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NB

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

NB/T 10514-2021

Replacing DL/T 5399-2007

Code for shiplift design of hydropower projects

水电工程升船机设计规范

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Foreword

This document was issued on 7 January 2021 by the National Energy Administration of the PRC and takes effect on 1 July 2021.

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 27.140, Chinese classification P 26.

It replaces DL/T 5399-2007, which is superseded.

This Code has been revised by the drafting group in accordance with the requirements of the Notice of the National Energy Administration on Issuing the 2016 Plan for the Development and Revision of Sector Standards in the Energy Field (Guo Neng Ke Ji [2016] No. 238), on the basis of extensive investigation and research, careful summarization of practical experience, and wide solicitation of opinions.

The main technical contents of this Code are: general provisions; terms; basic requirements; type selection and layout; civil structural design; metal structure and machinery and equipment; electrical and automation control; and fire-fighting facility and automatic fire alarm.

The main technical contents revised in this Code are as follows:

The contents relating to the wire rope hoist vertical shiplift have been revised.

The contents relating to the machine type of the rack and pinion vertical shiplift have been revised.

Contents relating to the machine type of the hydraulic vertical shiplift have been added.

Contents relating to civil structural design have been added.

Contents relating to project grading and design criteria have been added.

Contents relating to the effective scale of the ship chamber have been added.

Contents relating to navigation capacity have been added.

Contents relating to the appendices have been added.

This Code is under the administration of the National Energy Administration. It was proposed by, and is under the routine administration of, the China Renewable Energy Engineering Institute (General Institute of Hydropower and Water Resources Planning and Design). The Energy Sector Standardization Technical Committee on Hydropower Metal Structures and Hoists (NEA/TC 21) is responsible for the interpretation of the specific technical contents. Should any comment or suggestion arise during the implementation of this Code, please send it to the China Renewable Energy Engineering Institute (address: No. 2 Liupukang Beixiaojie, Xicheng District, Beijing; postal code: 100120).

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1 Scope

NB/T 10514-2021 is the Chinese design code for shiplifts on hydropower projects, replacing DL/T 5399-2007. Where a dam is too high for a lock, vessels are carried past it in a water-filled chamber raised and lowered as a single mass - hundreds or thousands of tonnes moving vertically beside the dam - and the code covers the design of that machine and of the civil structure around it. It sets the project grading and the design criteria that follow from it, the effective dimensions of the ship chamber for classes from 100 t to 3000 t, and the navigable conditions at the approaches. It then covers the layout: the upstream and downstream approach channels, the head structures and their gates, the tower or shaft, and the machine room. The lifting system is treated in detail - counterweighted wire rope systems, rack and pinion drive, hydraulic and floating types - with the drive machinery, the safety devices against overspeed and rope failure, the levelling and synchronisation of the chamber, and the electrical and control systems. Structural design of the towers, of the chamber itself and of the gates and seals follows, with the load combinations including seismic input and the accidental cases the safety system must cover. Hydraulic transients in the chamber and the ship-water interaction are addressed, and the code closes with the trial operation, the monitoring and the maintenance expected in service. It applies to the design of shiplifts on hydropower projects in China.

1.0.1 This Code is formulated in order to standardize the design of shiplifts of hydropower projects, to ensure the construction quality of the works, and to follow the principles of safety and reliability, technical advancement, economic rationality, and convenience of operation and management.

1.0.2 This Code is applicable to the design of fully balanced and partial balanced vertical shiplifts of the 100 t class to the 3000 t class for newly built, rebuilt and extended hydropower projects. The machine types covered include the wire rope hoist vertical shiplift, the rack and pinion vertical shiplift, and the hydraulic vertical shiplift.

1.0.3 The following data should mainly be collected for the design of a shiplift of a hydropower project:

- 1 Navigation planning data such as the waterway class, the vessel types and the freight volume.
- 2 Natural condition data such as topography, geology, hydrology, meteorology, sediment, water quality and floating objects.
- 3 Project condition data such as the layout of the project complex and the mode of operation, the characteristic water levels upstream and downstream, the navigable water levels upstream and downstream, and the range and rate of variation of the water levels upstream and downstream.
- 4 Conditions relating to manufacture, transport and erection.

1.0.4 In addition to complying with this Code, the design of shiplifts of hydropower projects