

Translated English of Chinese Standard: GB26545-2011

www.ChineseStandard.net → Buy True-PDF → Auto-delivery.

Sales@ChineseStandard.net

GB

NATIONAL STANDARD OF THE

PEOPLE'S REPUBLIC OF CHINA

ICS 91.220

P 97

GB 26545-2011

**Building construction machinery and equipment - Safety
requirements of drill rigs**

建筑施工机械与设备 钻孔设备安全规范

Issued on: June 16, 2011

Implemented on: May 01, 2012

**Issued by: General Administration of Quality Supervision, Inspection and
Quarantine;
Standardization Administration of the People's Republic of China.**

Table of Contents

Foreword	4
1 Scope	5
2 Normative references	6
3 Terms and definitions	8
4 List of hazards	12
5 Safety requirements and measures	13
5.1 General safety requirements	13
5.2 Driving, tramming and operating positions	14
5.3 Control system functions	16
5.4 Control device.....	18
5.5 Stability.....	19
5.6 Chassis braking.....	27
5.7 Protection of moving parts.....	29
5.8 Electrical system	32
5.9 Hydraulic system	32
5.10 Pneumatic system	33
5.11 Lighting.....	33
5.12 Fire prevention.....	33
5.13 Noise and vibration.....	34
5.14 Dust and exhaust gas.....	35
5.15 Winches, wire ropes and pulleys.....	36
5.16 Sprocket and chain.....	39
5.17 Columns, masts, feed booms and working platforms	39
5.18 Special requirements for remote control and automatic drill rigs.....	42
5.19 Warning devices.....	43
6 Verification of safety requirements/measures	44
7 Instructions for use.....	44
7.1 Labels.....	44
7.2 Indicator devices	44

7.3 Maintenance and repair.....	45
7.4 Instructions for drill rigs use manual	45
Appendix A (Normative) Measurement methods for noise and vibration	50
Appendix B (Normative) Inspection and testing methods for pulleys, wire ropes and chains.....	53
Appendix C (Normative) Braking test for drill rigs, excluding drill rigs mounted on trucks and tractors	54
Appendix D (Normative) Relationship between drill rig operating conditions and hazards.....	57
Appendix E (Informative) Graphical symbols and signs	59
Appendix F (Informative) Changes in chapter and figure numbers between this Standard and EN 791:1995	79
Appendix G (Informative) Technical differences between this Standard and EN 791:1995 and their causes.....	81
Bibliography	85

Building construction machinery and equipment - Safety requirements of drill rigs

1 Scope

This Standard specifies the safety requirements for the design, manufacture, use and maintenance of drill rigs, mainly involving the important operational safety and ergonomics of drill rigs.

This Standard applies to drill rigs, including casing, for surface and underground hole formation in building, tunnels, railways, roads, hydropower stations and water conservancy projects.

Note: This Standard includes the major hazards of drill rigs under the conditions of intended use and foreseeable by the manufacturer. However, this Standard does not include all mechanical, electrical, hydraulic, pneumatic and other device hazards, nor does it include all hazards involved in general standards. Hazards not included in this Standard shall be subject to the relevant provisions of GB/T 15706.1 and GB/T 15706.2.

The drill rigs to which this Standard applies mainly has the following characteristics:

- a) There are three types of drilling methods: impact, rotary and rotary impact;
- b) Chassis types include fixed, towed and self-propelled;
- c) Mainly used to form pile holes, anchor holes, blasting holes and drainage holes, etc. Specifically including the following models:
 - Drill rigs for pile formation, mainly including impact drill rigs, rotary drill rigs, long spiral drill rigs, forward/reverse circulation drill rigs, swing/rotary casing drill rigs, pile top drill rigs, down-the-hole hammer rock drill rigs, etc.;
 - Drill rigs for anchoring, mainly rotary and rotary impact drill rigs;
 - Drill rigs for blasting holes, mainly including rock drills (cars), down-the-hole drills, rotary drills, etc.;
 - Drill rigs for other purposes, including rotary spindle drill rigs, rotary and rotary impact drill rigs for surface/underground drilling, forward/reverse circulation drill rigs, horizontal directional drill rigs, etc.;

d) Casing or drilling fluid may be used to stabilize the drill hole.

