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Drilling and foundation equipment - Safety - Part 4: Foundation equipment

EESTI STANDARDI EESSÕNA

NATIONAL FOREWORD

See Eesti standard EVS-EN 16228-4:2014+A1:2021 sisaldab Euroopa standardi EN 16228-4:2014+A1:2021 ingliskeelset teksti.	This Estonian standard EVS-EN 16228-4:2014+A1:2021 consists of the English text of the European standard EN 16228-4:2014+A1:2021.
Standard on jõustunud sellekohase teate avaldamisega EVS Teatajas.	This standard has been endorsed with a notification published in the official bulletin of the Estonian Centre for Standardisation and Accreditation.
Euroopa standardimisorganisatsioonid on teinud Euroopa standardi rahvuslikele liikmetele kättesaadavaks 22.12.2021.	Date of Availability of the European standard is 22.12.2021.
Standard on kättesaadav Eesti Standardimis- ja Akrediteerimiskeskusest.	The standard is available from the Estonian Centre for Standardisation and Accreditation.

Tagasisidet standardi sisu kohta on võimalik edastada, kasutades EVS-i veebilehel asuvat tagasiside vormi või saates e-kirja meiliaadressile standardiosakond@evs.ee.

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EUROPEAN STANDARD

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English Version

Drilling and foundation equipment - Safety - Part 4: Foundation equipment

Machines de forage et de fondation - Sécurité - Partie 4 : Machines de fondation

Geräte für Bohr- und Gründungsarbeiten - Sicherheit - Teil 4: Geräte für Gründungsarbeiten

This European Standard was approved by CEN on 6 March 2014 and includes Amendment 1 approved by CEN on 22 November 2021.

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-CENELEC 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-CENELEC Management Centre has the same status as the official versions.

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European foreword

This document (EN 16228-4:2014+A1:2021) has been prepared by Technical Committee CEN/TC 151 “Construction equipment and building material machines - Safety”, the secretariat of which is held by DIN.

his 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 2022 and conflicting national standards shall be withdrawn at the latest by June 2022.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN shall not be held responsible for identifying any or all such patent rights.

This document supersedes ⟨A1⟩ EN 16228-4:2014 ⟨A1⟩.

This document includes Amendment 1 approved by CEN on 22 November 2021.

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 Standardization Request given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive(s) / Regulation(s).

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

This standard is divided into several parts and covers drilling and foundation equipment.

Part 1 contains requirements that are/may be common to all drilling and foundation equipment. Other parts contain additional requirements for specific machines that supplement or modify the requirements of part 1. Compliance with the clauses of part 1 together with those of a relevant specific part of this standard giving requirements for a particular machine provides one means of conforming with the essential health and safety requirements of the Directive concerned.

When a relevant specific part does not exist, part 1 can help to establish the requirements for the machine, but will not by itself provide a means of conforming to the relevant essential health and safety requirements of the Directive.

This European Standard, EN 16228, *Drillling and foundation equipment – Safety*, consists of the following parts:

— *Part 1: Common requirements*

— ⟨A1⟩ *Part 2: Mobile drill rigs for civil and geotechnical engineering in soil or soil and rock mixture* ⟨A1⟩

— *Part 3: Horizontal directional drilling equipment (HDD)*

— *Part 4: Foundation equipment*

— *Part 5: Diaphragm walling equipment*

— *Part 6: Jetting, grouting and injection equipment*

— *Part 7: Interchangeable auxiliary equipment*

Any feedback and questions on this document should be directed to the users' national standards body. A complete listing of these bodies can be found on the CEN website.

According to the CEN-CENELEC Internal Regulations, the national standards organisations 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, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

Introduction

This European Standard is a type C standard as stated in EN ISO 12100.

The machinery concerned and the extent to which hazards 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 drilling and foundation equipment that have been designed and built according to the provisions of this type C standard.

1 Scope

This European Standard, together with part 1, deals with all significant hazards for foundation equipment when they are used as intended and under the conditions of misuse which are reasonably foreseeable by the manufacturer associated with the whole life time of the machine (see Clause 4).

