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NB

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

NB/T 20579-2021

**Reference index for commissioning of nuclear power plant
construction project**

核电厂建设项目调试工程参考指标

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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 01.040.27, Chinese classification F 02.

This document has been 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.

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1 Scope

NB/T 20579-2021 sets out reference cost indices for the commissioning of nuclear power plants - the figures an estimator uses to budget the start-up testing of a new unit, from the first system tests through fuel loading and criticality to full-power operation. Commissioning a nuclear unit is a long, labour-intensive programme with its own consumables and instrumentation, and it also produces electricity that is sold before handover, so both its cost and that revenue have to be estimated at the design stage. The reference case is a pair of improved second-generation 1000 MWe pressurised water reactors. The document gives the scope, the normative references and the defined terms, then the structure of commissioning costs and the general rules for applying the indices. It sets out the labour quotas in man-days for each phase of commissioning and for the special tests, the consumable materials with their quantities for a twin-unit plant, the depreciation of the test instruments and equipment used, and the formula for the revenue from electricity sold during start-up, based on the number of days of power generation assumed per unit. The adjustment of the indices for other reactor types, unit sizes and numbers of units is addressed. The annexes list the plant system codes to which the indices are allocated and the detailed quota tables by system and phase. It is used by owners and cost consultants preparing commissioning budgets for nuclear power projects in China.

This document specifies the commissioning engineering indexes used in the budget quotas for nuclear power plant construction projects.

This document is applicable to the commissioning works of new-build and extension projects of 1000 MWe second-generation improved pressurized water reactor nuclear power units; retrofit projects of nuclear power units and nuclear power projects of other reactor types may refer to it.

2 General description

2.1 This document has been compiled on the basis of statistics and analysis of the commissioning cost structure and cost data of nuclear power projects already built in China, and serves as the basis for preparing project estimates and budgets and the commissioning-related investment of nuclear power projects.

2.2 This document has been compiled on the basis of the current technical regulations, codes and standards issued by the competent national energy authorities, mainly including the documents listed in items a) to l).

2.2 a) Standardization Law of the People's Republic of China (implemented in 1989).

2.2 b) Regulations for the Implementation of the Standardization Law of the People's Republic of China (implemented in 1990).

2.2 c) Administrative Measures for National Standards for Engineering Construction (implemented in 1992).

2.2 d) Provisions for the Drafting of Engineering Construction Standards (2008 edition).

2.2 e) Provisions for the Compilation of Other Project Costs of Nuclear Power Plant Construction Projects (2010 edition).

2.2 f) Safety Regulations for the Operation of Nuclear Power Plants (HAF 103/04, 2004 edition).

2.2 g) Implementing Rules No. 1 of the Regulations of the People's Republic of China on the Safety Supervision and Management of Civilian Nuclear Installations - Application for and Issuance of Safety Licences for Nuclear Power Plants (HAF 001/01, 1993 edition).

2.2 h) Reporting System for Nuclear Power Plant Operating Organizations (HAF 001/02/01, 1995 edition).

2.2 i) Safety Regulations for Quality Assurance of Nuclear Power Plants (HAF 003, 1991 edition).

2.2 j) Commissioning Procedures for Nuclear Power Plants (HAD 103/02, 1987 edition).

2.2 k) Quality Assurance during Commissioning and Operation of Nuclear Power Plants (HAD 003/09, 1988 edition).

2.2 l) Organization and Safe Operation Management of Nuclear Power Plant Operating Organizations (HAD 103/06, 2006 edition).

2.3 This document covers two parts: commissioning expenditure and commissioning revenue of nuclear power projects.

2.3 a) 1) Commissioning expenditure includes the expenditure for preparation, performance and related management of commissioning test items.

2.3 a) 2) Commissioning expenditure includes the expenditure for items used in the commissioning process, including electricity purchased from outside for commissioning.

2.3 a) 3) Commissioning expenditure includes the expenditure for the cooperation of the construction contractors with commissioning work during the commissioning period.

2.3 b) The commissioning revenue of a nuclear power project is the revenue from electricity sold during the commissioning period.

2.4 This document has been compiled taking as reference the commissioning programme and commissioning test list of a gigawatt-class, twin-unit, fully digital, second-generation improved pressurized water reactor. Test items are divided into two categories:

commissioning tests and special tests.

2.5 Commissioning tests are described in separate chapters for three stages: single-system tests, partial start-up tests and integrated start-up tests. Values are assigned in the form of a man-day quota, and costs are calculated as: commissioning test cost = man-day quota multiplied by man-day comprehensive unit price.

2.5 Note: The definitions of man-day quota and man-day comprehensive unit price are given in 2.10 and 2.11.

2.6 Compared with commissioning tests, special tests are technically more difficult and carry higher risk, and impose higher requirements on the technical ability and qualifications of test personnel and on tools and instruments (see Chapter 6). Costs are calculated as: special test cost = man-day quota multiplied by man-day comprehensive unit price plus amortization of tool and instrument costs.

2.7 Commissioning items are divided into two categories, commissioning consumables and commissioning tools and instruments; the quota costs are listed by item type and reference price. Commissioning consumables are included in the commissioning cost as one-off consumption.

2.7 Among commissioning tools and instruments, fixed assets such as instruments and meters are amortized by the straight-line method over their service life, and non-fixed assets are included in the commissioning cost as one-off consumption (see Chapter 7).

2.7 Note: Commissioning items do not include items supplied together with equipment or items for production preparation.

2.8 The cooperation of construction contractors with commissioning work is charged at a rate, calculated as a set proportion of the installation works cost (excluding the cost of installed materials) as the base.

2.9 a) Cooperation work of construction contractors includes installation, removal and maintenance of temporary commissioning facilities, scaffolding and working platforms.

2.9 b) Cooperation work includes transport of commissioning equipment, tools and instruments, and crane support during the commissioning period.

2.9 c) Cooperation work includes dismantling and restoration of related equipment, piping and insulation, and penetrations, piping openings and wall openings and their plugging.

2.9 d) Cooperation work includes surface cleaning, anti-corrosion treatment and paint touch-up of equipment and piping, and site cleaning work.

2.9 e) Cooperation work includes installation and removal of commissioning instruments and meters.

2.9 f) Cooperation work includes removal, replacement and restoration of strainers and