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Oprema za vrtanje in temeljenje - Varnost - 2. del: Prenosna vrtalna oprema za gradbeništvo in geotehniko, kamnolomstvo in rudarstvo

Drilling and foundation equipment - Safety - Part 2: Mobile drill rigs for civil and geotechnical engineering, quarrying and mining

Geräte für Bohr- und Gründungsarbeiten - Sicherheit - Teil 2: Mobile Bohrgeräte für Tiefbau, Geotechnik und Gewinnung

Machines de forage et de fondation - Sécurité - Partie 2: Appareils de forage mobiles pour le génie civil et l'ingénierie géotechnique, l'exploitation des carrières et des mines

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Drilling and foundation equipment - Safety - Part 2: Mobile drill rigs for civil and geotechnical engineering, quarrying and mining

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mines

Geräte für Bohr- und Gründungsarbeiten - Sicherheit - Teil
2: Mobile Bohrgeräte für Tiefbau, Geotechnik und
Gewinnung

This draft European Standard is submitted to CEN members for enquiry. It has been drawn up by the Technical Committee CEN/TC 151.

If this draft becomes a European Standard, 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.

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

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Foreword

This document (prEN 16228-2:2011) 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 document is currently submitted to the CEN Enquiry.

This document will supersede EN 791:1995+A1:2009, EN 996:1995+A3:2009.

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).

For relationship with EU Directive, see informative Annex ZA, which is an integral part of this document.

Part 1: Drilling and foundation equipment – Safety – Common requirements

Part 2: Drilling and foundation equipment – Safety – Mobile drill rigs for civil and geotechnical engineering, quarrying and mining

Part 3: Drilling and foundation equipment – Safety – Horizontal directional drilling equipment (HDD)

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

Part 5: Drilling and foundation equipment – Safety – Diaphragm walling equipment

Part 6: Drilling and foundation equipment – Safety – Jetting, grouting and injection equipment

Part 7: Drilling and foundation equipment – Safety – Interchangeable auxiliary equipment

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Introduction

This document is a Type C-standard as stated in EN ISO 12100.

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

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

1 Scope

This document specifies the specific safety requirements for drill rigs for civil engineering, geotechnical processes, geothermal energy, ground exploration, mining, quarrying and water wells for use above ground as well as underground when used as intended and under the conditions of misuse which are reasonably foreseeable by the manufacturer. In this part 2 of prEN 16228 these machines are referred to as drill rigs.

In this document the general term “drill rig” covers several different types of machines for use in:

- civil engineering;
- geotechnical engineering (including ground investigation, anchoring, soil nailing, mini-piling, ground stabilization, grouting);
- water well drilling;
- geothermal installations;
- landfill drilling;
- underpinning, tunnelling, mining and quarrying;
- for use above ground as well as underground.

Typically the process of drilling involves the addition of drill rods, tubes, casings or augers etc, normally threaded, as the borehole extends to depth.

NOTE 1 see Part 4 and 5 for piling rigs and foundation equipment.

NOTE 2 the term “drill rigs” includes rigs with a separate power pack supplied by the rig manufacturer.

This document does not specify requirements for the movement of drill rigs on public highways except when carried on a trailer or other transport vehicle.

Three drilling principles are currently available – percussive, rotary and vibration. Combinations of these principles are also possible e.g. rotary percussive.

Percussive drilling is a method by which the hole is produced by crushing the ground or rock at the bottom of the drill-hole by striking it with the drilling tool and removing the cuttings out of the borehole.

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Rotary drilling is a method in which the drilling tool at the bottom of the borehole is rotated and at the same time, a feed force is applied by a feed system or drill collar. The ground or rock at the bottom of the borehole is crushed or cut by pressure, shear or tensile stress produced by the different drilling tools. The cuttings are periodically or continuously removed out of the bore hole.

Vibration drilling, sometimes called “resonance” or “sonic” drilling, is a method by which the hole is formed by transmission of continuous compression waves through the drill rods which fluidise the ground immediately adjacent to the drill bit.

