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Machines for the manufacture of constructional products from concrete and calcium-silicate - Safety - Part 1: Common requirements

Maschinen für die Herstellung von Bauprodukten aus Beton und Kalksandsteinmassen - Sicherheit - Teil 1: Gemeinsame Anforderungen

Machines pour la fabrication de produits de construction en béton et silico-calcaire - Sécurité - Partie 1: Exigences communes

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COMITÉ EUROPÉEN DE NORMALISATION
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Contents

Foreword

This document (EN 12629-1:2000+A1:2010) has been prepared by Technical Committee CEN/TC 151 “Construction equipment and building material machines — Safety”, the secretariat of which is held by DIN.

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of an identical text or by endorsement, at the latest by March 2011, and conflicting national standards shall be withdrawn at the latest by March 2011.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 2010-08-05.

This document supersedes EN 12629-1:2000.

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).

For relationship with EU Directive(s), see informative Annex ZA, which is an integral part of this standard.

[A1] The series *"Machines for the manufacture of constructional products from concrete and calcium – silicate – Safety"* consists of the following parts:

Part 1: Common requirements

Part 2: Block making machines

Part 3: Slide and turntable machines

Part 4: Concrete roof tile making machines

Part 5.1: Pipe making machines manufacturing in the vertical axis

Part 5.2: Pipe making machines manufacturing in the horizontal axis

Part 5.3: Pipe prestressing machines

Part 5.4: Concrete pipe coating machines

Part 6: Stationary and mobile equipment for the manufacture of precast reinforced products

Part 7: Stationary and mobile equipment for long line manufacture of prestressed products

Part 8: Machines and equipment for the manufacture of constructional products from calcium silicate (and concrete) 〈A1〉

[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 [A1] EN ISO 12100 [A1].

The machinery concerned and the extent to which hazards, hazardous situations and events are covered are indicated in the scope of this standard.

When provisions of this type C standard are different from those which are stated in type A or B standards, the provisions of this type C standard take precedence over the provisions of the other standards, for machines that have been designed and built according to the provisions of this type C standard.

Reference to pertinent standards mentioned above is made where requirements of such standards are relevant.

1 Scope

1.1 This European Standard applies to machines for the manufacture of constructional products from concrete and/or calcium silicate examples of which are listed in annex A of this part. It gives concepts and general and common requirements for the design, operation and maintenance of such machines.

1.2 [A1] This European Standard deals with hazards listed in Clause 4 which can arise during the operation and maintenance, including the interfaces, of the machines for the manufacture of constructional products from concrete and calcium silicate, when carried out as intended and under conditions of misuse which are reasonably foreseeable by the manufacturer.

Part 2 to 8 of this standard give additional specific requirements and therefore have to be applied together with this part. [A1]

1.3 The preparation of concrete and/or calcium-silicate mixture and the transport from the mixer to the manufacturing plant are not part of this European Standard (see [A1] EN 12151:2007 [A1]). The equipment for the transport and handling of formed products, other than the integrated transport system, is not covered by this standard.

[A1] *deleted text* [A1]

[A1] **1.4** [A1] At the time of drafting, machine specific noise test codes for [A1] EN 12629-2 to -8 [A1] are not available to fulfill the requirements of 5.7.2 and 7.4.2. When they are available, they will be incorporated in these standards.

[A1] **1.5** This document is not applicable to machines for the manufacture of constructional products from concrete and/or calcium silicate, which are manufactured before the date of publication of this document by CEN. [A1]

2 Normative references

[A1] 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.

EN 349:1993+A1:2008, *Safety of machinery — Minimum gaps to avoid crushing of parts of the human body*

EN 457:1992, *Safety of machinery — Auditory danger signals — General requirements, design and testing*

EN 547-1:1996+A1:2008, *Safety of machinery — Human body measurements – Part 1: Principles for determining the dimensions required for openings for whole body access into machinery*

EN 547-2+A1:2008, *Safety of machinery — Human body measurements — Part 2: Principles for determining the dimensions required for access openings*

EN 547-3:1996+A1:2008, *Safety of machinery — Human body measurements – Part 3: Anthropometric data*

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

EN 614-1:2006+A1:2009, *Safety of machinery — Ergonomic design principles — Part 1: Terminology and general principles*

EN 626-1:1994+A1:2008, *Safety of machinery — Reduction of risks to health from hazardous substances emitted by machinery — Part 1: Principles and specifications for machinery manufacturers*

EN 894-1, *Safety of machinery — Ergonomics requirements for the design of displays and control actuators – Part 1: General principles for human interactions with displays and control actuators*

EN 894-2, *Safety of machinery — Ergonomics requirements for the design of displays and control actuators – Part 2: Displays*

EN 894-3, *Safety of machinery — Ergonomics requirements for the design of displays and control actuators – Part 3: Control actuators*

EN 953:1997+A1:2009, *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+A1:2008, *Safety of machinery — Safety requirements for fluid power systems and their components — Hydraulics*

EN 983:1996+A1:2008, *Safety of machinery — Safety requirements for fluid power systems and their components – Pneumatics*

