



SLOVENSKI STANDARD SIST EN 791:2000

01-april-2000

Drill rigs - Safety

Drill rigs - Safety

Bohrgeräte - Sicherheit

Appareils de forage - Sécurité

Ta slovenski standard je istoveten z: EN 791:1995

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ICS:

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EUROPEAN STANDARD

EN 791

NORME EUROPÉENNE

EUROPÄISCHE NORM

November 1995

ICS 91.220

Descriptors: drilling equipments, percussion drilling, rotary drilling, safety of machines, dangerous machines, hazards, safety measures, operating stations, control devices, brakes, safety devices, stability, fire protection, engine noise, vibration, marking, name plates, technical notices

English version

Drill rigs - Safety

Appareils de forage - Sécurité

Bohrgeräte - Sicherheit

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Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CEN member.

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CEN

European Committee for Standardization
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Foreword

This European Standard has been prepared by CEN/TC 151 "Construction equipment and building material machines - Safety" of which the secretariat is held by DIN.

This European Standard has been prepared under a mandate given to CEN by the Commission of the European Communities and the European Free Trade Association, and supports the essential requirements of EC Directive(s).

This standard is a Type C-standard in the structure of A-/B-/C-standards as defined in EN 292.

The Annex A is normative and contains "Measurement of noise and vibration", the Annex B is normative and contains "Instructions for the examination and checking of blocks, wire ropes and chains", the Annex C is normative and contains "Brake test for drill rigs excluding truck and tractor mounted drill rigs", the Annex D is normative and contains "Hazards related to operation modes of drill rigs", the Annex E is informative and contains "Symbols and signs" and the Annex F is informative and contains "Bibliography".

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of an identical text or by endorsement, at the latest by May 1996, and conflicting national standards shall be withdrawn at the latest by May 1996.

According to the CEN/CENELEC Internal Regulations, the following countries are bound to implement this European Standard: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, United Kingdom.

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0 Introduction

The extent to which hazards are covered is indicated in the scope of this standard.

In addition, machinery should comply as appropriate with EN 292 for hazards which are not covered by this standard.

Those hazards that are relevant for all mechanical, electrical, hydraulic, pneumatic and other equipment of machinery and that are dealt with in standards for common use are not covered by this standard.

Reference to pertinent standards of this kind is made where such standards are applicable and so far as is necessary.

1 Scope

1.1 The general term "Drill Rig" covers several differing types of machines for use in the construction industry, water well drilling industry, mining and quarrying, for use above ground as well as underground and for tunnel construction. The differing tasks determine the choice of drilling method and type of machine. For this reason there are many possible ways to separate drill rigs into different groups, e.g. in accordance with:

- the task;
- the drilling method used;
- the cutting removal method;
- the type of construction work.

The methods used for drilling can be basically differentiated in percussive and rotary drilling principles.

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.

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.

Rotary percussive drilling 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 are continuously removed out of the borehole by a flushing medium, air or fluid which is carried to the drilling tool.

Typical examples of drill rigs covered by this standard are:

- Cable tool drill rig;
- Pile drill rigs;
- Pile top drill rig;
- Raise borer;
- Reverse circulation drill rig;
- Rotary and rotary percussive drill rig for underground drilling;
- Rotary and rotary percussive drill rig for surface drilling;
- Rotary drill rig with power swivel;
- Rotary spindle rig;
- Rotary drill rig for underground use.

A casing or a drilling fluid may be used to stabilize the bore hole.

Drill rigs are stationary during drilling. They may move from one place of work to another, under their own power. Self propelled drill rigs may include those mounted on lorries, wheeled chassis, tractors, crawlers, skid bases (pulled by winch). When drill rigs are mounted on lorries, tractors and trailers, or are wheeled based, transportation may be carried out at higher speeds and on public roads. When designing and constructing these units attention is drawn to regulations covering both the drill rig and traffic regulations.

The questions of safety and ergonomic criteria in this standard mainly refer to the principal work, e.g. when the machine is stationary and drilling. In many cases the driver is also the operator of the drill rig.

