SLOVENSKI STANDARD

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Nadomešča:

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Naprave in sistemi za kontinuirni transport - Varnostne zahteve in zahteve za elektromagnetno združljivost naprav, sistemov in opreme za kontinuirni transport sipkih materialov na nepomičnih ogrodjih (vključno z dopolnilom A1)

Continuous handling equipment and systems - Safety and EMC requirements for fixed belt conveyors for bulk materials

Stetigförderer und Systeme - Sicherheits- und EMW- Anforderungen für ortsfeste Gurtförderer für Schüttgutt

Equipements et systèmes de manutention continue - Prescriptions de sécurité et de CEM pour les transporteurs à courroie fixes pour produits en vrac

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Continuous handling equipment and systems - Safety and EMC requirements for fixed belt conveyors for bulk materials

Equipements et systèmes de manutention continue - Prescriptions de sécurité et de CEM pour les transporteurs à courroie fixes pour produits en vrac

Stetigförderer und Systeme - Sicherheits- und EMW-Anforderungen für ortsfeste Gurtförderer für Schüttgutt

This European Standard was approved by CEN on 16 november 2001 and includes Amendment 1 approved by CEN on 9 November 2010.

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COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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Contents

Foreword

This document (EN 620:2002+A1:2010) has been prepared by Technical Committee CEN /TC 148, "Continuous handling equipment and systems - Safety", the secretariat of which is held by AFNOR.

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of an identical text or by endorsement, at the latest by June 2011, and conflicting national standards shall be withdrawn at the latest by June 2011.

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 includes Amendment 1, approved by CEN on 2010-11-09.

This document supersedes EN 620:2002.

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

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).

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

This [A1] standard [A1] forms part of a series of five [A1] standards [A1] the titles of which are given below:

— EN 617 "Continuous handling equipment and systems — Safety and EMC requirements for the equipment for the storage of bulk materials in silos, bunkers, bins and hoppers" ;

— EN 618 "Continuous handling equipment and systems — Safety and EMC requirements for equipment for mechanical handling of bulk materials except fixed belt conveyors" ;

— [A1] EN 619 [A1] "Continuous handling equipment and systems — Safety and EMC requirements for equipment for mechanical handling of unit loads" ;

— EN 620 "Continuous handling equipment and systems — Safety and EMC requirements for fixed belt conveyors for bulk material" ;

— EN 741 "Continuous handling equipment and systems — Safety requirements for systems and their components for pneumatic handling of bulk materials".

[A1] *deleted text* [A1]

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, Croatia, 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 stated in EN 1070:1998.

The products concerned and the extent to which hazards are covered are indicated in the scope of this standard.

While producing this standard it was assumed that:

— negotiations occur between the manufacturer and the purchaser concerning particular conditions for the use and places of use for the machinery related to health and safety;

— only suitably trained persons will operate this machinery;

— the machinery will be kept in good repair and working order, in accordance with the manufacturer's instructions, to retain specified health and safety characteristics throughout its working life;

— the place of installation is adequately lit.

— the place of installation will allow safe use of the machinery;

— by design of the load bearing elements, the safe operation of the system and components is assured for loading ranging from zero to 100 % of the rated capacities and during testing;

— all parts of the machinery without specific requirements, will be:

a) made from materials of adequate strength and durability and of suitable quality for their intended purpose;

b) of sound mechanical construction;

c) designed in accordance with the usual engineering practice and engineering codes, taking account of all failure modes and incorporating appropriate safety factors.

EN 617, EN 618 and EN 741 need to be considered for a complete continuous handling system (machine).

1 Scope

1.1 This European standard deals with the technical requirements to minimise the risks due to the hazards listed in clause **4**, which can arise during operation and maintenance of fixed belt conveyors and systems as defined in **3.1 to 3.2.4** and designed for continuously conveying loose bulk materials from the loading point(s) to the unloading point(s). Requirements for electromagnetic compatibility are also covered.

