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NB

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

NB/T 20580.2-2021

**Budget estimation norm of nuclear power plant construction
project works - Part 2: Mechanical equipment installation
engineering for nuclear island**

核电厂建设工程概算定额 第2部分：核岛机械设备安装工程

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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.

This document is Part 2 of NB/T 20580, Budget estimation norm of nuclear power plant construction project works. The following parts of NB/T 20580 have already been issued:

Part 1: Civil engineering works of the nuclear island;

Part 2: Mechanical equipment installation works of the nuclear island;

Part 3: Piping installation works of the nuclear island;

Part 4: Ventilation and air conditioning installation works of the nuclear island;

Part 5: Electrical installation works of the nuclear island;

Part 6: Instrumentation, control and communication installation works of the nuclear island;

Part 7: Building works of the conventional island;

Part 8: Thermal power equipment installation works of the conventional island;

Part 9: Electrical equipment installation works of the conventional island.

This document was proposed by the Nuclear Power Standardization Technical Committee of the energy industry.

This document is under the jurisdiction of the Research Institute of Nuclear Industry Standardization.

Drafting organizations of this document: China Nuclear Power Engineering Co., Ltd.; China General Nuclear Power Engineering Co., Ltd.; Electric Power Planning and Engineering Institute.

Main drafters of this document: Zheng Baojun, Shang Xin, Bo Meifang, Yu Rong, Hu Jiang, Rong Mei, Fa Dan, Zhang Li, Zhu Jianping, Wu Lei, Ji Kai.

Structure of the norm tables

The norm tables of this part are arranged in seven chapters, each covering one family of nuclear island mechanical equipment:

Chapter 1 Main system equipment, covering the equipment of the reactor coolant system and the associated main components.

Chapter 2 Fuel storage and process transport system, covering the equipment for the storage and the process handling of fuel.

Chapter 3 Engineered safety features, covering the equipment of the safety systems provided for accident conditions.

Chapter 4 Nuclear auxiliary equipment, the most extensive chapter of the part, covering the auxiliary mechanical equipment of the nuclear island.

Chapter 5 Hoisting equipment, covering cranes and other lifting appliances installed in the nuclear island.

Chapter 6 Pumping station equipment, covering the equipment of the pumping stations serving the nuclear island.

Chapter 7 Fabrication and installation of metal storage tanks, covering the site fabrication and the erection of metal tanks.

1 Scope

NB/T 20580.2-2021 is the Chinese preliminary estimation norm for installing the mechanical equipment of the nuclear island, the second part of the NB/T 20580 series. The nuclear island is where the cost of a nuclear plant actually lives: the reactor pressure vessel, the steam generators, the pressuriser, the main coolant pumps and the reactor coolant piping, together with the safety injection, residual heat removal and containment spray systems. Installing them is not ordinary mechanical erection. Components weighing

hundreds of tonnes are set to millimetre tolerances inside a containment that is itself still being built, by qualified crews working to procedures that are inspected and documented at every step, and the schedule is driven by the order in which things physically fit through the equipment hatch. Estimating that from first principles is not realistic, which is why the state publishes a norm: for each defined unit of installation it fixes the labour, material and plant consumption considered necessary, and those figures become the basis of the preliminary estimate at the stage when the investment decision is taken. This is the coarse-grained companion to the detailed budget norms of the NB/T 20358 series, intended for feasibility and preliminary design rather than for settling a contractor's account. A note on the title: the English line printed on the cover reads Mechanical equipment, a typographical error; the Chinese reads ?????????? and the title given here follows it. It was issued on 7 January 2021 by the National Energy Administration and took effect on 1 July 2021.

This norm specifies the norm for mechanical equipment installation works of the nuclear island within the budget estimation norm for nuclear power plant construction project works.

This norm applies to the nuclear island works of new-build and extension projects of pressurized water reactor nuclear power units, and to those sub-items of BOP works that carry nuclear safety requirements, namely: the nuclear island radioactive liquid waste storage tank building, the conventional island radioactive liquid waste storage tank building, the radioactive solid waste treatment auxiliary building, the interim solid waste storage facility, the radioactive machinery repair shop and the decontamination workshop.

Other nuclear reactor types and nuclear engineering projects may take this norm as a reference.

2 General explanation

2.1 This norm shall be applied together with the Fee norm for building and installation works of the nuclear island of nuclear power plant construction projects and with the Norm for machine-shift costs of nuclear power plant construction projects.

2.2 The norm is the basis for preparing the preliminary design budget estimate, for drawing up the investment control plan, for carrying out technical and economic analysis and comparison, and for controlling the construction drawing budget.

2.3 The norm has been compiled on the assumption of normal natural and environmental conditions, on the basis of a reasonable construction organization design and a reasonable allocation of construction machinery for the design stage concerned, taking into account reasonable overlapping of activities, and in accordance with the relevant technical standards for pressurized water reactor nuclear power plants, the construction and acceptance codes, the quality assurance programme, the safe operating procedures and the requirements for civilized and safe site construction and for environmental protection.

2.4 The consumption of labour, materials and construction machinery given in the norm

reflects the present technical and organizational level of nuclear power plant construction. Except where the norm expressly permits adjustment, no adjustment of the norm may be made on the grounds that the construction organization, the working methods or the material wastage of a particular project differ from those assumed.

2.5 Labour cost in the norm is regulated as follows:

- a) The labour input of the norm is expressed in composite man-days, without distinction of trade or skill grade; each composite man-day is based on an eight-hour working day.
- b) The composite unit price of the norm is calculated at a wage of 135 yuan per man-day for production workers, which includes basic wages, wage supplements, auxiliary wages, employee welfare charges and labour protection charges.

2.6 The norm has been compiled for the following normal construction conditions:

- a) Equipment, materials, finished and semi-finished products and components are complete and undamaged, comply with the quality standards and the design requirements, are accompanied by certificates of conformity and test records, and are supplied at a rate that meets the installation schedule.
- b) The overlapping of installation works with civil works is normal, and the civil works do not disturb the normal progress of the installation works.
- c) The installation location, the buildings, the equipment foundations and the embedded holes and openings all comply with the design standards and satisfy the installation requirements.
- d) The site installation conditions comply with the design requirements and satisfy the technical conditions.
- e) The supply of water and electricity meets the normal needs of installation work.
- f) The geographical environment and the climatic conditions do not affect the normal work or the physical health of the installation workers. Where construction takes place in a special environment, the costs shall be calculated separately in accordance with the relevant provisions.

2.7 Material cost is regulated as follows:

- a) The materials of the norm comprise the main materials, auxiliary materials and sundry materials directly consumed in the work content covered by the norm; material consumption comprises the quantity used, the loss in handling and the prescribed wastage arising in that work content.
- b) Material wastage covers transport losses from the site warehouse, the central stacking area or the site fabrication point to the place of installation, losses in construction operations and losses in site stacking.