EN 999, *Safety of machinery — The positioning of protective equipment in respect of approach speeds of parts of the human body*

EN 1037:1995+A1:2008, *Safety of machinery — Prevention of unexpected start-up*

EN 1088, *Safety of machinery — Interlocking devices associated with guards — Principles for design and selection*

EN ISO 3746:2009, *Acoustics — Determination of sound power levels of noise sources using sound pressure — Survey method using an enveloping measurement surface over a reflecting plane (ISO 3746:1995, including Cor 1:1995)*

EN ISO 11204:2010, *Acoustics — Noise emitted by machinery and equipment — Determination of emission sound pressure levels at a work station and at other specified positions applying accurate environmental corrections (ISO 11204:2010)*

EN ISO 11688-1:2009, *Acoustics — Recommended practice for the design of low-noise machinery and equipment — Part 1: Planning (ISO /TR 11688-1:1995)*

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

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

EN ISO 13850:2008, *Safety of machinery — Emergency stop — Principles for design (ISO 13850:2006)*

EN ISO 13857:2008, *Safety of machinery — Safety distances to prevent hazard zones being reached by upper and lower limbs (ISO 13857:2008)*

EN ISO 14122-1:2001, *Safety of machinery — Permanent means of access to machinery — Part 1: Choice of fixed means of access between two levels (ISO 14122-1:2001)*

EN ISO 14122-2:2001, *Safety of machinery — Permanent means of access to machinery — Part 2: Working platforms and walkways (ISO 14122-2:2001)*

EN ISO 14122-3:2001, *Safety of machinery — Permanent means of access to machinery — Part 3: Stairs, stepladders and guard-rails (ISO 14122-3:2001)*

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

EN 60204-1:2006, *Safety of machinery — Electrical equipment of machines — Part 1: General requirements (IEC 60204-1:2005, modified)*

EN 61310-1:2008, *Safety of machinery — Indication, marking and actuation — Part 1: Requirements for visual, acoustic and tactile signals (IEC 61310-1:2007)*

EN 61496-1:2004, *Safety of machinery — Electro-sensitive protective equipment — Part 1: General requirements and tests (IEC 61496-1:2004, modified)* A1

3 A1 Terms and definitions A1

A1 For the purposes of this document, the terms and definitions given in EN ISO 12100-1:2003 apply. Additional definitions specifically needed for EN 12629 series are given below: A1

3.1
products
constructional items manufactured from concrete or calcium silicate

3.1.1
blocks [bricks]
generally cuboid product made from concrete or calcium silicate. They are used in the construction of buildings for example, and can be solid or hollow

3.1.2
concrete kerbs unit
unit of precast concrete A1 (see EN 1340:2003) A1, intended to separate surfaces of the same or different level to provide:

— physical or visual declination or containment;

— drainage channels, either on their own or in combination with other units;

— separation between surfaces submitted to different kinds of traffic

3.1.3
concrete flag
precast concrete unit A1 (see EN 1340:2003) A1 used as a surfacing material that satisfies the following conditions:

— overall length does not exceed 1 m;

— overall length divided by its thickness is greater than four

3.1.4
element
generally cuboid product of calcium silicate bigger than a block used in the construction of buildings

3.1.5
constructional element
generally large product that is manufactured from concrete or calcium silicate, with or without reinforcement material forming an integral part used in the construction of buildings, bridges, roads

3.1.6
roof or wall tile
thin slab of concrete for external application to roofs and walls

3.1.7
pipe
cylindrical or cuboid hollow body manufactured of concrete to convey liquids

3.1.8
prestressed concrete product
prestressed concrete product incorporating tensioned elements

3.1.9
reinforced concrete product
reinforced concrete product incorporating reinforcing elements which are not tensioned

3.2
mould
tool used to form, make or press a product

3.3
material

3.3.1
concrete
a composition of aggregates, cement and water with possible mixtures and additions which sets to form solid mass

3.3.2
calcium silicate
a composition of lime, natural siliceous materials (e.g. sand, crushed or uncrushed siliceous gravel or rock) with possible additives which sets to form solid mass by the action of steam under pressure

3.4
mixture
either fresh concrete or calcium silicate which has not set and which feeds the producing machines

3.5
green product
formed, compressed or de-watered product which has not hardened

3.6
vibration
physical phenomena generating the motion of the particles of a body in alternately opposite directions to enable the mixture to flow in the mould

3.7
compression
the application of force on the surface of the mixture within a mould

3.8
compaction
the application of vibration, impact, compression and/or vacuum in the mixture within a mould

3.9
integrated transport system
equipment forming an integral part of the manufacturing assembly used to move green products from the making point to the handling equipment

4 List of significant hazards

This clause contains all hazards, as far as they are dealt with in this European Standard, identified by risk assessment significant for this type of machinery and which require action to eliminate or reduce risk.

NOTE This standard covers many different type of machines for the manufacturing of products from concrete and calcium-silicate. Therefore, the following requirements correspond to a general risk assessment. When designing a specific machine, the manufacturer needs to make a specific risk assessment to ensure that the machine does not generate different or additional risks and to take the adequate protective measure

Detailed description of hazards identified and specific hazards are contained in the specific standards parts 2 to 8.

