SLOVENSKI STANDARD
SIST EN 1114-2:2000+A1:2008

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Stroji za predelavo gume in plastike - Ekstruderji in oprema za iztiskavanje - 2. del: Varnostne zahteve za granulatorje

Plastics and rubber machines - Extruders and extrusion lines - Part 2: Safety requirements for die face pelletisers

Kunststoff- und Gummimaschinen - Extruder und Extrusionsanlagen - Teil 2: Sicherheitsanforderungen für Kopfgranulatoren

Machines pour les matières plastiques et le caoutchouc - Extrudeuses et lignes d'extrusion - Partie 2: Prescriptions de sécurité pour les granulateurs en tête

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Plastics and rubber machines - Extruders and extrusion lines - Part 2: Safety requirements for die face pelletisers

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This European Standard was approved by CEN on 26 January 1998 and includes Amendment 1 approved by CEN on 8 June 2008.

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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 CEN Management Centre has the same status as the official versions.

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COMITÉ EUROPÉEN DE NORMALISATION
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Foreword

This document (EN 1114-2:1998+A1:2008) 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of an identical text or by endorsement, at the latest by March 2009, and conflicting national standards shall be withdrawn at the latest by December 2009.

This document includes Amendment 1, approved by CEN on 2008-06-08. The main changes compared to the previous version are:

- modification of the main element of the title
- editorial modification of Annex ZA
- addition of Annex ZB
- editorial changes of EN 292-1:1991 to EN ISO 12100-1:2003 and of EN 292-2:1991 to EN ISO 12100-2:2003 in the following clauses and sub-clauses: Introduction, 2, 5.6, 5.7, 5.8, Table 1, 7.1, 7.2
- minor changes in the Foreword and in sub-clauses 5.7.2 and 7.1, second paragraph.

This document supersedes EN 1114-2:1998.

The start and finish of text introduced or altered by amendment is indicated in the text by tags ⟨A1⟩ ⟨A1⟩.

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).

⟨A1⟩ For relationship with EU Directive(s), see informative Annexes ZA and ZB, which are integral parts of this document. ⟨A1⟩

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

Part 1 deals with extrudors.

Part 2 deals with haul-offs.

Further parts are under discussion.

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 United Kingdom.

Introduction

This European Standard is a type C Standard as defined in [A1] EN ISO 12100 [A1].

The extent to which hazards are covered is indicated in the scope of this standard. In addition, machinery shall comply as appropriate with [A1] EN ISO 12100 [A1] for hazards which are not covered by this standard.

1 Scope

This European Standard specifies safety requirements for the design and construction, in respect of the hazards listed in clause 4 and dealt with in clause 5, of the following kinds of die face pelletisers used with extruders for pelletising of plastics and rubber:

— Underwater pelletisers;

— Water ring pelletisers;

— Dry pelletisers;

— Centrifugal pelletisers;

— Knife rotor pelletisers.

Strand pelletisers are not subject to this standard. They are dealt with in a separate standard being produced by CEN/TC 145/WG6.

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

This standard applies to machines which are manufactured after the date of publication by CEN of the standard.

2 Normative references

This European standard includes by dated or undated reference provisions from other publications. These normative references are quoted 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.

[A1] *deleted text* [A1]

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 563:1994, *Safety of machinery – Temperatures of touchable surfaces – Ergonomic data to establish temperature limit values for hot surfaces*

EN 626-1:1994, *Safety of machinery – Principles for machinery manufacturers on the reduction of risk to health from hazardous substances emitted by machinery*

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 movable guards*

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

EN 982:1996, *Safety requirements for fluid power systems and components - Hydraulics*

EN 983:1996, *Safety requirements for fluid power systems and components - Pneumatics*

EN 1088:1995, *Safety of machinery – Interlocking devices with and without guard locking – General principles and provisions for design*

EN ISO 3744:1995, *Acoustics – Determination of sound power levels of noise sources – Engineering methods for free field conditions over a reflecting plane (ISO 3744:1994)*

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 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* (ISO 11201:1995)

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* (ISO 11204:1995)

