.iteh.ai)

[SIST EN 1114-1:2000](https://standards.iteh.ai/catalog/standards/sist/ef784ef3-e792-4464-bccd-80f75faaf7c6/sist-en-1114-1-2000)

<https://standards.iteh.ai/catalog/standards/sist/ef784ef3-e792-4464-bccd-80f75faaf7c6/sist-en-1114-1-2000>

2 Normative references

This European standard incorporates by dated 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.

EN 292-1: 1991 Safety of Machinery, Basic concepts, general principles for design. Part 1: Basic Terminology, Methodology.

EN 292-2:1991 Safety of Machinery, Basic concepts, general principles
+ A1:1995 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 to parts of the human body.

EN 418: 1992 Safety of Machinery, Emergency Stop Equipment.
Functional Aspects. Principles for design.

EN 563: 1994 Safety of machinery, Temperature of touchable surfaces.
Ergonomic data to establish temperature limit values for hot surfaces

prEN 574: 1991 Safety of Machinery - two hand control devices.

EN 626-1:1994 Safety of machinery - risks from hazardous substances emitted by machinery. Part 1:Principles for manufacturers

- prEN 811: 1992 Safety of Machinery - safety distances to prevent danger zones being reached by the lower limbs.
- prEN 953: 1992 Safety of Machinery: general requirements for the design and construction of guards (fixed, movable)
- prEN 954-1:1994 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 with and without guard locking - general principles and provisions for design.
- 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.
- 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.
- EN 60204-1: 1992 Safety of Machinery. Electrical Equipment of Machines, Part 1, specification for general requirements.
- EN 60529: 1991 Degrees of protection provided by enclosure.
- EN ISO 3744:1995 Acoustics. Determination of sound power levels of noise sources. Engineering methods for free field conditions over a reflecting plane.

ITeH STANDARD PREVIEW
(standards.iteh.ai)

SIST EN 1114-1:2000
<https://standards.iteh.ai/catalog/standards/sist/ef784e3-e792-4464-bccd-80f75faaf7c6/sist-en-1114-1-2000>

prEN ISO/DIS
4871:1995 Acoustics. Declaration and verification of noise
emission values of machinery and equipment.

EN ISO 9614-1:1995 Acoustics. Determination of sound power levels of noise
sources using sound intensity, Part 1, measurement at discrete points

iTeh STANDARD PREVIEW
(standards.iteh.ai)

[SIST EN 1114-1:2000
https://standards.iteh.ai/catalog/standards/sist/ef784ef3-e792-4464-bccd-
80f75faaf7c6/sist-en-1114-1-2000](https://standards.iteh.ai/catalog/standards/sist/ef784ef3-e792-4464-bccd-80f75faaf7c6/sist-en-1114-1-2000)

3 Definitions

For the purposes of this Standard the following definitions apply:

3.1 Extruder

The extruder is a machine which conveys solid or liquid material by means of one or more screws rotating within a barrel and discharges it continuously through the extrusion head. In doing so the material can be heated, cooled, consolidated, mixed, plasticised, can undergo chemical reactions, and may be degassed or gas injected. Viewed in the direction of flow of the material the extruder itself ends with the tip of the screw or screws.

Screen changers, melt pumps, shear head devices, static mixers and degassing equipment, etc may be arranged between the extruder and the extruder head or along the barrel.

3.2 Plasticised material

A liquid, paste or solid product which is ready to be processed into semi-finished products or finished products.

3.3 Feeding system

Any equipment which feeds the material into the screw(s).

[SIST EN 1114-1:2000](https://standards.iteh.ai/catalog/standards/sist/ef784ef3-e792-4464-bccd-5faaf7c6/sist-en-1114-1-2000)

[https://standards.iteh.ai/catalog/standards/sist/ef784ef3-e792-4464-bccd-](https://standards.iteh.ai/catalog/standards/sist/ef784ef3-e792-4464-bccd-5faaf7c6/sist-en-1114-1-2000)

3.4 Crammer feeding system

A system which has a dedicated drive which assists the flow of materials from the hopper feed into the extruder by means of screws or other devices. It is also used to densify bulk low density materials.