Self-propelled drill rigs includes equipment with a movable chassis such as a truck, tractor or other wheeled chassis, a tracked chassis, a walking chassis, a sliding chassis (pulled by a winch), etc. Drill rigs using a truck, tractor, trailer chassis or other wheeled chassis can travel at a higher speed on the road. Its design and manufacture shall comply with the standards and regulations for both drill rigs and road transport vehicles.

If the main machine of the drill rig is an excavator, crane, etc., this type of main machine shall comply with its own standards when the requirements of this Standard are not applicable.

If the drill rig is equipped with additional working devices other than the drilling components specified in this Standard, such as piling devices, these additional working devices shall also comply with their own safety standards.

Drill rigs used in explosive gas environments shall comply with the provisions of relevant standards for equipment used in explosive gas environments.

This Standard does not apply to drill rigs used in the petroleum and natural gas industry, or drill rigs used in open pit and underground mines.

2 Normative references

The terms in the following documents become the terms of this Standard by reference to this Standard. For dated references, all subsequent amendments (not including errata content) or revisions do not apply to this standard. However, parties to agreements that are based on this Standard are encouraged to study whether the latest versions of these documents can be used. For undated references, the latest edition applies to this Standard.

GB/T 3766, Hydraulic Fluid Power - General Rules Relating to Systems (GB/T 3766-2001, eqv ISO 4413:1998)

GB/T 3811-2008, Design rules for cranes

GB 4351.1, Portable fire extinguishers - Part 1: Performance and construction (GB 4351.1-2005, ISO 7165:1999, Fire fighting - Portable fire extinguishers - Performance and construction, NEQ)

GB 5226.1-2008, Electrical Safety of Machinery - Electrical Equipment of Machines - Part 1: General Requirements (IEC 60204-1:2005, IDT)

GB/T 5972-2009, Cranes - Wire ropes - Care, maintenance, installation, examination and discard (ISO 4309:2004, IDT)

The materials used in drill rigs shall not be harmful to the safety and health of exposed person. The material shall be suitable for the intended ambient temperature. The manufacturer shall indicate the designed operating temperature range of the drill rig in the operating instruction manual.

5.1.7 Manual operation of drill rig and its components

The lifting points or lifting aids for the complete drill rig or parts shall be clearly specified. The lifting points or lifting aids can also be used for fixation and protection during transportation. The lifting points shall be clearly marked.

The articulated chassis shall have a mechanical locking device to lock the hinge point during lifting and transportation. The locking device shall comply with GB/T 22355.

Drill rig parts that need to be operated by hand shall be designed to be safe for manual operation.

If the weight and/or shape of a component prevents safe manual operation, it shall be designed so that a lifting device can be used safely.

5.1.8 Operation and maintenance channel

Ladders, escalators, aisles, steps, handrails, handles and guardrails shall be provided to ensure that normal operation, adjustment and maintenance positions can be reached safely, see GB/T 17300. For other requirements, see GB/T 17299.

If doors, windows and skylights are free to open and close, they shall be safe in either the open or closed state.

5.1.9 Isolation of power source

All external power sources of drill rigs shall be isolated. Isolation devices shall be clearly marked. If reconnection will endanger exposed person, the isolation device shall be able to be locked. It shall comply with GB/T 19670 and GB 5226.1-2008 5.3.

After the power source is shut off, any residual or stored energy in the circuit shall be eliminated without causing harm to exposed person.

However, some circuits may remain connected to their power source, such as to maintain component position, protect information, and internal lighting.

5.2 Driving, tramming and operating positions

5.2.1 General

Driving, tramming and operating positions shall be reasonably designed and manufactured so that the operator can complete all necessary actions of driving and operating the drill rig in these positions without causing danger to himself or other

people near the drill rig. The operator's body size and minimum activity space, as well as the comfortable operation area and accessible range shall meet the requirements of GB/T 8420 and GB/T 21935.