1.2 This standard deals with the significant hazards pertinent to mechanized drill rigs, when used as intended and under the conditions foreseen by the manufacturer. It specifies requirements of safety concerning the design, construction, operation and maintenance. This standard applies to drill rigs for surface and underground drilling in the tunnelling, mining, construction and water well drilling industries. Casing units are also covered by this standard.

If the base of a drill rig consists of an excavator, crane, etc. it shall be covered by its own standards to the extent the requirements of this standard are not applicable.

NOTE 1: If a drill rig operates with attachments other than those for drilling according to this standard, e.g. pile driving, the safety standards applying to such machines shall also be complied with.

For drill rigs to be used in an explosive atmosphere (coal mining etc.) the relevant standards apply additionally.

NOTE 2: CEN/TC 196 is preparing complementary standards for machines to be used in explosive atmospheres.

Oil and gas industry drill rigs are not covered by this standard.

2 Normative references

This European Standard incorporates, by dated or undated references, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

EN 3:1975	Portable fire extinguishers
EN 292-1:1991	Safety of machinery - Basic concepts, general principles for design - Part 1: Basic terminology, methodology
EN 292-2:1991	Safety of machinery - Basic concepts, general principles for design - Part 2: Technical principles and specifications
EN 294:1992	Safety of machinery - Safety distance to prevent danger zones being reached by the upper limbs
EN 418:1992	Safety of machinery - Emergency stop equipment, functional aspects - Principles for design
prEN 563	Safety of machinery - Temperatures of touchable surfaces - Ergonomic data to establish temperature limit values for hot surfaces
prEN 953	Safety of machinery - General requirements for the design and construction of guards (fixed, movable)
prEN 954-1	Safety of machinery - Safety related parts of control systems - Part 1: General principles for design
prEN 982	Safety requirements for fluid power systems and components - Hydraulics
prEN 983	Safety requirements for fluid power systems and components - Pneumatics
prEN 1037	Safety of machinery - Isolation and energy dissipation - Prevention of unexpected start-up
ENV 1070:1993	Safety of machinery - Terminology
EN 22860:1985	Earth-moving machinery - Minimum access dimensions

EN 23164:1985	Earth-moving machinery - Laboratory evaluations of roll-over and falling-object protective structures - Specifications for the deflection-limiting volume
EN 23411:1988	Earth-moving machinery - Human physical dimensions of operators and minimum operator space envelope
EN 50081-2:1993	Electromagnetic compatibility - Generic emission standard - Part 2: Industrial environment
EN 50082-2:1994	Electromagnetic compatibility - Generic immunity standard - Part 2: Industrial environment
EN 60204-1:1992	Electrical equipment of industrial machines - Part 1: General requirements
ISO 2631-1:1985	Evaluation of human exposure to whole-body vibration - Part 1: General requirements
ISO 2867:1989	Earth-moving machinery - Access systems
ISO 3449:1992	Earth-moving machinery - Falling-object protective structures - Laboratory tests and performance requirements
ISO 3450:1985	Earth-moving machinery - Wheeled machines - Performance requirements and test procedures for braking systems
ISO 3457:1986	Earth-moving-machinery - Guards and shields - Definitions and specifications
ISO 3471-1:1986	Earth-moving machinery - Roll-over protective structures - Laboratory tests and performance requirements - Part 1: Crawler, wheel loaders and tractors, backhoe loaders, graders, tractor scrapers, articulated steer dumpers
ISO 3795:1989	Road vehicles and tractors and machinery for agriculture and forestry - Determination of burning behaviour of interior materials
ISO 4302:1981	Cranes - Wind load assessment
ISO 4309:1990	Cranes - Wire ropes - Code of practice for examination and discard
ISO 4872:1978	Acoustics - Measurement of airborne noise emitted by construction equipment intended for outdoor use - Method for determining compliance with noise limits
ISO 6682:1986	Earth-moving machinery - Zones of comfort and reach for controls

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ISO 10570:1992	Earth-moving machinery - Articulated frame lock - Performance requirements
ISO/DIS 11201:1993	Acoustics - Noise emitted by machinery and equipment - Measurement of emission sound pressure levels at the work-station and at other specified positions - Engineering method in an essentially free field over a reflecting plane
IEC 651: 1979	Sound level meters
IEC 804: 1985	Integrating-averaging sound level meters

3 Definitions

For the purposes of this standard, the definitions of ENV 1070:1993 apply. Additional definitions, specifically needed for drill rigs, are added below.