〉A1〈 EN ISO 12100-1:2003, *Safety of machinery - Basic concepts, general principles for design - Part 1: Basic terminology, methodology (ISO 12100-1:2003)* 〉A1〈

〉A1〈 EN ISO 12100-2:2003, *Safety of machinery - Basic concepts, general principles for design - Part 2: Technical principles (ISO 12100-2:2003)* 〉A1〈

EN 60204-1:1992, *Safety of machinery – Electrical equipment of machines Part 1: General requirements*

EN 60529:1991, *Degrees of protection provided by enclosures* (IP code)

3 Definitions

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

3.1
die face pelletiser
device connected directly at the end of the extruder for converting plasticised material into pellets by forcing the plasticised material, by pressure or centrifugal force, through die plates or nozzles and converting it into strands with small cross section which are then immediately cut off after emerging by cutting knives to create pellets which are cooled and carried away by water or air.

The die face pelletiser includes essentially:

— Melt ducts;

— The diverter valve (also known as a starter valve);

— The pellet chamber;

— The drive for the knife shaft or the rotor;

— The cutting knife supporting equipment;

— The water and air inlet and outlet connections for the cooling and transport medium at the pellet chamber;

— The diverter device for pellets;

— The first flange connection at the material discharge side (pellet discharge).

3.2
underwater pelletiser
die face pelletiser where the discharge side of the die and the knives are mounted within the pellet chamber which is completely filled with water being circulated by an external system.

3.3
water ring pelletiser
die face pelletiser where the knives operate in an air atmosphere and the hot pellets are thrown into a rotating bath surrounding the die plate for cooling and conveying them away.

3.4
dry pelletiser

die face pelletiser where the knives operate in an air atmosphere and the hot pellets are thrown from the pellet chamber by the motion of the knives. The severed pellets are conveyed and cooled either by air alone or by capturing them within a water stream. The position of the cutting device can be either concentric or eccentric in relation to the die plate.

3.5
centrifugal pelletiser
rotating die face pelletiser where the extrusion pressure is generated by centrifugal force within the rotating die and the extruded strands are severed into pellets by fixed knives in an air atmosphere. The pellets are thrown into the conveying and cooling system and transported onwards within an air or water stream.

3.6
knife rotor pelletiser
die face pelletiser where the knife rotates on an axis perpendicular to the axis of discharge of the die. Air flows along the cutting device. For cooling and conveying purposes water may also be added.

3.7
plasticised material
liquid, paste or solid product which is ready to be processed into semi-finished products or finished products.

3.8
melt duct
heated pipe connecting the extruder with the die face pelletiser and carrying plasticised material.

3.9
Diverter/starter valve
device positioned in the melt duct in front of the die plate or nozzles to divert plasticised material away from the die face pelletiser during start-up.

3.10
pellet chamber
housing in which water and/or air is circulated for receiving, cooling and transport of pellets after cutting.

3.11
diverter device
device positioned at the outlet of the die face pelletiser to divert pellets away from the transport media.

4 Hazards and Danger Zones

4.1 List of hazards

4.1.1 Mechanical hazards

Mechanical hazards are:

a) Crushing;

b) Cutting and severing;

c) Drawing in or trapping;

d) Ejection of parts of the machine.

These hazards are principally due to:

— The rotating parts of the drive and power transmission system (a, b, c);

— The stationary or rotating pelletising knives (a, b, c, d);

— The rotating drums in the case of centrifugal pelletisers (a, b, c);

— Movement of the complete machine or parts of it (a);

— Powered movement of the diverter/starter valve (a, b, c).

4.1.2 Loss of stability

Hazards due to overturning can occur

— During mounting and removal of the die face pelletiser;

— For a die face pelletiser mounted on a supporting frame or carriage when being moved separately from the extruder

4.1.3 Hazards due to electrical energy

4.1.3.1 Electrical shock or burns due to for example direct or indirect contact with live parts.

4.1.3.2 Electric shock due to electrostatic phenomena.

4.1.4 Hazards due to hydraulic or pneumatic energy

If hydraulic or pneumatic energy is used to move the cutters towards the die plate or the nozzles, to move the diverter valve or to drive the rotor shaft, hazards can occur due to:

— Release of fluids under pressure from hydraulic systems or of compressed air from pneumatic components;

— Whiplash of pipelines in case of pipe breakage.