1.2 This standard applies to use in ambient air temperatures of -15° C to + 40° C.

1.3 This standard does not cover:

a) use in open cast lignite mining or use underground, such as in mines or tunnels;

b) use in public areas or for man-riding;

c) floating, dredging and ship mounted equipment;

d) conveyors requiring a high level of cleanliness for hygiene reasons, e.g. in direct contact with foodstuffs or pharmaceuticals;

e) conveyors using a moving belt with other than a continuous rubber or polymeric surface for the conveying medium;

f) transportation of the conveyor;

g) the design of the supporting structure which is not part of a conveyor (see **3.2**);

h) the effects of wind;

i) hazards resulting from handling specific hazardous materials, (e.g. explosives, radiating material);

j) hazards resulting from contact with or inhalation of harmful fluids, gases, mists, fumes or dust;

k) biological and micro-biological (viral or bacterial) hazards;

l) hazards due to heat radiation from the materials handled;

m) hazards caused by operation in electromagnetic fields outside the range of EN 61000-6-2:1999;

n) hazards caused by operation subject to special regulations (e.g. explosive atmospheres);

o) hazards caused by noise;

p) hazards caused by the use of ionising radiation sources;

q) hazards caused by hydraulic equipment.

The safety requirements of this standard apply to equipment and systems placed on the market 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

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 amendments) applies.

〚A1〛 *deleted text* 〚A1〛

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 457:1992, *Safety of machinery — Auditory danger signals — General requirements — Design and testing (ISO 7731:1986, modified)*

EN 563:1994, *Safety of machinery — Temperatures of touchable surfaces — Ergonomics data to establish temperature limit values for hot surfaces*

EN 574:1996, *Safety of machinery — Two-hand control devices — Functional aspects — Principles for design*

EN 614-1:1995, *Safety of machinery — Ergonomic design principles — Part 1: Terminology and general principles*

〚A1〛 EN 617 〚A1〛, *Continuous handling equipment and systems — Safety and EMC requirements for the equipment for the storage of bulk materials in silos, bunkers, bins and hoppers*

〚A1〛 EN 618 〚A1〛, *Continuous handling equipment and systems — Safety and EMC requirements for equipment for mechanical handling of bulk material except fixed belt conveyors*

〚A1〛 EN 619 〚A1〛, *Continuous handling equipment and systems — Safety and EMC requirements for equipment for mechanical handling of unit loads*

〚A1〛 EN 741 〚A1〛, *Continuous handling equipment and systems — Safety requirements for systems and their components for pneumatic handling of bulk materials*

EN 811:1996, *Safety of machinery — Safety distances to prevent danger zones being reached by the lower limbs*

EN 842:1996, *Safety of machinery — Visual danger signals — General requirements — Design and testing*

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 1005-1:2001, *Safety of machinery — Human physical performance — Part 1: Terms and Definitions*

〚A1〛 EN 1005-2, *Safety of machinery — Human physical performance — Part 2: Manual handling of machinery and component parts of machinery* 〚A1〛

EN 1005-3:2002, *Safety of machinery — Human physical performance — Part 3: Recommended force limits for machinery operation*

EN 1037:1995, *Safety of machinery — Prevention of unexpected start-up*

EN 1050:1996, *Safety of Machinery — Principles for Risk Assessment*

EN 1070:1998, *Safety of machinery — Terminology*

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 1760-2:2001, *Safety of machinery — Pressure sensitive protective devices — Part 2: General principles for the design and testing of pressure sensitive edges and pressure sensitive bars*

[A1] EN ISO 12100-1, *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 ISO 12150-1:2000, *Glass in building — Thermally toughened soda lime silicate safety glass — Part 1: Definition and description*

EN ISO 14122-1:2001, *Safety of machinery — Permanent means of access to machines and industrial plants — Part 1: Choice of fixed means of access between two levels*

EN ISO 14122-2:2001, *Safety of machinery — Permanent means of access to machines and industrial plants — Part 2: Working platforms and gangways*

EN ISO 14122-3:2001, *Safety of machinery — Permanent means of access to machines and industrial plants — Part 3: Stairways, Stepladders and guard-rails*

[A1] EN ISO 14122-4, *Safety of machinery — Permanent means of access to machinery — Part 4: Fixed ladders (ISO 14122-4:2004)* [A1]

EN ISO 12543:1998, *Glass in building — Laminated glass and laminated safety glass*

