

Betooni ja mördi vedamise, pritsimise ja laotamise masinad. Ohutusnõuded

Conveying, spraying and placing machines for concrete and mortar - Safety requirements

EESTI STANDARDI EESSÕNA

NATIONAL FOREWORD

Käesolev Eesti standard EVS-EN 12001:2003+A1:2010 sisaldab Euroopa standardi EN 12001:2003+A1:2009 ingliskeelset teksti.

Standard on kinnitatud Eesti Standardikeskuse 31.01.2010 käskkirjaga ja jõustub sellekohase teate avaldamisel EVS Teatajas.

Euroopa standardimisorganisatsioonide poolt rahvuslikele liikmetele Euroopa standardi teksti kättesaadavaks tegemise kuupäev on 25.11.2009.

Standard on kättesaadav Eesti standardiorganisatsioonist.

This Estonian standard EVS-EN 12001:2003+A1:2010 consists of the English text of the European standard EN 12001:2003+A1:2009.

This standard is ratified with the order of Estonian Centre for Standardisation dated 31.01.2010 and is endorsed with the notification published in the official bulletin of the Estonian national standardisation organisation.

Date of Availability of the European standard text 25.11.2009.

The standard is available from Estonian standardisation organisation.

ICS 91.220

Standardite reprodutseerimis- ja levitamiseõigus kuulub Eesti Standardikeskusele

Andmete paljundamine, taastekitamine, kopeerimine, salvestamine elektroonilisse süsteemi või edastamine ükskõik millises vormis või millisel teel on keelatud ilma Eesti Standardikeskuse poolt antud kirjaliku loata.

Kui Teil on küsimusi standardite autorikaitse kohta, palun võtke ühendust Eesti Standardikeskusega:
Aru 10 Tallinn 10317 Eesti; www.evs.ee; Telefon: 605 5050; E-post: info@evs.ee

Right to reproduce and distribute Estonian Standards belongs to the Estonian Centre for Standardisation

No part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying, without permission in writing from Estonian Centre for Standardisation.

If you have any questions about standards copyright, please contact Estonian Centre for Standardisation:
Aru str 10 Tallinn 10317 Estonia; www.evs.ee; Phone: +372 605 5050; E-mail: info@evs.ee

English Version

Conveying, spraying and placing machines for concrete and mortar - Safety requirements

Machines pour le transport, la projection et la distribution
de béton et mortier - Prescriptions de sécurité

Förder-, Spritz- und Verteilmaschinen für Beton und Mörtel
- Sicherheitsanforderungen

This European Standard was approved by CEN on 11 March 2003 and includes Amendment 1 approved by CEN on 17 October 2009.

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

CEN members are the national standards bodies of 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.



EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

Management Centre: Avenue Marnix 17, B-1000 Brussels

Contents

page

Foreword.....	4
Introduction.....	5
1 Scope	5
2 Normative references	6
3 Terms and definitions – Symbols and abbreviated terms.....	7
4 List of significant hazards	8
5 Safety requirements and/or protective measures	10
5.1 Requirements common to all machines.....	10
5.1.1 Hazards resulting from the failure of hydraulic or pneumatic systems.....	10
5.1.2 Risk of slipping	10
5.1.3 Electrical hazards	10
5.1.4 Emergency stop system	10
5.1.5 Thermal protection and exhaust fumes	11
5.1.6 Ergonomics	11
5.1.7 Power supply, control systems failures.....	11
5.1.8 Fixed guards.....	11
5.2 Specific requirements for single machines.....	11
5.3 Machinery groups	12
5.3.1 Mobile and stationary concrete pumps and shotcreting machines (see annex A)	12
5.3.2 Mortar conveying and spraying machines (see annex A)	16
5.3.3 Mobile and stationary concrete placing booms (see annex A).....	19
5.3.4 Delivery line systems (see annex A).....	21
5.4 A1 Control requirements (electrical and hydraulic), general A1	22
5.4.1 Hopper cover.....	22
5.4.2 Pumping piston.....	22
5.4.3 Stabilisers.....	22
5.4.4 Emergency stop devices.....	22
5.4.5 Concrete placing boom incl. slewing mechanism	22
5.5 Stability	23
5.5.1 Verification of stability of placing booms on vehicles.....	23
5.5.2 Verification of stability of placing booms on a mobile or stationary subassembly	24
5.5.3 Verification of stability of placing booms on a crane	24
5.5.4 Verification of stability of placing booms on a soffit scaffolding, components or similar.....	24
5.6 A1 Noise A1	24
5.7 Electromagnetic compatibility (EMC).....	24
6 Verification of safety requirements and/or protective measures	25
6.1 Type verification	25
6.2 A1 Individual verification of each construction group A1	25
6.3 Final inspection.....	26
7 Information for use	26
7.1 Accompanying documents (in particular: instruction handbook)	26
7.2 Log book.....	27
7.3 Re inspection	28
7.4 Mobile and stationary concrete pumps and shotcreting machines	28
7.5 Mortar conveying and spraying machines.....	28
7.6 Mobile and stationary concrete placing booms	28
7.7 Delivery line systems	29
7.8 Maintenance	29
7.9 Identification marking	29
Annex A (informative) Diagrams of different machines	33