For drill rigs mounted on trucks or tractors, the requirements for the driving position are given in the relevant standards.

If the drill rig is tramming in places where there is a risk of rollover, an alternate driving position shall be set up or a rollover protection structure (ROPS) that meets the requirements of GB/T 17922 shall be equipped so that the driver can drive the drill rig without endangering himself. For some special applications, a remote-control device shall be equipped.

5.2.2 Operator position

The drill rig shall be provided with an operator's cabin to protect the operator from noise, dust and adverse weather. However, there are some types of drill rigs or operating conditions where it is not suitable or possible to equip the operator's cabin.

If used in an environment where there is a risk of falling rocks, the drill rig shall be equipped with a falling object protection structure (FOPS) that meets the requirements of acceptance criterion II in GB/T 17771-1999.

In all cases, the drill rigs for pile formation shall be equipped with a protective shed, which shall meet the requirements of acceptance criteria I in GB/T 17771-1999.

Consideration shall be given to protection against horizontal projections, such as auger drilling and pile drilling.

The control room shall be equipped with the following devices:

- When necessary and appropriate, ventilation devices with dust filtering function, cooling and/or heating devices shall be provided;

Note: No verification is given for this requirement.

- noise protection device: when measured according to Appendix A, the sound pressure level in the control room shall not exceed 85 dB(A);

- floor vibration damping device, see 5.13.3;

- a quick way to escape from the control room;

- emergency exits, such as means of breaking windows or panels, providing or placing window-breaking tools on different sides of the normal exits of the control room;

- seats: unless that the operator must stand to work, a seat shall be provided; the seat shall be comfortable and stable and adjustable according to the operator's weight and

5.4 Control device

5.4.1 General

Control devices shall be clearly marked in accordance with relevant standards and shall be positioned to ensure safe, fast and comfortable operation, see 4.8.7 and Appendix E of GB/T 15706.2-2007.

The control device shall ensure that its action and effect are consistent.

Except for the control of continuous operations (such as drilling and casing operations), other control devices shall be of the stop-and-go type [a control device that can trigger and maintain the operation of dangerous machine functions only when the manual control device (actuator) is driven]. However, emergency shutdown devices and similar devices are excluded.

The control device shall also meet the following requirements:

- The most important control device shall be placed in a comfortable operating area;
- The second most important control device shall be placed within normal reach;
- When possible, it shall be placed outside the danger zone.

Note: For the definition of comfort zone and reach range of manipulation, see GB/T 21935.

If the drill rig has multiple operating positions, it shall be equipped with a mode selection device to enable the operator to select the operating position to be used and ensure that only one set of operating devices is in effect. However, this provision does not apply to emergency shutdown and safety devices.

5.4.2 Emergency shutdown and safety devices

5.4.2.1 Emergency shutdown device

The emergency shutdown device shall comply with the requirements of GB 16754 and shall be placed in a position that is easily accessible to the operator, see 5.3.3.2.

Once the emergency shutdown device is activated, it shall remain in effect until manually reset. Manual reset shall not restart the machine, but only enable the machine to restart through the normal start-up procedure.

5.4.2.2 Safety devices for stopping rotation and feeding

Drill rigs with a feed boom may pose a risk of personnel being caught in or injured by its rotating parts. An automatic stop device shall be installed in close proximity to the rotating drill assembly where personnel can easily come into contact with it. In an emergency, the device shall be able to be triggered by the human body or a part of the

human body. Once triggered, it shall automatically operate without any delay or difficulty to quickly stop the dangerous movement of the equipment. The trigger of the device shall be clearly marked.

Note 1: For examples of automatic shutdown devices, see 3.26.5 of GB/T 15706.1-2007.

If the drill rig is equipped with a mechanical drill rod/ drill pipe handling system, only one automatic shutdown device may be provided at the free end of the drill rod/ drill pipe. See 5.7.3.3.

When the automatic shutdown device is activated, any residual energy in the system shall be limited or released so that it cannot cause any dangerous movement.

Once the automatic shutdown device is activated, it shall remain in effect until manually reset. Manual reset shall not restart the machine, but only enable the machine to restart through the normal start-up procedure.