EN 13202:2000, *Ergonomics of the thermal environment — Temperatures of touchable hot surfaces — Guidance for establishing surface temperature limit values in production standards with the aid of EN 563*

EN 50081-1:1992, *Electromagnetic compatibility — Generic emission standard — Part 1: Residential, commercial and light industry*

EN 61000-6-2:1999, *Electromagnetic compatibility (EMC) — Part 6-2: Generic standards — Immunity for industrial environments (IEC 61000-6-2:1999)*

EN 60204-1:1997, *Safety of machinery — Electrical equipment of machines — Part 1: Specification for general requirements (IEC 60204-1:1997)*

[A1] EN 60204-11:2000, *Safety of machinery — Electrical equipment of machines — Part 11: Requirements for HV equipment for voltages above 1000 V a.c. or 1500 V d.c. and not exceeding 36 kV (IEC 60204-11:2000)* [A1]

EN 60529:1991, *Degrees of protection provided by enclosures (IP Code) (IEC 60529:1989)*

EN 60947-5-1:1997, *Low-voltage switchgear and controlgear — Part 5-1: Control circuit devices and switching elements — Electromechanical control circuit devices (IEC 60947-5-1:1997)*

EN 61310-1:1995, *Safety of machinery — Indication, marking and actuation — Part 1: Requirements for visual, auditory and tactile signals (IEC 61310-1:1995)*

EN 61496-1:1997, *Safety of machinery — Electro-sensitive protective equipment — Part 1: General requirements and tests (IEC 61496-1:1997)*

ISO 2148:1974, *Continuous handling equipment — Nomenclature*

ISO 6184-1:1985, *Explosion protection systems — Part 1: Determination of explosion indices of combustible dust in air*

IEC 61241-1-1:1999. *Electrical apparatus for use in the presence of combusible dust — Part 1: Electrical apparatus protected by enclosures and surface temperature limitation — Specification for apparatus*

CENELEC Report No. R044-001:1999, *Safety of machinery — Guidance and recommendations for the avoidance of hazards due to static electricity*

3 Terms and definitions

For the purposes of this European standard, the terms and definitions stated in EN 1070:1998 apply in addition to those below. Additional terminology for conveyors is given in ISO 2148:1974.

3.1
conveyor system
number of linked conveyors with their ancillary equipment

3.2
belt conveyor
conveyor including its structural components, using a moving belt with a continuous rubber or polymeric surface for the conveying medium. The belt is usually driven by a pulley at one end, passing over a free-running pulley at the other end. The upper portion of the belt may be supported by free-running idlers or suitable flat surfaces. The conveyor may be arranged for horizontal or inclined travel, the angle of slope depending on the character of the goods conveyed and the type of belt

3.2.1
troughed belt conveyor
belt conveyor where the belt is supported on horizontal centre rollers and inclined side rollers which impart a transverse curvature to the belt

3.2.2
walled belt conveyor
belt conveyor where the belt has its flat carrying face extended to form side walls of limited height

3.2.3
radial conveyor
belt conveyor which is pivoted at one end and may be mounted on wheels or skids at a point along its length, which permits movement in a horizontal arc

3.2.4
belt feeder
shortened form of belt conveyor, normally running at slow speed, designed to extract or control the rate of flow of bulk materials from hoppers

3.3 Ancillary equipment

3.3.1
feed hopper
collecting device at the loading point of the conveyor for receiving material

3.3.2
tripper
device usually comprising two or more pulleys, mounted either in a fixed position or on a travelling carriage, for discharging material at selected points or at any point along the length of a belt conveyor

3.3.3
chute
straight or curved, open topped or enclosed, smooth trough by which materials are directed and fall under gravity

3.4 Other terms and definitions

3.4.1
skirt plate
extension to the feed hopper or independent plate along the length of the conveyor for centralising and/or retaining material on the belt

3.4.2
take-up device
device for taking up slack and applying tension to the belt

3.4.3
gravity take-up device
vertical weight operated (automatic) take-up device

3.4.4
scraper
cleaning device fixed or flexibly mounted across the width of a belt or pulley of a conveyor, for removing adherent material

