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NB

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

NB/T 11550-2024

**Code for confined concrete support in underground
engineering**

地下工程约束混凝土支护规范

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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 73.100.99, Chinese classification D 98.

This code was prepared in accordance with the requirements of the plan of the National Energy Administration for the formulation and revision of industry standards in the energy field. The drafting group carried out extensive investigation and research, carefully summarised practical experience, and prepared this code on the basis of wide consultation.

The main technical content of this code is: general provisions; terms; basic requirements; design; construction; monitoring; occupational health, safety and green construction; and acceptance check and quantity control.

This code is administered by the National Energy Administration, and the China Coal Construction Association is the chief drafting department.

This code contains quoted patents, which are listed in the list of quoted patents.

1 Scope

NB/T 11550-2024 is the Chinese code for confined concrete support in underground works - mine roadways, transport tunnels and hydraulic tunnels - and it is written above all for the difficult ground where ordinary support fails. Confined concrete is a simple idea with a large

effect: a steel tube is filled with concrete, and because the tube prevents the concrete from expanding sideways under load the concrete carries far more than it could alone, while the concrete in turn stops the thin-walled tube from buckling. Each material fixes the other one's weakness, and the resulting arch has several times the capacity of the conventional steel I-beam arch of the same weight. That matters in deep mines and in squeezing ground, where the rock does not simply need holding up but deforms continuously for months, and where a conventional arch either yields early or is crushed. This code covers the whole discipline. It defines the components and the joint types, including the yieldable joint that deforms by a designed amount when the load on the arch reaches a set limit - the feature that lets the support give ground in a controlled way instead of failing. It sets the design rules for the arch itself, for the materials, for the joints, for the longitudinal connections between arches, and for the grouting holes and their strengthening plates. Construction is covered in the order of the work: manufacture of the arch, its erection, the backfilling behind it, and the grouting of the core concrete that turns the erected steel into a composite structure. A monitoring clause requires surface convergence and internal displacement of the surrounding rock to be measured together with the stress in the confined concrete arch itself, so that the support is verified in service rather than assumed. Occupational health, safety and green construction follow, and the last clause sets the quality control and acceptance requirements for arch erection, backfilling and core grouting, with six appendices of record forms covering daily monitoring, completion acceptance, quality control data verification, apparent quality, and the cycle-by-cycle quality acceptance and its summary. The code carries a list of quoted patents as well as quoted standards. It was issued on 24 May 2024 by the National Energy Administration and took effect on 24 November 2024.

1.0.1 This code is formulated in order to strengthen the application and promotion of confined concrete support technology in underground engineering, to standardise the technical requirements for the design, construction, quality control and acceptance of confined concrete support, and to guarantee the quality of confined concrete support and the safety of construction.

1.0.2 This code provides only for confined concrete support in underground engineering.

1.0.3 This code applies to underground engineering such as mine roadways, transport tunnels and hydraulic tunnels, and applies in particular to difficult and critical projects that require high strength support.

1.0.4 In addition to complying with this code, the design, construction, quality control and acceptance of confined concrete support in underground engineering shall also comply with the requirements of the relevant current national and industry standards and codes.

2 Terms

2.0.1 confined concrete component

A component in which core concrete is filled inside an external confining material, and in which the confining material and the core concrete bear the load together.

2.0.2 confined material

The material that applies the external confining action to the core concrete.

2.0.3 core concrete

The concrete filled inside the confining material.

2.0.4 confined concrete support

A support structure that uses confined concrete components as its principal load-bearing members.

2.0.5 casing joint

A joint type in which the individual confined concrete components are connected by means of hollow tube material.

2.0.6 flange joint

A joint type in which the individual confined concrete components are connected by means of flange plates and high strength bolts.

2.0.7 yieldable joint

A joint type that achieves yielding through its own deformation. When the load on the arch reaches a certain limit, the yieldable joint can yield through its own deformation, and it has a specific amount of yield.

2.0.8 confined concrete arch

A support structure assembled from confined concrete components and joints.

2.0.9 longitudinal connection

The connecting components that achieve the longitudinal positioning between the individual arches. They consist of pin sleeves set at specific positions on the arch and connecting reinforcing bars with bent straight-angle sections.