If an automatic shutdown device cannot be provided due to operational reasons, entry into the danger zone shall be prohibited during drilling or other dangerous operations. In this case, a “No Entry” sign shall be placed in the prohibited area. See Appendix E and 7.4.3.

Note 2: The function of the automatic shutdown device can be the same as that of the emergency shutdown device.

5.4.2.3 Accidental triggering of operating devices

There shall be protective devices on the operating panel to prevent the accidental triggering of controls that could cause danger.

5.4.3 Verification

All emergency shutdown and safety devices shall be tested to ensure their effectiveness, and the manufacturer shall provide corresponding certificates.

5.5 Stability

5.5.1 General stability criteria

The design and manufacture of drill rig shall ensure its stability under normal use conditions, such as transportation, tramming, parking and drilling, and ensure that there is no risk of tipping or falling. Stability shall be verified by calculation.

The following stability criteria and calculations are for mobile and fixed drill rigs, but not for drill rigs fixed to the ground or foundation. For drill rigs fixed to the ground or foundation, the weight and moment caused by the load shall be considered in the calculation and design of the anchor.

5.6.3 Service braking system of wheeled drill rigs

The braking force provided by the service braking system shall not be less than 35% of 9.81 times the maximum mass of the drill rig, in Newton (N). For the operation and parking of drill rigs on a large slope, see 5.15.3.

In addition, the service braking system shall be able to slow down at an acceleration of at least -1 m/s^2 on the maximum gradient permitted by the manufacturer.

For drill rigs with hydrostatic transmission, if the above requirements are met, the service braking action can be achieved by hydrostatic transmission.

The service braking system shall be protected against thermal failure, see C.2.3.

5.6.4 Auxiliary braking system of wheeled drill rigs

After the service braking system fails, the auxiliary braking system shall be able to ensure stopping under all slopes, ground conditions, speeds and working conditions permitted by the manufacturer.

The braking force of the auxiliary braking system shall not be less than 25% of 9.81 times the maximum mass of the drill rig, expressed in Newton (N).

In addition, the auxiliary braking system shall be able to slow down at an acceleration of at least -1 m/s^2 on the maximum gradient permitted by the manufacturer. In order to achieve the required braking force, the parking braking system can be used in conjunction.

For drill rigs with hydrostatic service brakes, the auxiliary braking system shall also independently meet the performance requirements of the service brake.

5.6.5 Parking braking system of wheeled and tracked drill rigs

A purely mechanical parking braking system shall be provided to keep the equipment stationary in a fixed position. The parking braking system shall have a locking device.

The parking braking system shall be able to keep the drill rig stationary at the maximum working slope allowed by the manufacturer, which can reach 20° with a safety factor of 1.2. When working on a slope with a slope greater than 20° , see 5.15.3.

5.6.6 Driving, auxiliary and parking braking systems of tracked drill rigs

Tracked drill rigs shall also have a service and auxiliary braking systems in accordance with 5.6.3 and 5.6.4, or two service braking systems, one for each track. The two braking systems shall be independently controlled, such as by two independent control systems, one for each track. The braking system may be combined with the steering system.

The minimum braking force provided by the combined service braking system shall be equivalent to the force specified by the manufacturer for a maximum slope of 20° multiplied by a safety factor of 1.2, expressed in Newtons (N). When working on a slope with a slope greater than 20°, see 5.15.3.

The above requirements shall be verified by the slope test or tension test specified in C.2.5.

For vehicles with two independent braking systems, if one of them fails, the other can be regarded as an auxiliary braking system.

In case of power outage, if the service brake is automatically applied by mechanical spring loading, it can be the same as the parking brake. Otherwise, the parking brake shall comply with the requirements of 5.6.5.

5.6.7 Braking system of skid-steer wheel drill rigs

The requirements for skid steer chassis are the same as for tracked drill rigs. Braking action shall be able to be applied to all wheels.

5.6.8 Verification

The brakes of wheeled drill rigs shall be tested in accordance with the requirements of Appendix C.

The brakes of tracked drill rigs shall be tested in accordance with C.2.5.

