SLOVENSKI STANDARD
SIST EN 16228-3:2014

01-oktober-2014

Nadomešča:
SIST EN 791:2000+A1:2009
SIST EN 996:2000+A3:2009

Oprema za vrtanje in temeljenje - Varnost - 3. del: Oprema za vodoravno usmerjeno vrtanje (HDD)

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

Geräte für Bohr- und Gründungsarbeiten - Sicherheit - Teil 3: Geräte für das Gerichtete Horizontalbohrverfahren (HDD)

Machines de forage et de fondation - Sécurité - Partie 3: Appareils de forage dirigé (HDD)

Ta slovenski standard je istoveten z: **EN 16228-3:2014**

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53.100	Stroji za zemeljska dela	Earth-moving machinery
93.020	Zemeljska dela. Izkopavanja. Gradnja temeljev. Dela pod zemljo	Earthworks. Excavations. Foundation construction. Underground works

SIST EN 16228-3:2014 **en,fr**

EUROPEAN STANDARD

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EN 16228-3

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Supersedes EN 791:1995+A1:2009, EN 996:1995+A3:2009

English Version

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

Machines de forage et de fondation - Sécurité - Partie 3: Appareils de forage horizontal dirigé (HDD)

Geräte für Bohr- und Gründungsarbeiten - Sicherheit - Teil 3: Geräte für das gerichtete Horizontalbohrverfahren

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

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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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Foreword

This document (EN 16228-3:2014) 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of an identical text or by endorsement, at the latest by November 2014 and conflicting national standards shall be withdrawn at the latest by November 2014.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.

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 situations 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 European Standard, together with part 1, deals with all significant hazards for horizontal directional drilling equipment (HDD) 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 horizontal directional drills.

A machine is considered a horizontal directional drill if it is designed to drill in a shallow arc for the installation of pipes, conduits, and cables and typically has a drill string entry angle of less than 45° relative to the operating surface of the earth.

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 474-1:2006+A4:2013, *Earth-moving machinery — Safety — Part 1: General requirements*

EN 12999:2011+A1:2012, *Cranes — Loader cranes*

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

EN ISO 2867:2011, *Earth-moving machinery — Access systems (ISO 2867:2011)*

EN ISO 3411:2007, *Earth-moving machinery — Physical dimensions of operators and minimum operator space envelope (ISO 3411:2007)*

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

EN ISO 3471:2008, *Earth-moving machinery — Roll-over protective structures — Laboratory tests and performance requirements (ISO 3471:2008)*

EN ISO 5353:1998, *Earth-moving machinery, and tractors and machinery for agriculture and forestry — Seat index point (ISO 5353:1995)*

EN ISO 6682:2008, *Earth-moving machinery — Zones of comfort and reach for controls (ISO 6682:1986, including Amd 1:1989)*

EN ISO 7731:2008, *Ergonomics — Danger signals for public and work areas — Auditory danger signals (ISO 7731:2003)*

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

ISO 9244:2008, *Earth-moving machinery — Machine safety labels — General principles*

ISO 9533:2010, *Earth-moving machinery — Machine-mounted audible travel alarms and forward horns — Test methods and performance criteria*

ISO 11112:1995[1], *Earth-moving machinery — Operator's seat — Dimensions and requirements*)

ISO/DIS 15818:2013, *Earth-moving machinery — Lifting and tying-down attachment points — Performance requirements*

ISO 16754:2008, *Earth-moving machinery — Determination of average ground contact pressure for crawler machines*

ISO 17063:2003, *Earth-moving machinery — Braking systems of pedestrian-controlled machines — Performance requirements and test procedures*

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 Terminology for horizontal directional drills is specified in ISO 21467.

3.1
horizontal directional drill
machine that uses a steerable cutting head attached to the end of a drill string for creating a bore through the earth in a horizontal direction

Note 1 to entry: Drilling can include fluid injection through the drill string to the cutting head, tracking of the bore by use of sensors or a transponder near the cutting head and subsequent enlargement of the bore by back-reaming.

3.2
drill string for HDD
length of rods joined together which transmit forces from the drill frame to the cutting head or back-reamer that cuts the earth and which is also used to rotate the cutting head to position it for steering

Note 1 to entry: This terms is herafter referred to as "drill string".

3.3
drill frame
structure on the horizontal directional drill that transmits rotational and linear forces to the drill string

3.4
ground fixation device
device by which the horizontal directional drill is secured to the ground

3.5
exit side
location remote from the base machine where the drill string exits the ground

3.6
back-reaming
process of enlarging the bore by pulling back a tool of larger diameter than that previously used to form the bore

3.7
back-reamer
tool of larger diameter than that previously used to form the bore