3.1 danger zone: Any zone within and/or around a drill rig in which a person is exposed to risk of injury or damage to health.

NOTE: For a drill rig this means the area in which a person can be reached by an operational movement of the drill rig, its working devices, its auxiliary equipment or swinging or falling equipment.

3.2 working area: An area near a machine in which its tools are moved in order to carry out work.

3.3 exposed person: A person wholly or partially in the danger zone.

3.4 operator: A person operating the drill rig while drilling. He may also be the driver of the rig.

3.5 driver: A person responsible for the movement of the drill rig.

NOTE: The driver may be transported on the drill rig, may be on foot (pedestrian driver) or he may control the drill rig by remote control.

3.6 hook load: The actual load carried by the hook of the bottom block, including the weight of the bottom block and of the running ropes.

NOTE: A distinction shall be made between the normal operating case and the exceptional operating case as defined in 3.7 and 3.8.

3.7 normal operating case: Operating conditions that are normal or usual such as those occurring mainly during the sinking and clearing out of bore holes.

NOTE: The maximum permissible hook load under those conditions is designated as the normal hook load.

3.8 exceptional operating case: Operating conditions, which do not arise frequently or are of limited duration and during which, the normal hook load may be exceeded. The maximum permissible hook load under these conditions is designated as the exceptional hook load.

NOTE: Examples are fishing jobs and certain casing operations.

3.9 stability angle: The angle between the vertical plane, passing through the tipping line and the plane passing through the centre of gravity, displaced as defined in 5.5.2 and the tipping line. The stability angle thus defines the tilt angle to overturning.

3.10 tipping lines:

a) or drill rigs, crawler and wheel mounted:

- 1) in the direction of travel, the lines connecting the lowest support points of contact of the idlers, rollers or the drives of the tracks or the front wheels, see figures 2 to 6;
- 2) in sideward direction (perpendicular to the direction of travel), the lines passing through the centres of the support contact areas on each side of the chassis. See figures 2 to 6.

b) For drill rigs on support legs:
The lines connecting the centres of the support legs/jacks on each side of the chassis see figures 2 and 5.

3.11 total vertical resultant force: The sum of the total weight force of the drill rig and all other working forces in the vertical direction.

NOTE: Resultant horizontal forces (wind forces etc.) have an influence only on the position of the total vertical resultant force.

3.12 tramming: Short movements of a drill rig in drilling condition on site.

3.13 sweep radius: A special term for drill rigs with booms, being the outer radius, R , of the turning circle for a drill rig in tramming, see figure1.

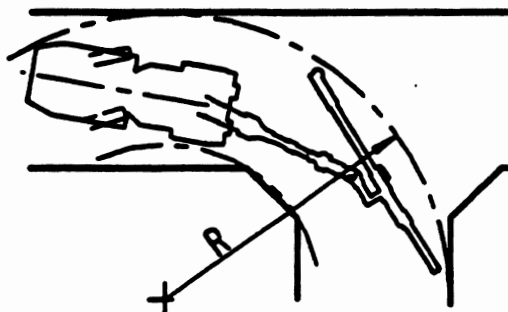


Figure 1: Sweep radius

3.14 safety factor of rope: The ratio between the minimum breaking load of a rope guaranteed by the manufacturer, and maximum pulling force of a rope on the first layer of a winch.

3.15 examination: A periodic thorough visual inspection by a competent person to determine faults or damage, of all components important to safety, and functional tests including all necessary measurements.

3.16 check: A frequent inspection of components by the operator or the maintenance personnel to detect obvious damages or faults, and to determine, by means of spot checks, their ability to function normally.

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3.17 personnel lift for operational work: A lift used only for personnel transport and consisting of a guided platform on the mast.

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NOTE: The vertical movement is commonly winch operated.

3.18 movable platforms for maintenance and repair: A platform attached to parts of the drilling equipment, e.g. the drill head, which can be moved along the drill mast. The attachment can be temporary or permanent.

NOTE: Personnel and material can be moved on this platform and personnel can work from it.