Rotary percussive drilling is widely used and is performed by a piston striking directly on the bit (down the hole hammer drills) or by percussive energy transmitted via a drill string to the bit. The piston is powered by either hydraulic fluid or compressed air. At the same time the drill bit is rotated either continuously or intermittently.

The cuttings can be continuously removed out of the borehole by a flushing medium, which is carried to the drilling tool.

The requirements of this part are complementary to the common requirements formulated in prEN 16228-1.

This document does not repeat the requirements from prEN 16228-1, but adds or replaces the requirements for application for drill rigs.

This document specifies the appropriate technical measures to eliminate or reduce risks arising from the significant hazards, hazardous situations and events during commissioning, operation and maintenance of drill rigs.

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 280:2001+A2:2009, *Mobile elevating work platforms — Design calculations — Stability criteria — Construction — Safety — Examinations and tests*

EN 795:1996, *Protection against falls from a height — Anchor devices — Requirements and testing*

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EN ISO 3449:2008, *Earth-moving machinery — Falling-object protective structures — Laboratory tests and performance requirements (ISO 3449:2005)*

EN ISO 3450:2008, *Earth-moving machinery — Braking systems of rubber-tyred machines — Systems and performance requirements and test procedures (ISO 3450:1996)*

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)*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in prEN 16228-1 and the following apply.

3.1**drill rig**

a machine for drilling to depth in soil or rock utilising either percussive, rotary or vibration principles (or a combination of principles) which involves the addition of drill rods, tubes, casings or augers etc, normally threaded, as the hole extends

3.2**mast**

a structure for supporting guiding the drilling tools

3.3**feed beam**

a structure on which drill head is mounted providing linear movement to the head

3.4**feed extension**

a structure for linear movement of mast or feed beam

3.5**boom**

a structure for positioning of the mast or feed beam

3.6**drill string**

a structure transforming the rotation and/or percussion energy from the drill/rotation unit in to the drill hole

3.7**boom mounted elevating work platform**

a working platform used for raising or lowering personnel, consisting of a platform fitted onto a (articulated/telescopic) boom

3.8**drill mast attachment**

interchangeable equipment comprising a feed beam which can be mounted on a carrier machine such as a 360 ° excavator in place of the bucket

3.9**rubber tyred drill rig for underground use**

a machine for drilling blastholes, rockbolts or anchors in tunnels, mines or similar underground structures. It is can be fitted with one or more feed beams and a boom mounted platform.

3.10**vibration drilling**

a method in which the drill string is vibrated with or without rotation

3.11**underground pre-armouring machine**

a machine dedicated to drill almost horizontal holes mainly at the periphery of the excavation front

4 List of significant hazards

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

Cross references from hazards are given to the clauses that specify the action that needs to be taken to reduce the risk.

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Hazards can occur under the following conditions:

- a) in transportation to and from the work site;
- b) in rigging and dismantling on the work site;
- c) in service on the work site;
- d) when moving between pile positions on the work site;
- e) out of service on the work site;
- f) in storage at the plant depot or on the work site.

Table 1 — List of significant hazards and associated requirements

No.	Hazard	EN ISO 12100-1	EN ISO 12100-2	Other EN-standards and ISO-standards	Relevant clause(s) in this standard
1	Mechanical Hazards	4.2	4.1		5.5
1.1	Mass and stability				5.3
1.2	Crushing	4.2			5.5.3,5.5.4
1.3	Shearing	4.2	4.2		5.5.3,554
1.4	Cutting and severing	4.2			5.5.3,554
1.5	Entanglement	4.2	4.2		5.5.5,554
1.6	Drawing-in or trapping hazard-moving transmission part	4.2	4.2		5.5.5
1.7	Falling or ejected object	4.2.2	4.3	EN ISO 3449	5.2
2	Slip, trip and falling of person	4.2.3		EN 795	5.14
3	Uncontrolled loading, overloading				5.6,5.7
4	Lifting of person				5.2
5	Movement of machine (tramming) while in drilling position				5.3.3.2
6	Fire				