4.1.5 Hazards due to failure of safety related parts of control systems

Hazards due to uncontrolled dangerous movements or unexpected start-up can occur due to failure of components of the measuring, regulating and control circuitry.

4.1.6 Thermal hazards

— Burns due to contact with hot machine parts, hot plasticised material or hot pellets

— Scalds due to contact with hot transport and cooling medium if the pellet chamber is opened;

— Fire due to hydraulic fluid resulting from unexpected leakage and contact with hot machine parts.

4.1.7 Hazards due to noise

High noise levels can cause:

— Hearing loss;

— Interference with speech communication;

— Interference with the perception of acoustic signals.

4.1.8 Hazards due to materials and substances processed, used or exhausted by the machine

Harmful health hazards can occur due to contact with or inhalation of harmful materials and substances such as fluids, gases, fumes or dusts during operation and due to failure e.g. if materials are processed which can decompose following unexpected overheating of the attached extruder.

Harmful materials may be released:

— From the plasticised material during start-up;

— From the pellets and the discharge medium at the discharge point.

4.2 Danger zones

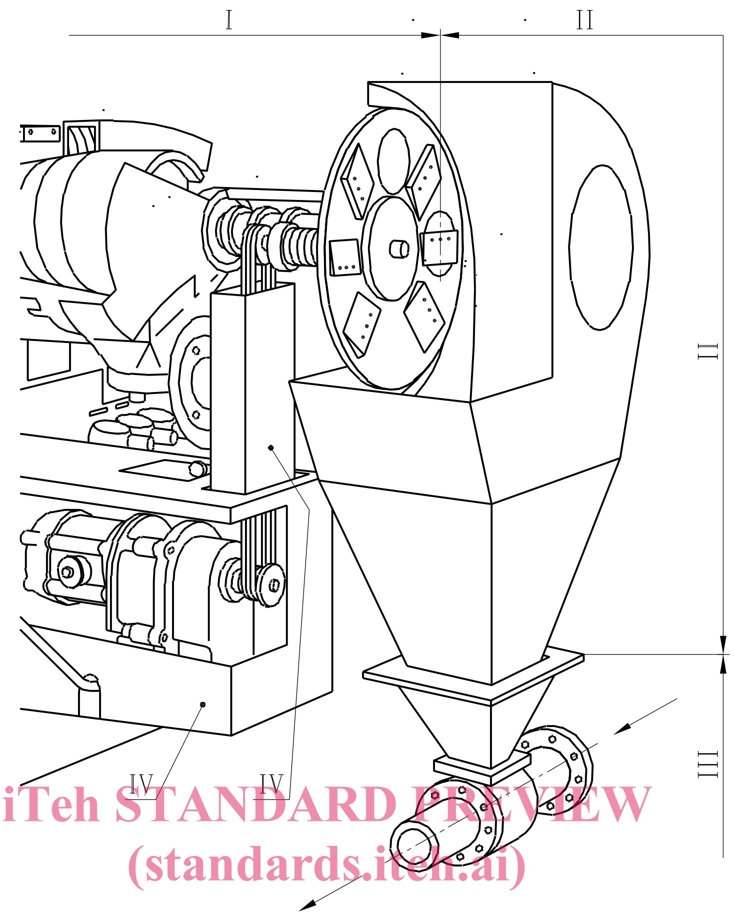
4.2.1 Subdivision into danger zones

For all types of die face pelletisers the following zones can be identified:

Zone I:	melt duct, diverter/starter valve
Zone II:	area of cutter, pellet chamber
Zone III:	pellet discharge area/diverter device, cooling and transport media outlet area
Zone IV:	area of drive motor and clutch
Zone V:	wheels for horizontal movement

4.2.2 Examples of die face pelletisers

Figures 1 to 5 show examples of die face pelletisers with danger zones indicated.



I Melt duct, diverter/starter valve

II Area of cutter, pellet chamber

III Pellet discharge area/diverter device, cooling and transport media outlet area

IV Area of drive motor and clutch

Figure 1 — dry pelletiser