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KONSOLIDEERITUD TEKST**

Tunnelling machines - Shield machines, thrust boring machines, auger boring machines, lining erection equipment - Safety requirements CONSOLIDATED TEXT

EESTI STANDARDI EESSÕNA

NATIONAL FOREWORD

<p>Käesolev Eesti standard EVS-EN 12336:2005+A1:2008 sisaldab Euroopa standardi EN 12336:2005+A1:2008 ingliskeelset teksti.</p> <p>Standard on kinnitatud Eesti Standardikeskuse 10.11.2008 käskkirjaga ja jõustub sellekohase teate avaldamisel EVS Teatajas.</p> <p>Euroopa standardimisorganisatsioonide poolt rahvuslikele liikmetele Euroopa standardi teksti kättesaadavaks tegemise kuupäev on 15.10.2008.</p> <p>Standard on kättesaadav Eesti standardiorganisatsioonist.</p>	<p>This Estonian standard EVS-EN 12336:2005+A1:2008 consists of the English text of the European standard EN 12336:2005+A1:2008.</p> <p>This standard is ratified with the order of Estonian Centre for Standardisation dated 10.11.2008 and is endorsed with the notification published in the official bulletin of the Estonian national standardisation organisation.</p> <p>Date of Availability of the European standard text 15.10.2008.</p> <p>The standard is available from Estonian standardisation organisation.</p>
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ICS 91.220, 93.060

Võtmesõnad: accident prevention, definition

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English Version

**Tunnelling machines - Shield machines, thrust boring machines,
auger boring machines, lining erection equipment - Safety
requirements**

Tunneliers - Boucliers, machines de fonçage, matériel de
mise en place de revêtement - Prescriptions de sécurité

Tunnelbaumaschinen - Schildmaschinen,
Pressbohrmaschinen, Schneckenbohrmaschinen, Geräte
für die Errichtung der Tunnelauskleidung -
Sicherheitstechnische Anforderungen

This European Standard was approved by CEN on 21 February 2005 and includes Amendment 1 approved by CEN on 9 September 2008.

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Foreword

This European Standard (EN 12336:2005+A1:2008) 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of an identical text or by endorsement, at the latest by April 2009, and conflicting national standards shall be withdrawn at the latest by December 2009.

This document includes Amendment 1, approved by CEN on 2008-09-09.

This document supersedes EN 12336:2005.

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 EC Directive(s).

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

This European Standard includes a Bibliography.

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 stated in EN ISO 12100-1:2003.

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

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.

In this European Standard it is assumed that:

- only competent persons operate the machine;
- components without specific requirements are:
 - a) designed in accordance with the usual engineering practice and calculation codes, including all failure modes;
 - b) of sound mechanical and electrical construction according to the state of the art;
 - c) made of materials with adequate strength and of suitable quality;
 - d) made of no harmful materials, such as asbestos;
- components are kept in good repair and working order, so that the required characteristics remain despite wear;
- the installation allows a safe use of the machine;
- negotiation occurs between the manufacturer and the user/purchaser concerning particular conditions of use and the places (e. g. ground and local safety conditions) of use of the machinery.

NOTE "Manufacturer" is understood within the European Union as intended in the Machinery Directive.

1 Scope

1.1 Description of the machines

This European Standard is applicable to all types of shield machines and associated back up equipment, thrust boring machines, auger boring machines and lining erection equipment. It specifies the essential safety requirements for the design, installation, maintenance, and information for use of such machines.

Shield machines and associated back up equipment include:

- open shields for both manual and mechanical excavation;
- shielded tunnel boring machines;
- micro tunnelling machines;
- towed or stationary back up equipment;
- pipe jacking equipment.

All shield machines provide lateral and radial ground support. In addition they may provide various types of face support and ground water control (see Clause 3).

Certain associated matters are not included in the scope of the standard:

- additional equipment which may form an integral part of a shield machine or back up equipment and is used for compressed air (hyperbaric/plenum) working (see EN 12110:2002);
- use under hyperbaric conditions;
- the supply of electricity up to the machine;
- ancillary tools and equipment used for, at or on the machine;
- electromagnetic compatibility;
- loading and transport equipment which is not an integral part of the machine, e.g. rolling stock, man riders, grout cars, segment cars, muck cars.

NOTE Within the European Union 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 document is not intended to provide means of complying with the essential health and safety requirements of Directive 94/9/EC.

1.2 Hazards

This European Standard deals with significant hazards, hazardous situations and events relevant to shield machines and associated back up equipment, thrust boring machines and auger boring machines when they are used as intended and under the conditions foreseen by the manufacturer (see Clause 4).

1.3 Validity

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

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.