3.5 Double roller feeding device

A device used for constant feeding of the extruder with rubber, eg rubber strips. The feeding device consists of two rolls arranged in parallel positioned at the feed opening of the extruder above the open screw. The rolls are driven in contra-rotating direction under constant power so that the material is transported into the extruder under constant pressure. The rolls are water cooled to prevent heating and vulcanising of the product.

3.6 Single roller feeding device

A roller, which has an axis parallel to that of the screw. The screw and the roller counter-rotate and form an in-running nip and thereby improve the regularity of feeding. It may be driven by the screw or by an independent device.

3.7 Main feed opening

An opening in the barrel through which for example the granulate, sheets, strips, powder or plasticised material passes.

3.8 Secondary feed opening

A subsidiary opening in the barrel through which for example granulate, powder, liquid or paste (eg colour, stabilisers, plasticisers) passes.

3.9 Barrel

A housing which surrounds one or more screws.

3.10 Degassing equipment

A device which is arranged in certain sections of the screw barrel and is intended to

iTeh STANDARD PREVIEW
(standards.iteh.ai)

SIST EN 1114-1:2000
<https://standards.iteh.ai/catalog/standards/sist/ef784ef3-e792-4464-bccd-80f75faaf7c6/sist-en-1114-1-2000>

remove volatile components of the plasticised material during preparation of plastic material and rubber.

3.11 Pins

These are components fixed into the extruder barrel and which protrude into the inside of the barrel to allow a better mix of the material.

3.12 Accessories attached to openings in the extruder barrel

Accessories are parts of measuring devices for example temperature or pressure gauges with a maximum connection diameter of 30mm.

3.13 Melt/gear pump

A pump which has a dedicated drive conveying continuously plasticised material. Its purpose is to ensure equalisation of pressure, in particular to increase it downstream of the screw leading to an improvement in the regularity of delivery.

3.14 Melt ducts

Melt ducts are heated pipes connecting accessories for example screen changers, melt pumps and static mixers and carry plasticised material.

ITeH STANDARD PREVIEW
(standards.iteh.ai)

3.15 Static mixer

[SIST EN 1114-1:2000
https://standards.iteh.ai/catalog/standards/sist/ef784ef3-e792-4464-bccd-80f75faaf7c6/sist-en-1114-1-2000](https://standards.iteh.ai/catalog/standards/sist/ef784ef3-e792-4464-bccd-80f75faaf7c6/sist-en-1114-1-2000)

A device positioned at the outlet of the screw of an extruder which contains fixed obstacles. When the screw pushes the material it cuts and kneads it to improve homogeneity.

3.16 Screen changer

A device containing one or more screens through which plasticised material flows to remove foreign particles. The screen or screens are fixed on a carrier and can be moved from an on-line operating position to an off-line or non-operating position and vice versa.

3.17 Shear head device

An item of ancillary equipment which has its own motive power and temperature control system, fitted between the screw of the extruder and the extrusion head. It serves to raise the plasticised material discharged from the extrusion head to the correct temperature for continuous vulcanisation.

3.18 Extruder head

A device that gives shape to the plasticised material.

3.19 Extrudate

The plasticised material which comes out of the extrusion head during extrusion. If there is no extrusion head the extruded product is the plasticised material which leaves the extruder.

iTeh STANDARD PREVIEW
(standards.iteh.ai)

[SIST EN 1114-1:2000
https://standards.iteh.ai/catalog/standards/sist/ef784ef3-e792-4464-bccd-80f75faaf7c6/sist-en-1114-1-2000](https://standards.iteh.ai/catalog/standards/sist/ef784ef3-e792-4464-bccd-80f75faaf7c6/sist-en-1114-1-2000)