The parking brake of towed drill rigs shall be tested in accordance with C.2.5.

Note: If the truck or tractor used for the drill rig has been assessed for conformity with road traffic regulations, the above verification is not necessary.

5.7 Protection of moving parts

5.7.1 General

The design, manufacture and arrangement of moving parts of drill rigs shall be able to avoid the hazards described in GB/T 15706.1. For exceptions, see 5.7.3.

5.7.2 Transmission parts

For rotating transmission parts, such as transmission shafts, couplings, transmission belts and other parts that may injure people, protective devices shall be equipped to avoid contact. The protective devices shall comply with the requirements of GB/T 8196. The protective devices shall be made firmly and fixed reliably. For transmission parts that are not often approached, fixed protective devices shall be installed. Fixed protective devices shall be fixed by welding or by using necessary tools or keys to open or move them.

- a) On drill rigs with a top hammer, the impact mechanism is considered to be a component of the power-driven drill pipe breakout device;
- b) On drill rigs with top rotary drive, the controlled reverse rotation of the top drive and the use of a clamping device or an equivalent lockable rotary connection are considered as power-driven drill pipe breakout devices;
- c) On rotating spindle drill rigs, the controlled reverse rotation of the chuck or an equivalent lockable rotary connection and the rotation of the spindle are considered to be part of the power-driven drill pipe breakout device.

5.7.3.3 Drill pipe handling system

If the weight of the drill rod or drill pipe causes the manual operating force to exceed 25 kg, the drill rigs shall be equipped with a mechanized drill rod or drill pipe handling system.

If the use of drill rigs does not allow for a mechanized drill rod or drill pipe handling system, a lifting device shall be provided to facilitate the safe transportation of drill rods or drill pipes from the drill rod rack to the center of the drill shaft.

Note: Swinging power head with chuck or movable pulley, or with lifting device, drilling lifting cap, lifting flange, lifting sling or similar tools are considered usable.

5.7.3.4 Restricted areas during drilling

The dangerous area in front of the drill rig, such as the area between the chassis and the drilling surface, shall be set as a restricted access area during drilling operations, and warning signs shall be placed on the drill rig.

The form and design of warning signs shall comply with 7.2.2. It shall be clearly visible from the operating position whether anyone is in the danger zone. See 5.2.4.

During drilling operations, if auxiliary personnel are required to work in danger zones, the requirements of 7.4.3 and 7.4.5 shall be met.

5.7.3.5 Drill rigs with rotating superstructure

When the drill rig is drilling and the superstructure is rotating, the danger zone shall be restricted for access.

Drill rigs shall be equipped with warning signs according to 7.2.2. See 5.2.4.

During drilling operations, if auxiliary personnel are required to work in danger zones, the requirements of 7.4.3 and 7.4.5 shall be met.

This is an excerpt of the PDF (Some pages are marked off intentionally)

Full-copy PDF can be purchased from 1 of 2 websites:

1. <https://www.ChineseStandard.us>

- SEARCH the standard ID, such as GB 4943.1-2022.
- Select your country (currency), for example: USA (USD); Germany (Euro).
- Full-copy of PDF (text-editable, true-PDF) can be downloaded in 9 seconds.
- Tax invoice can be downloaded in 9 seconds.
- Receiving emails in 9 seconds (with download links).

2. <https://www.ChineseStandard.net>

- SEARCH the standard ID, such as GB 4943.1-2022.
- Add to cart. Only accept USD (other currencies - <https://www.ChineseStandard.us>).
- Full-copy of PDF (text-editable, true-PDF) can be downloaded in 9 seconds.
- Receiving emails in 9 seconds (with PDFs attached, invoice and download links).

Translated by: Field Test Asia Pte. Ltd. (Incorporated & taxed in Singapore. Tax ID: 201302277C)

About Us (Goodwill, Policies, Fair Trading...): <https://www.chinesestandard.net/AboutUs.aspx>

Contact: Wayne Zheng, Sales@ChineseStandard.net

Linkin: <https://www.linkedin.com/in/waynezhengwenrui/>

----- The End -----