Annex B (normative) A1 Logbook for concrete pump and concrete-placing boom*) A1	41
B.1 Preliminary remarks and assemblies	42
B.2 Master record sheet	42
B.3 Master record sheet for verification of stationary machines	43
B.4 Master record sheet for verification of the other machines	43
B.5 Supplements to the master record sheet	43
B.6 Inspection records	43
B.6.2 Master record sheet for inspection prior to initial commissioning (initial inspection) by the competent expert, by manufacturer	46
B.6.3 Classification of mobile subassemblies	49
B.6.4 Example of subassemblies	50
B.6.5 Inspection report for concrete placing boom by contractor	51
Annex C (normative) A1 Noise-test code for machines and equipment for conveying, spraying and placing concrete and mortar A1	59
C.1 Scope	59
C.2 Determination of the A-weighted sound-power level	59
C.2.1 General	59
C.2.2 Measurement surface and microphone positions	59
C.2.3 Test procedure	59
C.2.4 Operator's positions	60
C.3 Determination of the A-weighted emission sound pressure level at workstations	60
Annex ZA (informative) Relationship between this European Standard and the Essential Requirements of EU Directive 98/37/EC	61
Annex ZB (informative) A1 Relationship between this European Standard and the Essential Requirements of EU Directive 2006/42/EC A1	62
Bibliography	63

Foreword

This document (EN 12001:2003+A1:2009) 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 May 2010, and conflicting national standards shall be withdrawn at the latest by May 2010.

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 2009-10-17.

This European Standard supersedes EN 12001:2003.

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 document includes a bibliography.

Annex A is informative, annex B is normative.

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 document is a type C standard as stated in ^{A1} EN ISO 12100-1:2003 ^{A1}.

^{A1} *deleted text* ^{A1}

When compiling this standard it was assumed that a negotiation took place between the user and the manufacturer in relation with the specific health and safety requirements for the needed use. It was also assumed that the design and calculation is based on European usual calculation rules.

NOTE 1 DIN 15018-1:1984, DIN 15019-2:1979 and ^{A1} DIN 24117:2007 ^{A1} are good examples of rules used in European usual calculation rules.

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.

NOTE 2 Some machines covered by this standard present risks which are very similar to mobile cranes.

^{A1} The machinery concerned and the extent to which hazards, hazardous situations and hazardous events are covered are indicated in the scope of this document. ^{A1}

1 Scope

1.1 This standard specifies the safety requirements for:

- conveying machines;
- spraying machines;
- placing machines for concrete and mortar or their components.

The machinery can be stationary or mobile.

This standard covers the machines described in 3.3 to ^{A1} 3.7 ^{A1}.

This standard does not cover:

- machines that are mobile during conveying, spraying and placing;
- cabins for any machines covered by this standard.

^{A1} *deleted text* ^{A1}

This standard does not concern the undercarriage of the truck and the engine(s) of the machines that are not driven by the main engine during conveying, spraying and placing. One other possibility is the combination with a truck mixer (see 3.3). ^{A1} *deleted text* ^{A1}

This standard does not establish the additional requirements for operation subject to special rules (e. g. potentially explosive atmosphere, ^{A1} *deleted text* ^{A1} supply by electrical networks where voltage, frequency and tolerance differ from those of the public supply, if relevant due to e. g. electronic components, earthquake, lightning, using on public roads, hazards occurring during construction, transportation, commissioning, decommissioning, cableless remote controls other than radio controls, compressors and pressure vessels).

1.2 This standard deals with all significant hazards, hazardous situations and events relevant to conveying, spraying and placing machines when they are used as intended and under the conditions foreseen by the manufacturer (see clause 4). This standard specifies the appropriate technical measures to eliminate or reduce risks arising from the significant hazards.