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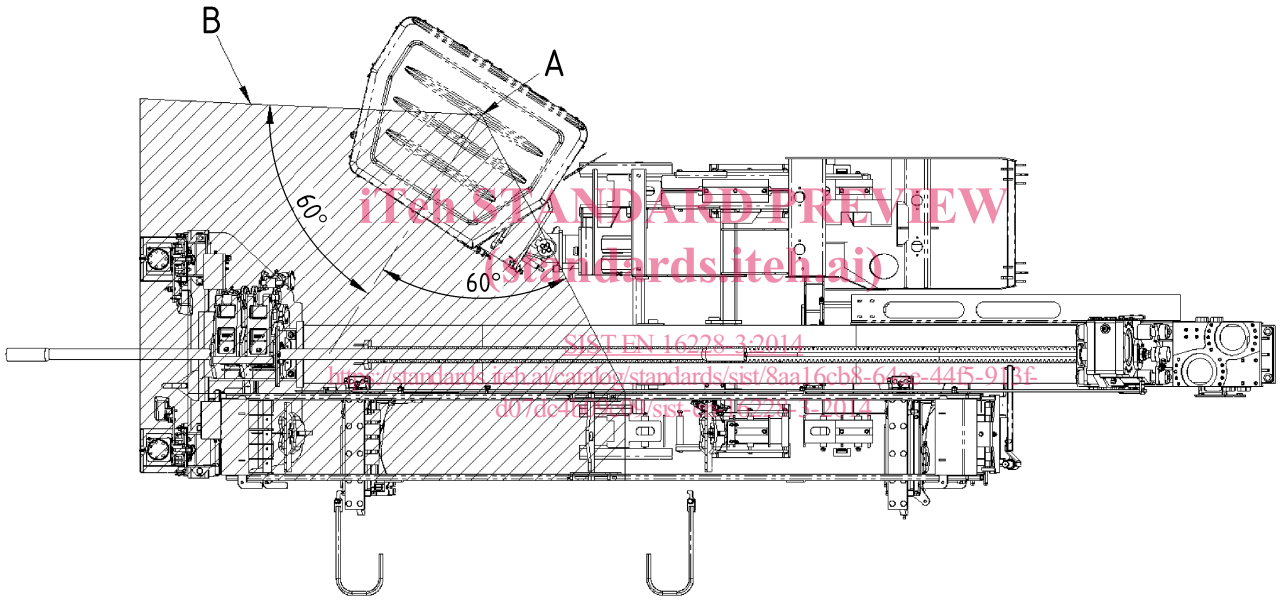
[1]) This document is impacted by Amendment 1 published in 2001.

3.8
hose track
carrier that protects, guides, and maintains proper bend radius of hydraulic hoses, electrical cables, and air hoses during movement between the stationary and moving portion of the horizontal directional drill

3.9
drill rod/pipe receiver
structure or a method that supports the drill rod/pipe on horizontal directional drills that are not equipped with mechanical drill rod/pipe loaders

3.10
operator zone of control
visible length of the drill pipe when seated in the operator's seat with a profile of 60° each side based on the nasal binocular field of vision assuming a fixed head and fixed eyes measured from the central position with respect to the head but the length extends only to the inside edge of the drill rod/pipe storage magazine and not beyond

Note 1 to entry: See Figure 1.



Key
A seat index point
B operator zone of control

Figure 1 — Operator zone of control

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 horizontal directional drilling equipment and which require action to eliminate or reduce risk.

Hazards generally 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 tramming between working positions on the job site;

e) out of service on the work site;

f) maintenance;

g) in storage at the plant depot or on the work site.

Table 1 — List of additional significant hazards and associated requirements

No.	Hazard	Relevant clause(s) in this standard
1	Mechanical Hazards	5.10.3
1.1	Drawing in or trapping	5.3
1.2	Entanglement	5.10.3, 5.12.3, 5.13
1.3	Crushing due to machine operation	5.6, 5.7, 5.9, 5.10.2
1.4	Crushing due to product movement	5.6
1.5	Crushing during rod/pipe connection operation	5.12.8, 5.12.9.1
1.6	Crushing during manual drill rod handling	5.12.9
2	Hazardous events due to unexpected movement	5.3
2.1	Movement of drill string/tooling at Exit side	5.13
2.2	Movement of product connected to drill string at exit side	5.13
2.3	Movement of machine from anchored position	5.2
2.4	Movement of machine (tramming) while in drilling position	5.6, 5.8
3	Hazards due to electrical contact	5.11
4	Hazards generated by noise, resulting in:	
4.1	Hearing losses and physiological disorders	Annex B
4.2	Accidents due to interference with speech communication and warning signals	Annex B
5	Visibility of work area	5.6.2.2, 5.11.2, 5.12.5

5 Safety requirements and/or protective measures

5.1 General

Horizontal directional drills 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 Stability

5.2.1 General

Subclause 5.2.3 of EN 16228-1:2014 applies with the following modification(s).

The stability angle shall not be less than 10° in any direction when tramming and not less than 5° under any other conditions. This shall be achieved by having a sufficiently heavy machine and/or by the use of ground fixation devices. Stability shall be determined by calculation or by physical test.

5.2.2 Ground pressure

Subclause 5.2.3.7 of EN 16228-1:2014 applies with following modification.

For crawler mounted horizontal directional drills, the ground pressure while tramming shall be calculated according to Annex F of EN 16228-1:2014 or ISO 16754:2008.

5.3 Brakes

5.3.1 Brakes for travelling

Subclause 5.7.1 of EN 16228-1:2014 applies with the following addition.

Brake systems of pedestrian controlled horizontal directional drills shall meet the requirements of ISO 17063:2003.

5.3.2 Brakes for slewing

Subclause 5.7.2 of EN 16228-1:2014 applies with the following modification.

Only horizontal directional drills equipped with a slewing mechanism shall comply.

5.4 Winches, draw-works and ropes

5.4.1 General

Subclause 5.8 of EN 16228-1:2014 does not apply.

NOTE Horizontal directional drills do not have winches used for the purpose of lifting.

5.4.2 Roller and leaf chains

Subclause 5.8.5 of EN 16228-1:2014 applies with the following exception:

Roller and leaf chains used on horizontal directional drills for linear feeding of the drill string with a force of 200 kN or less may be selected with a safety factor of at least 1,5.

5.5 Indicating devices for inclination

Subclause 5.10 of EN 16228-1:2014 does not apply.

NOTE Horizontal directional drill stability is not affected by the position of the drill frame.

5.6 Operating position(s)

5.6.1 General

Subclause 5.14.1 of EN 16228-1:2014 does not apply.

Where there is a risk of horizontally ejected objects, an appropriate protection shall be provided.

Required space, leg space etc. shall be in accordance with EN ISO 3411:2007 and EN ISO 6682:2008.