4.1 Mechanical hazards

Mechanical hazards caused by moving parts of the machine and products

4.1.1 Crushing hazards

4.1.2 Shearing hazards

4.1.3 Cutting or severing hazards

4.1.4 Entanglement hazards

4.1.5 Drawing-in or trapping hazards

4.1.6 Impact hazards

4.1.7 High pressure ejection hazards

4.1.8 Slip, trip or fall hazards

4.2 Electrical hazards

4.3 Hazards generated by noise

4.4 Hazards generated by materials and products

4.5 Hazards generated by neglecting ergonomic principles

4.6 Hazards caused by failure of energy supply

5 [A1] Safety requirements and/or protective measures [A1]

[A1] Machinery shall comply with the safety requirements and/or protective measures of this clause. In addition, the machine shall be designed according to the principles of EN ISO 12100 for relevant but not significant hazards which are not dealt with by this document. [A1]

Concerning the design of guards the relevant clauses of [A1] EN 953:1997+A1:2009 [A1] shall be observed. Moreover, they shall be fitted as close as possible to hazardous mobile parts taking into account the requirements contained in [A1] EN 349:1993+A1:2008 and EN ISO 13857:2008 [A1].

NOTE 1 The protective devices stated in this clause were fixed taking into consideration the criteria described in clause 7 of EN 1088:1995.

NOTE 2 Some guarding examples to avoid contact with hazardous parts are described in Annex B.

Where it is necessary to see the working process, guards shall be designed to allow visibility e.g. grids, transparent material or electro-sensitive devices.

When using electro-sensitive protective devices, the requirements described in [A1] 4.2.2 of EN 61496-1:2004 [A1], shall be fulfilled.

As far as possible guards shall be separated from the noise enclosures. However, these guards can be combined if it is impossible for a person to be present between the guard and the hazardous mobile parts of the machine (see [A1] Table 5 of EN ISO 13857:2008 [A1]) and if the setting, changing of mould, cleaning and maintenance works can be done easily and safely [A1] (see EN 614-1:2006+A1:2009) [A1]. Additional requirements are, if needed, described in the machine specific [A1] EN 12629-2 to -8 [A1].

[A1] *deleted text* [A1]

5.1 Mobile parts of power transmission

5.1.1 Mobile parts to which access during the machine operation is not necessary shall be protected by fixed guards according to clause 3.2 of [A1] EN 953:1997+A1:2009 [A1] (see B.1).

5.1.2 If the frequency of access to mobile parts of the power transmission does not exceed once a week and if the work can be done without energy supply fixed guards according to 3.2 of [A1] EN 953:1997+A1:2009 [A1] shall be fitted.

5.1.3 If the frequency according to 5.1.2 exceeds once a week or if the work cannot be done with energy supply isolated, interlocking guards shall be fitted according to 3.5 of [A1] EN 953:1997+A1:2009 [A1] the circuits of which comply with category 3 of EN 954-1:1996 (see B.2).

5.1.4 If the time taken to gain access to the dangerous zone is less than the after-running accrues, interlocking guards with guard locking according to 3.6 of [A1] EN 953:1997+A1:2009 [A1] shall be fitted.

[A1] **5.1.5** Fixed guards, or parts of the machines acting as such, which are not permanently fixed, e.g. by welding, shall be fixed by systems that can be opened or removed only with tools. These guards fixing systems shall remain attached to the guards or to the machinery when the guards are removed.

Where possible, fixed guards shall be incapable of remaining in place without their fixings.

NOTE This requirement aims to reduce the risk of fixed guards that have been removed, for example, for maintenance purposes, not being replaced or being only partially fixed in place because one or more of the fixings have been lost.

Application of this requirement depends on the manufacturer's assessment of the risk concerned. The requirement applies to any fixed guards that are liable to be removed by the user with a risk of loss of the fixings, for example, to fixed guards that are liable to be removed during routine cleaning, setting or maintenance operations carried out at the place of use.

The requirement does not necessarily apply to fixed guards that are only liable to be removed, for example, when the machinery is completely overhauled, is subject to major repairs or is dismantled for transfer to another site. [A1]

5.2 Mobile parts taking part in the working process

5.2.1 Mobile parts taking part in the working process and to which access during the operation is not necessary shall be protected by fixed guards according to 3.2 of [A1] EN 953:1997+A1:2009 [A1] (see B.1).

5.2.2 If work in the dangerous zones is necessary more than once a week, interlocking guards according to 3.5 of [A1] EN 953:1997+A1:2009 [A1] shall be used, the circuits of which shall comply with EN 954-1:1996 (e. g. with two mechanical controllers according to 6.2.2 of EN 1088:1995).

[A1] If sensitive protective equipment as defined in 3.26.5 of EN ISO 12100-1:2003 are selected, they shall meet the requirements of EN 61496-1:2004 and give an equivalent level on integrity as described in the previous sentence (see B.2, B.3, B.4). [A1]