The requirements of this part are complementary to the common requirements formulated in ▌A1⟩ EN 16228-1:2014+A1:2021 ⟨A1▌.

This document does not repeat the requirements from ▌A1⟩ EN 16228-1:2014+A1:2021 ⟨A1▌ but adds or replaces the requirements for application for foundation equipment.

In this document the general term “foundation equipment” covers several different types of machines used for installation and/or extracting by drilling (machines with a rotary torque greater than 35 kNm), driving, vibrating, pushing, pulling or a combination of techniques, or any other way, of:

— longitudinal foundation elements;

— soil improvement by vibrating and soil mixing techniques;

— vertical drainage.

NOTE Some foundation equipment may have an additional rotary head with a torque less than 35 kNm for pre-drilling applications; this equipment is covered by this standard.

Machines with one or more of the following characteristics are not covered by this standard, but are covered by ▌A1⟩ EN 16228-2:2014+A1:2021 ⟨A1▌:

— machines that have a main rotary head torque of less than 35 kNm;

— machines that have multi-directional drilling capability;

— machines for which adding and removing rods or digging and drilling tools etc. is usually required during the installation/extraction process.

Typically the process of foundation techniques involves the installation of longitudinal elements such as concrete piles, steel beams, tubes and sheet piles, injection elements as tubes and hoses and casings for cast *in situ*.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 474-5:2006+A3:2013, *Earth-moving machinery — Safety — Part 5: Requirements for hydraulic excavators*

EN 474-12:2006+A1:2008, *Earth-moving machinery — Safety — Part 12: Requirements for cable excavators*

▌A1⟩ EN 13000:2010+A1:2014 ⟨A1▌, *Cranes — Mobile cranes*

▌A1⟩ *deleted text* ⟨A1▌

[A1] EN 16228-1:2014+A1:2021 [A1], *Drilling and foundation equipment — Safety — Part 1: Common requirements*

[A1] EN 16228-2:2014+A1:2021 [A1], *Drilling and foundation equipment — Safety — [A1] Part 2: Mobile drill rigs for civil and geotechnical engineering in soil or soil and rock mixture [A1]*

EN ISO 12100:2010, *Safety of machinery — General principles for design — Risk assessment and risk reduction (ISO 12100:2010)*

[A1] ISO 12117-2:2008, *Earth-moving machinery — Laboratory tests and performance requirements for protective structures of excavators — Part 2: Roll-over protective structures (ROPS) for excavators of over 6 t* [A1]

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN ISO 12100:2010, [A1] EN 16228-1:2014+A1:2021 [A1] and the following apply.

3.1
foundation equipment
equipment fitted with a carrier machine in order to perform piling and foundation operations

3.1.1
impact piling rig
carrier machine fitted with a mast or leader on which a hammer is mounted

Note 1 to entry: Hammers can be powered or free-fall drop weights.

3.1.2
rotary piling rig
carrier machine fitted with a mast or leader to which a rotary drive is attached

Note 1 to entry: Drilling or digging tools such as an auger or bucket are connected to the rotary drive by a coupling. Couplings between the rotary drive and tools and between sections of tools are non-threaded.

3.1.3
vibration piling rig
carrier machine fitted with a mast or leader, on which a vibrating tool is attached

Note 1 to entry: A range of vibrating tools are available for purposes such as pile driving, sheet piling or ground improvement.

Note 2 to entry: There are other piling and foundation engineering techniques such as band drains, mechanical mixing, rotary soil displacement and jet grouting. The machines and tools used in these techniques are sufficiently similar to the machines and tools defined above that separate categories are not required.

4 List of additional significant hazards

Clause 4 of [A1] EN 16228-1:2014+A1:2021 [A1] applies with the following additional Table 1.

Table 1 of [A1] EN 16228-1:2014+A1:2021 [A1] and the additional Table 1 in this document contain all hazards, (hazardous situations and events), identified by risk assessments as significant for foundation equipment and which require action to eliminate or reduce risk.

Hazards generally occur under the following conditions: