

SLOVENSKI STANDARD

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Nadomešča:

SIST EN 791:2000+A1:2009

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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

Ta slovenski standard je istoveten z: EN 16228-2:2014

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EUROPEAN STANDARD
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EUROPÄISCHE NORM

EN 16228-2

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ICS 93.020

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996:1995+A3:2009

English Version

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

Machines de forage et de fondation - Sécurité - Partie 2:
Machines mobiles de forage de génie civil, de
géotechnique, de forage d'eau, d'exploration de sol,
d'énergie géothermique, de mines et carrières

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

This European Standard was approved by CEN on 6 March 2014.

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.

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EN 16228-2:2014 (E)

Foreword

This document (EN 16228-2:2014) 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of an identical text or by endorsement, at the latest by November 2014 and conflicting national standards shall be withdrawn at the latest by November 2014.

This document supersedes EN 791:1995+A1:2009 and 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(s), see informative Annex ZA, which is an integral part of this document.

This European 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.

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

- *Part 1: Common requirements*
- *Part 2: Mobile drill rigs for civil and geotechnical engineering, quarrying and mining*
- *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*

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, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

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 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.

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EN 16228-2:2014 (E)

1 Scope

This European Standard, together with part 1, deals with all significant hazards for mobile drill rigs for civil and geotechnical engineering, quarrying and mining 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 EN 16228-1:2014.

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

In this document the general term “mobile 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 For machines with torque greater than 35 kNm see EN 16228—4 initially.

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

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 280:2013, *Mobile elevating work platforms - Design calculations - Stability criteria - Construction - Safety - Examinations and tests*

EN 16228-1:2014, *Drilling and foundation equipment — Safety — Part 1: Common requirements*

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

EN ISO 3450:2011, *Earth-moving machinery - Wheeled or high-speed rubber-tracked machines - Performance requirements and test procedures for brake systems (ISO 3450:2011)*

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

3 Terms and definitions

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

NOTE Examples of drilling and foundation equipment are given in Annex A of EN 16228-1:2014.

3.1

drill rig

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

3.1.1

drill jumbo

rock drill rig specifically designed for and solely intended to be used underground, for drilling blast holes in rock, rock bolting or anchoring in tunnels, mines or similar underground structures

Note 1 to entry: These machines are designed for multi directional drilling, e.g. upwards, sidewise, downwards, forward and any combination of this and can be fitted with one or more feed beams and a boom mounted working platform. Most of these machines are rubber-tyred; see figures in Annex A of EN 16228-1.

3.1.2

pre-armouring machine

machine specifically designed for and solely intended to be used underground, for advanced roof and side wall ground reinforcement, e.g. pre-armouring, fore-piling, spiling etc., in a horizontal or almost horizontal orientation

Note 1 to entry: The machine can be fitted with one or more feed beams and a boom mounted working platform. Reinforcement bar loader may be present depending on the reinforcement technology.

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3.2

mast

structure for supporting guiding the drilling tools

3.3

feed beam

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

3.4

feed beam extension

structure for linear movement of mast or feed beam

3.5

boom

structure for positioning of the mast or feed beam

3.6

drill string

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

3.7

boom mounted working platform

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

EN 16228-2:2014 (E)**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**

machine for drilling blastholes, rockbolts or anchors in tunnels, mines or similar underground structures

Note 1 to entry: It can be fitted with one or more feed beams and a boom mounted platform.

3.10**motion detector**

device detecting access to the danger zone

3.11**full drill cycle automation mode**

operating mode in which the machine drills a pre-programmed hole pattern automatically.

Note 1 to entry: This includes automatic boom and/or feed positioning.

3.12**single hole automation mode**

operating mode in which the machine, initiated by the operator, drills the full length of the drill rod and then adds rods automatically; when the pre-programmed hole length has been drilled the machine stops and the rods may be removed automatically or semi mechanized

3.13**single rod automation mode**

operating mode in which the machine, initiated by the operator, drills the full length of the single drill rod and then returns automatically

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3.14**manual rod handling mode**

operating mode in which the machine, initiated by the operator, drills one rod and then stops; additional rods may be added and removed manually into rod adding clamps or directly into the drill string

4 List of additional significant hazards

Clause 4 of EN 16228-1:2014 applies with the following Table 1.

Table 1 of EN 16228-1:2014 and Table 1 of this document contain all hazards, hazardous situations and events, identified by risk assessments as significant for mobile drill rigs and which require action to eliminate or reduce risk.

Hazards generally occur under the following conditions:

- in transportation to and from the work site;
- in rigging and dismantling on the work site;
- in service on the work site;
- when moving on the work site;
- out of service on the work site;

- in storage at the plant depot or on the work site;
- maintenance.

Table 1 — List of additional significant hazards and associated requirements

No.	Hazard	Relevant clause(s) in this standard
1	Mechanical hazards	
1.1	Stability	5.3, 5.8
1.2	Crushing	5.5, 5.6
1.3	Shearing	5.5, 5.6
1.4	Cutting and severing	5.5, 5.6
1.5	Entanglement	5.5, 5.6, 5.7
1.6	Kinetic energy	5.9, 5.10, Annex B
1.7	Falling or ejected object	5.2
1.8	Uncontrolled loading, overloading	5.2, 5.8
1.9	Lifting of person	5.2
1.10	Insufficient instructions for the driver/operator	7.1, 7.2
2	Thermal hazards	
2.1	Fire	5.4
4	Hazards generated by noise, resulting in:	
4.1	Hearing losses and physiological disorders	Annex A
4.2	Accidents due to interference with speech communication and warning signals	Annex A

5 Safety requirements and/or protective measures

5.1 General

Drill rigs shall comply with the requirements of EN 16228-1:2014, as far as not modified or replaced by the requirements of this part.

5.2 Boom mounted working platforms for underground use

Subclause 5.13.2 of EN 16228-1:2014 does not apply.

When a drill rig for underground use is equipped with a boom mounted working platform intended for use in an area where there is risk of object fall, the person(s) on the platform shall have adequate protection. A suitably designed protective structure, FOPS shall be provided over the platform.

Level I of EN ISO 3449:2008 shall be the minimum requirement (e.g. underground pre-armouring machines). Level II shall be chosen where there is the risk of rock fall.

NOTE The FOPS may be adjustable taking into account the various functions to be performed from the platform.

Drill rigs equipped with one or more boom mounted platforms shall comply with EN 280:2013.