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

Geräte für Bohr- und Gründungsarbeiten - Sicherheit - Teil 7: Auswechselbare Zusatzausrüstungen

Machines de forage et de fondation - Sécurité - Partie 7: Equipements interchangeables

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English Version

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

Equipement de forage et de fondation - Sécurité - Partie 7: Equipements complémentaires interchangeables

Geräte für Bohr- und Gründungsarbeiten - Sicherheit - Teil 7: Auswechselbare Zusatzausrüstungen

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.

This draft European Standard was established by CEN 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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Recipients of this draft are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

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

Management Centre: Avenue Marnix 17, B-1000 Brussels

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Foreword

This document (prEN 16228-7:2011) 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.

prEN 16228 "Drilling and foundation equipment – Safety" comprises the following parts:

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

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 document specifies the specific safety requirements for interchangeable auxiliary equipment used with drilling and foundation equipment and/or earth moving machinery when they are used as intended and under the conditions of misuse which are reasonably foreseeable by the manufacturer. This part specifies the appropriate technical measures to eliminate or reduce risks arising from the significant hazards

Interchangeable auxiliary equipment includes pile installation and extraction equipment, impact hammers, extractors, vibrators, static pile pushing/pulling devices, rotary percussion hammers, rotary drilling drives, drill mast equipment such as leaders equipped with a drill stem and gears attached to the boom of an excavator, casing oscillators/rotators etc.

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 accessories of drilling and foundation equipment.

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 accessories of drilling and foundation equipment.

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.

prEN 16228-1:2010, *Drilling and foundation equipment — Safety — Part 1: General requirements*

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 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 11201:2010, *Acoustics — Noise emitted by machinery and equipment — Determination of emission sound pressure levels at a work station and at other specified positions in an essentially free field over a reflecting plane with negligible environmental corrections (ISO 11201:2010)*

EN ISO 11203:2009, *Acoustics — Noise emitted by machinery and equipment — Determination of emission sound pressure levels at a work station and at other specified positions from the sound power level (ISO 11203:1995)*

ISO/FDIS 15818:2008, *Earth-moving machinery — Lifting and tying-down attachment points — Performance requirements*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in prEN 16228-1, ISO 11886 and the following apply.

3.1
rotary percussion hammers
equipment to drill holes into the soil, where the rotary drive has an additional impact hammer. The rotary percussion hammer can by mounted at the end of the drill stem outside the hole on the leader of the drilling and foundation equipment The range of the impact frequencies is usually between 20 Hertz and 60 Hertz

3.2
down the hole hammers (DTH-hammers)
in DTH drilling, the percussion mechanism – commonly called the hammer – is located directly behind the drill bit. The drill pipes transmit the necessary feed force and rotation to hammer and bit plus compressed air or fluids for the hammer and flushing of cuttings. The drill pipes are added to the drill string successively behind the hammer as the hole gets deeper. The piston strikes the impact surface of the bit directly, while the hammer casing gives straight and stable guidance of the drill bit. This means that the impact energy does not have to pass through any joints at all. The impact energy therefore is not lost in joints allowing for much deeper percussion drilling

3.3
impact hammer
equipment to drive pile-elements into the ground. The equipment can be actuated by hydraulic or pneumatic energy, or by internal combustion, e.g. diesel hammer or a free falling weight lifted by a winch

3.4
static pile pushing/pulling device
equipment to push or pull piles, mostly sheet piles, into or out of the ground or vice versa, by static pushing pulling forces, which were commonly actuated by hydraulic energy. The equipment is fastened via clamps to more than one pile and is pushing/pulling one pile with the actuator und using the other clamps as thrust bearing. This equipment can be mounted on a leader of a piling rig or can be self riding on top of the piles

3.5
sonic drilling device
equipment which superposes rotary drilling with vibrations at a high frequency. The vibrations are mostly generated within the drill head and can be controlled by the operator to suit the specific conditions of the soil/rock geology. Resonance magnifies the amplitude of the drill bit, which fluidizes the soil particles at the bit face, generating a fast and easy penetration through most geological formations. The frequencies used with this method are normally between 50 and 120 Hertz. This equipment can be fastened at the leader of a piling rig

