

ICS 73.020
CCS D 01

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**ENERGY INDUSTRY STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA**

NB/T 11548-2024

**Technical specification for simultaneous operation of drilling
and grouting in vertical shaft**

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Issued on: May 24, 2024

Implemented on: November 24, 2024

Issued by: National Energy Administration of the PRC

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Foreword

This document was issued on 24 May 2024 by the National Energy Administration of the PRC and takes effect on 24 November 2024.

It is a NB/T standard: recommended rather than compulsory, but it is the text a Chinese reviewer applies when assessing a submission.

It is classified under ICS 73.020, Chinese classification D 01.

This document was drafted in accordance with the rules given in GB/T 1.1-2020 Directives for standardization - Part 1: Rules for the structure and drafting of standardizing documents.

Please note that some of the content of this document may be the subject of patent rights. The issuing body of this document assumes no responsibility for identifying patents.

This document was proposed by, and is under the administration of, the coal standardization technical committee of the energy industry.

This document is issued for the first time.

1 Scope

NB/T 11548-2024 is the Chinese specification for carrying out shaft boring and surface pre-grouting at the same time when sinking a vertical mine shaft. It exists to attack the longest item on the critical path of building a deep mine. Sinking a shaft through water-bearing strata requires the aquifers to be sealed first: holes are drilled from the surface into each water-bearing layer and grout is injected to shut the water off, and only when that is finished can the shaft itself be bored. Done in series, on a shaft of several hundred metres, the grouting alone can take a year before boring even starts. The idea in this document is to overlap the two: the upper aquifers are sealed conventionally through vertical holes, then the boring machine starts work on that already-sealed upper section while the lower aquifers are being grouted through S-shaped directional holes that curve out around the shaft and back in beneath it. Two operations that used to follow one another now run in the same shaft at the same time, and the risk is obvious - a grouting hole that strays into the shaft being bored, or grout injected too close beneath the advancing shaft bottom. The document exists to make the overlap safe, and its core is a set of clearances. The vertical holes must stand outside the shaft wall by a distance calculated from the permissible deviation rates of both the bore and the hole over the drilling depth, plus a constant of 1 to 1.5 m. The trajectory of an S-type hole must keep at least 3.0 m in horizontal projection from the shaft wall through the bored section. Grouting of the S-type

section must start at least 100 m vertically below the shaft bottom. And the grouting must overlap the bored section by at least 10 m so that no unsealed band is left between them. Around those rules the document sets the design of the grouting sections, the hole layout and trajectory, the surface facilities, and the drilling design; then the construction itself, with drilling mud parameters, control, logging and monitoring, the grouting operation and its completion criteria, and the monitoring of borehole trajectory and of the grouting process. A separate clause covers the grout made from the drilling mud itself - its quality requirements, mix proportion and preparation - and a final clause sets the inspection of the overlap sections, the grouting diameter, the grouting quantity and the final grouting pressure. It was issued on 24 May 2024 by the National Energy Administration and took effect on 24 November 2024.

This document specifies the requirements for the design of simultaneous drilling and grouting operation, the construction of that operation, the drilling mud grout, and the inspection, in the parallel operation of shaft boring construction and surface pre-grouting construction of vertical shafts.

This document applies to the vertical shafts of mines; other similar underground vertical shaft works may apply it by reference.

2 Normative references

The contents of the following documents constitute indispensable provisions of this document through normative reference in the text. For dated references, only the edition corresponding to that date applies to this document. For undated references, the latest edition, including all amendments, applies to this document.

GB/T 50511-2022 Standard for construction of coal mine shaft and roadway engineering

GB 50213-2010 Code for acceptance of construction quality of coal mine shaft and roadway engineering

GB 51227-2017 Code for construction and acceptance of vertical shaft sinking by boring method

MT/T 1057 Method for water pressure test inspection of the effect of surface pre-grouting of vertical shafts

MT/T 1150 Technical specification for construction of grouting holes in surface pre-grouting engineering of vertical shafts

3 Terms and definitions

The following terms and definitions apply to this document.

3.1 sinking by shaft boring method

The shaft sinking method in which the vertical shaft is bored by a shaft boring machine.
[GB/T 15663.2-2023, definition 7.1, modified]

3.2 surface pre-grouting

The operation in which, before the shaft is sunk, holes are drilled from the surface into the aquifer and grout is injected into the aquifer using grouting facilities set up on the surface.
[GB/T 15663.2-2023, definition 9.2]

3.3 simultaneous operation of drilling and grouting

The method in which, during the construction of a vertical shaft, shaft boring construction and surface pre-grouting construction are carried out at the same time within a defined period and space.

3.4 mud to grout

The grout made principally from the drilling mud during the simultaneous drilling and grouting operation.

3.5 vertical grouting hole

A grouting hole constructed as a vertical hole before the simultaneous drilling and grouting operation.

3.6 S-type grouting hole

A grouting hole constructed as an S-shaped directional hole.

3.7 vertical grouting section

The grouting section constructed as a vertical hole before the simultaneous drilling and grouting operation.

3.8 S-type grouting section

The grouting section constructed by the S-type hole method.

3.9 grouting diameter

The diameter of the circle projected on the horizontal plane by the design landing points of the grouting holes, with the centre point of the shaft as the centre of the circle.

4 Design of simultaneous drilling and grouting operation

4.1 Design of the space-time relationship between drilling and grouting

4.1.1 Overall space-time relationship. The grouting sections of the whole shaft are divided into an upper and a lower section, that is the vertical hole grouting section and the S-type hole grouting section. The construction sequence of the whole shaft shall be: grouting of the vertical hole section; shaft boring construction carried out in parallel with grouting of the