1.3 This document is not applicable to machines which are manufactured before the date of publication of this document by CEN.

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. **[A1]**

[A1] *deleted text* **[A1]**

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

EN 894-1:1997, *Safety of machinery — Ergonomic requirements for the design of displays and control actuators — Part 1: General principles for human interactions with displays and control actuators*

EN 894-2:1997, *Safety of machinery — Ergonomic requirements for the design of displays and control actuators — Part 2: Displays*

EN 894-3:2000, *Safety of machinery — Ergonomic requirements for the design of displays and control actuators — Part 3: Control actuators*

EN 953:1997, *Safety of machinery — Guards — General requirements for the design and construction of fixed and movable guards*

[A1] *deleted text* **[A1]**

EN 982:1996, *Safety of machinery — Safety requirements for fluid power systems and their components — Hydraulics*

[A1] *deleted text* **[A1]**

EN 1088:1995, *Safety of machinery — Interlocking devices associated with guards — Principles for design and selection*

[A1] *deleted text* **[A1]**

EN 13309:2000, *Construction machinery — Electromagnetic compatibility of machines with internal electrical power supply*

[A1] EN 60204-1:2006, *Safety of machinery — Electrical equipment of machines — Part 1: General requirements (IEC 60204-1:2005, modified)* **[A1]**

[A1] EN ISO 3744:2009, *Acoustics — Determination of sound power levels of noise sources using sound pressure — Engineering method in an essentially free field over a reflecting plane (ISO 3744:1994)*

EN ISO 11201:2009, *Acoustics — Noise emitted by machinery and equipment — Measurement of emission sound pressure levels at a work station and at other specified positions — Engineering method in an essentially free field over a reflecting plane (ISO 11201:1995, including Cor 1:1997)*

EN ISO 11204:2009, *Acoustics — Noise emitted by machinery and equipment — Measurement of emission sound pressure levels at a work station and at other specified positions — Method requiring environmental corrections (ISO 11204:1995, including Cor 1:1997)*

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 13732-1:2008, *Ergonomics of the thermal environment — Methods for the assessment of human responses to contact with surfaces — Part 1: Hot surfaces* (ISO 13732-1:2006)

EN ISO 13849-1:2008, *Safety of machinery — Safety-related parts of control systems — Part 1: General principles for design* (ISO 13849-1:2006)

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 danger zones being reached by upper and lower limbs* (ISO 13857:2008) ^(A1)

3 Terms and definitions – Symbols and abbreviated terms

For the purposes of this document, the definitions given in ^(A1) EN ISO 12100-1:2003 ^(A1) and the following apply.

3.1

concrete and mortar

homogeneous mix comprising the components cement, graded aggregate and water plus additives

3.2

additives

material added to concrete or mortar to change the properties of the mix

3.3

Conveying, spraying and placing machines for concrete

3.3.1

concrete pumps

concrete pumps are working machines with hopper for pumping of concrete, see example figure A.1.1. Concrete pumps are piston pumps or rotor pumps. The concrete hopper can be fitted out as an agitator. The concrete pumps can be towed or not but can be used only in the stationary position. The pumping is realised by mechanical transport through delivery lines. The concrete pumps can be self-propelled integrated into concrete placing booms and shotcreting machines, see A.1, A.1.2 and A.1.3

NOTE One other possibility is the combination with a truck mixer. This case is not dealt with in this standard.

3.3.2

shotcreting machines

shotcreting machines are machines with hopper for spraying of concrete.

The hopper can be fitted out as a mixer. The spraying is realised by mechanical or pneumatic transport through delivery lines. Pneumatic concrete spraying compressors can be used with or without air chambers. The shotcreting machines can be self propelled, towed or not but can be used only in the stationary position. See example figure A.1.3

3.4

mortar conveying and spraying machines

mortar conveying and spraying machines are working machines for conveying and/or spraying of mortar. The conveying is realised by mechanical (see example figure A.2.1, A.3 and A.4) or pneumatic (see example figure A.2.2) transport through delivery lines. In case of only pneumatic function the hopper is an air chamber, see example figure A.2.2. For mechanical drive the pumping is realised by screw pumps. A mixer can be integrated, see example figure A.2.1. The conveying and spraying machines can be towed or not but can be used only in the stationary position. See example figures A.2, A.3 and A.4

3.5

concrete placing booms

concrete placing booms are power-driven, slewable devices consisting of one or more extending or fold-out parts for guiding the delivery line.