3.4.5
troughing idlers
idler set which supports the belt and maintains it in a troughed form

3.4.6
transition idlers
idler sets supporting the belt over the transition distance. The geometry of the idlers may vary over the transition distance to give the change from the troughed profile to flat

3.4.7
carrying idler
idler which supports the load carrying side of the belt

3.4.8
return idler
idler which supports the return (empty) side of the belt

3.4.9
drive pulley
pulley that drives the belt

3.4.10
snub pulley
pulley used to develop the necessary arc of contact (angle of wrap) of the belt on the drive pulley

3.4.11
bend pulley
pulley used to change the direction of the belt

3.4.12
head pulley
terminal pulley at the head of a conveyor

3.4.13
take-up pulley
moving pulley used in the take-up device

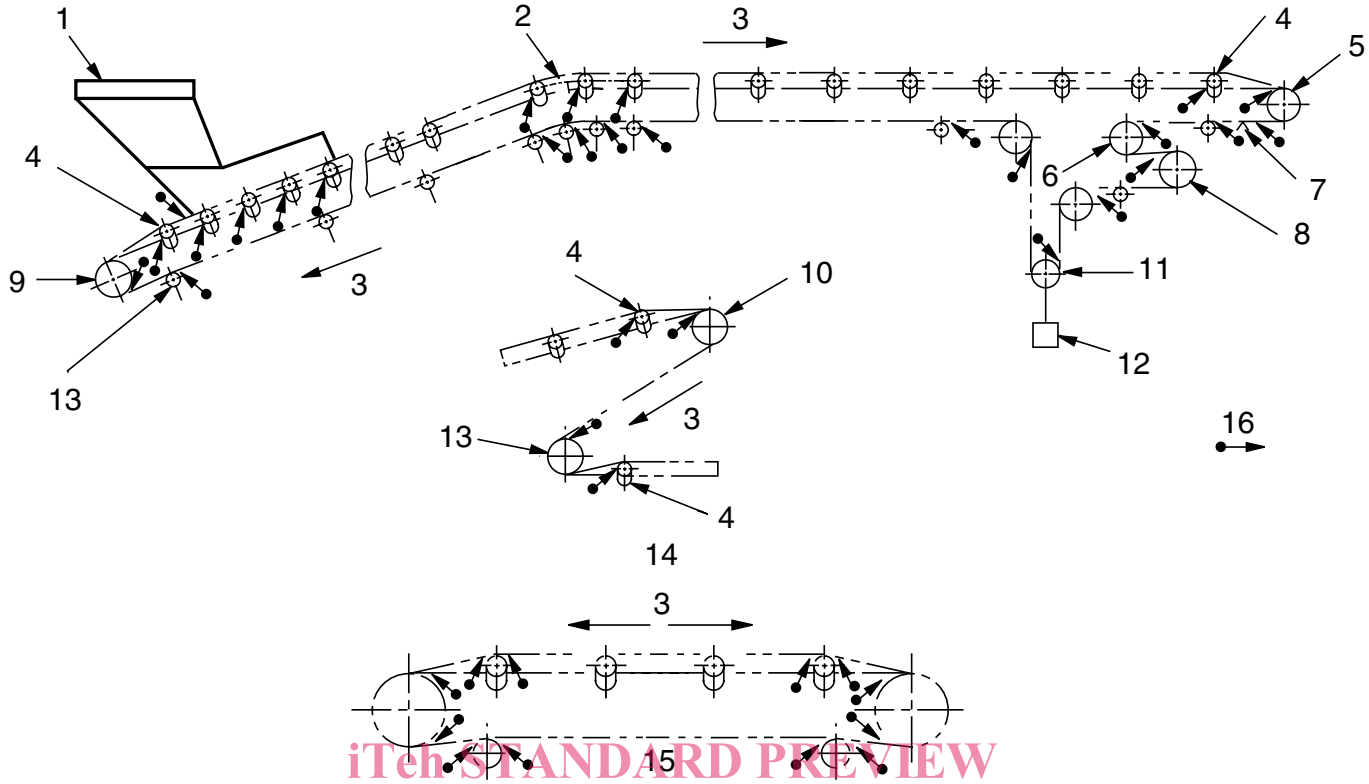
3.4.14
tail pulley
terminal pulley at the tail of a conveyor. This may be a take-up pulley