3.6
casing oscillator/rotator
equipment to drive in or push out casings with great diameters. This equipment can be connected to the undercarriage of the piling rig or being a standalone equipment. In case of combination with the undercarriage, the piling rig has to able to adjust the reaction forces coming from the torque and the pushing/pulling forces of the casing oscillator/rotator. The movement of the clamp system holding the casing can be intermittently, changing the moving direction after each movement interval or can be a more or less turning movement in one direction

3.7
rotary drilling drives
equipment to actuate the rotating drilling stem, which is normally mounted at a leader or mast. Rotary drilling drives are rotating the drill stem continuously in one direction

3.8
deep vibrator
equipment to densify the soil by using a vertical into the ground driven lance, which is driven by an unbalanced mass at the bottom part of the lance. The hole which is generated by densifying the ground is filled with soil improving material such as gravel. This material can be fed by a special material tube alongside the deep vibrator or by filling the emerging hole with gravel by loaders. The apparatus can be rope suspended or guided on a leader or mast. The vibrations are normally generated by hydraulic or electric power and have a usual range between 25 and 60 Hertz

3.9
vibrators
equipment to install or extract piling elements or drilling tools into or out of the ground. The force is generated by vibrations, which have a usual range between 20 and 50 Hertz. These vibrations will soften the ground, the weight or pull down or pulling force will move the elements. The vibrations are generated by unbalanced weights, which are driven by hydraulic or electric power. Vibrators can be mounted at the leader of a piling rig or can be free riding at top of the element, suspended by a rope or universal joint to the carrier machine

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.

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 (as listed in EN ISO 14121-1)	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		
1.1	Generated by machine parts or work pieces, e.g. by:	4.2	4.2, 5		
1.1.1	Shape				
1.1.2	relative location				
1.1.3	mass and stability			EN 13001	5.2, 5.3.1, 5.3.4, 5.4
1.1.4	mass and velocity			EN 13001	5.3.3
1.1.5	inadequacy of mechanical strength			EN 13001	5.3.1, 5.3.4
1.2	Accumulation of energy inside the machinery, e.g. by:	4.2	4.10, 4.11		
1.2.1	elastic elements (springs)				5.3.3
1.2.2	fluids under pressure				
1.2.3	the effect of vacuum				
1.3	Elementary forms of mechanical hazards	4.2			5.3.3
1.3.1	Crushing	4.2	4.2	EN ISO 13857, EN 349	
1.3.2	Shearing	4.2	4.2, 5.2	EN ISO 13857, ISO 13857, EN 349	
1.3.3	Cutting or severing	4.2	4.2	EN ISO 13857, EN 349	
1.3.4	Entanglement hazard	4.2		EN ISO 13857, EN 349	
1.3.5	Drawing-in or trapping hazard - moving transmission parts	4.2.1		EN ISO 13857, EN 349, EN 953+A1	
1.3.6	Impact	4.2.1			5.3.1

No.	Hazard (as listed in EN ISO 14121-1)	EN ISO 12100-1	EN ISO 12100-2	Other EN-standards and ISO-standards	Relevant clause(s) in this standard
1.3.7	Stabbing or puncture hazard	4.2.1			
1.3.8	Friction or abrasion hazard	4.2.1			
1.3.9	High pressure fluid injection or ejection hazard	4.2.1	4.10		
2	Electrical hazards due to:				
2.1	Contact of persons with live parts (direct contact)	4.3	4.9, 4.11	EN 60204-1	
2.2	Contact of persons with parts which have become live under faulty conditions (indirect contact)	4.3	4.9	EN 60204-1	
2.3	Approach to live parts under high voltage	4.3	4.9, 4.11	EN 60204-1	
2.4	Electrostatic phenomena	4.3	4.9	EN 60204-1	
2.5	Thermal radiation or other phenomena such as the projection of molten particles and chemical effects from short-circuits, overloads, etc.	4.3	4.9	EN 60204-1	
3	Thermal hazards, resulting in:				
3.1	burns and scalds, by possible contact of persons with objects or materials with an extreme temperature, by flames, by radiation, etc.	4.4		EN ISO 13732-1	
3.2	Hot or cold working environment.	4.4			
4	Hazards generated by noise, resulting in:	4.5	4.2.2, 5	EN ISO 11201	
4.1	Hearing losses				5.5
4.2	Interference with speech communication, signals,..				
5	Hazards generated by vibration	4.6	4.2.2	ISO 2631-1	
5.1	Use of hand-held machines.				
5.2	Whole-body vibration, particularly when combined with poor postures				