- EN 3-7:2004, *Portable fire extinguishers - Part 7: Characteristics, performance requirements and test methods*
- EN 294:1992, *Safety of machinery — Safety distance 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 — Ergonomics data to establish temperature limit values for hot surfaces*
- EN 620:2002, *Continuous handling equipment and systems — Safety and EMC requirements for fixed belt conveyors for bulk materials*
- EN 894-3:2000, *Safety of machinery — Ergonomics requirements for the design of displays and control actuators — Part 3: Control actuators*
- EN 954-1:1996, *Safety of machinery — Safety-related parts of control systems — Part 1: General principles for design*
- EN 981:1996, *Safety of machinery — System of auditory and visual danger and information signals*
- EN 982:1996, *Safety of machinery — Safety requirements for fluid power systems and their components — Hydraulics*
- EN 983:1996, *Safety of machinery — Safety requirements for fluid power systems and their components — Pneumatics*
- EN 1088:1995, *Safety of machinery — Interlocking devices associated with guards — Principles for design and selection*
- EN 1837:1999, *Safety of machinery — Integral lighting of machines*
- EN 12094-1:2003, *Fixed firefighting systems — Components for gas extinguishing systems — Part 1: Requirements and test methods for electrical automatic control and delay devices*
- EN 13627:2000, *Earth-moving machinery — Falling-object protective structures — Laboratory tests and performance requirements (ISO 3449:1992 modified)*
- EN 60204-1:1997, *Safety of machinery — Electrical equipment of machines — Part 1: General requirements (IEC 60204-1:1997)*
- 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)*
- EN 60439-1:1999, *Low-voltage switchgear and controlgear assemblies — Part 1: Type-tested and partially type-tested assemblies (IEC 60439-1:1999)*
- EN 60439-2:2000, *Low-voltage switchgear and controlgear assemblies — Part 2: Particular requirements for bus-bar trunking systems (busways) (IEC 60439-2:2000)*
- EN 60439-3:1991, *Low-voltage switchgear and controlgear assemblies — Part 3: Particular requirements for low-voltage switchgear and controlgear intended to be installed in places where unskilled persons have access for their use — Distribution boards (IEC 60439-3:1991, modified)*
- EN 60439-4:2004, *Low-voltage switchgear and controlgear assemblies — Part 4: Particular requirements for assemblies for construction sites (ACS) (IEC 60439-4:2004)*

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

EN 60825-1:1994, *Safety of laser products — Part 1: Equipment classification, requirements and user's guide (IEC 60825-1:1993)*

EN 60947-1:2004, *Low-voltage switchgear and controlgear — Part 1: General rules (IEC 60947-1:2004)*

EN ISO 2860:1999, *Earth-moving machinery — Minimum access dimensions (ISO 2860:1992)*

EN ISO 3411:1999, *Earth-moving machinery — Human physical dimensions of operators and minimum operator space envelope (ISO 3411:1995)*

EN ISO 3457:2003, *Earth moving machinery — Guards — Definitions and requirements (ISO 3457:2003)*

EN ISO 11202:1995, *Acoustics — Noise emitted by machinery and equipment — Measurement of emission sound pressure levels at a workstation and at other specified positions — Survey method in situ (ISO 11202:1995)*

EN ISO 11688-1:1998, *Acoustics — Recommended practice for the design of low-noise machinery and equipment — Part 1: Planning (ISO/TR 11688-1:1995)*

EN ISO 11688-2:2000, *Acoustics — Recommended practice for the design of low-noise machinery and equipment — Part 2: Introduction to the physics of low-noise design (ISO/TR 11688-2:1998)*

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)*

ISO 3795:1989, *Road vehicles and tractors and machinery for agriculture and forestry — Determination of burning behaviour of interior materials*

ISO 3864-1:2002, *Graphical symbols — Safety colours and safety signs — Part 1: Design principles for safety signs in workplaces and public areas*

ISO 7745:1989, *Hydraulic fluid power — Fire-resistant (FR) fluids — Guidelines for use*

3 Terms, definitions symbols and abbreviated terms

For the purposes of this European Standard, the terms and definitions given in EN ISO 12100-1:2003 and the following apply.

3.1

shield machine

steerable protective structure within which tunnel excavation takes place by manual, mechanical or hydraulic means. Erection of tunnel support may take place within the shield machine. Examples of shield machines are given in Annex A (informative)

3.1.1

shield

shield machine in which an open or partial face is excavated by manual or independent mechanical means

3.1.2

shielded tunnel boring machine (TBM)

shield machine for full face excavation, having one or more rotating cutting heads in which the cutter head(s) may be separated from the rest of the shield by a bulkhead. Passage of material through the bulkhead may be controlled