3.4.15
fixed enclosing guard
fixed guard which prevents access to a danger zone from all sides

3.4.16
fixed distance guard
fixed guard which does not completely enclose a danger zone, but which prevents or reduces access by virtue of its dimensions and its distance from the danger zone e.g. perimeter fence or tunnel guard

3.4.17
nip guard
fixed guard inserted at a nip point to directly safeguard that point

3.4.18
nip point
dangerous point which occurs on the in-running side at the line of contact between the conveyor belt and rotating pulley and in certain cases between belt and an idler roller or a fixed part (see Figure 1)



Key

1	Feed hopper	9	Tail pulley
2	Idlers at convex curve (brow) position	10	Tripper discharge pulley
3	Direction of belt travel	11	Take up pulley
4	Transition idler	12	Gravity take-up weight
5	Head pulley	13	Bend pulley
6	Snub pulley	14	Typical tripper
7	Scraper	15	Reversible belt
8	Drive pulley	16	Nip point

Figure 1 – Typical nip points

3.4.19
transition section
section of a troughed belt conveyor at the head, tail or at an intermediate discharge pulley, where the belt profile changes between a troughed form and a flat form

3.4.20
transition distance
length of the conveyor occupied by the transition section

3.4.21
head of conveyor
discharge end of the conveyor

3.4.22
tail of conveyor
loading end of the conveyor

3.4.23
working area
area as intended by the manufacturer, where persons work at, or operate conveyors under normal conditions (inspection, maintenance and cleaning are excluded)

3.4.24
traffic area
area as intended by the manufacturer, which is accessible or reachable by all persons without opening a guard, activating a trip device or using additional means

4 List of hazards

This clause contains all the significant hazards and events, as far as they are dealt with in this standard, identified by risk assessment as significant for this type of machinery and which require action to eliminate or reduce the risk. Clause 5 deals with these hazards in the same order.

NOTE The hazards described below usually occur in combination. e.g. crushing, shearing and drawing-in.

4.1 Mechanical hazards

4.1.1 General

Mechanical hazards exist if people may sustain physical injury by direct contact with moving machinery, or indirectly sustain physical injury by being struck by parts of failed machinery or the materials being conveyed or discharged.

4.1.2 Crushing and shearing hazards

Fixed conveyors may include a part moving in a vertical or horizontal plane and may be actuated manually or by power.

Crushing and shearing hazards may be caused by e.g. :

— moving parts passing obstructions at gangways or passageways ;

— articulated or mobile parts, if movement of the belt continues when power is removed ;

— overtravel. e.g. lowering, lifting or travelling ;

— counterweight tension devices.

4.1.3 Cutting or severing hazards

Cutting or severing hazards may be caused by e.g. :

— unprotected sharp edges ;

— corners or rough surfaces ;

— material conveyed ;

— broken window glass in the operators cabin.

4.1.4 Entanglement, drawing-in or trapping hazards

Entanglement, drawing-in and trapping hazards may occur in the following locations e.g. :

— at nip points where the belt wraps around pulleys (see Figure 1) such as :

  — drive pulleys and snub pulleys ;

  — head pulleys and tail pulleys ;

  — take-up pulleys ;

  — tripper discharge pulleys and bend pulleys.

— at nip points where the lifting of the belt at carrying and return idlers may be restricted by means other than the load (see Figure 1) such as :

  — at convex curves ;

  — beneath feed hoppers and skirt plates ;

— at scrapers or other cleaning devices ;

— around transmission parts e.g. gears, couplings, belt drives and chain drives ;

— between conveyed material and fixed components of the conveyor.

4.1.5 Hazards arising from ejection of parts (of machinery or handled materials)

Hazards may arise from the ejection of machinery parts or from the ejection of the materials being conveyed e.g. :

— parts of machinery fitted above working and traffic areas ;

— failure of the conveying belt ;

— due to spillage or falling of conveyed material ;

— the sliding or collapse of conveyed materials ;

— when freeing jammed or blocked conveyed materials.