

ICS 01.040.27
CCS F02

NB

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

NB/T 20358.10-2018

Replacing NB/T 20358.10-2015

**Cost estimation of nuclear power plant construction project -
Part 10: Anticorrosion and thermal insulation engineering for
nuclear island**

核电厂建设工程预算定额 第10部分：核岛防腐、保温工程

Issued on: March 22, 2018

Implemented on: September 1, 2018

Issued by: National Energy Administration of the PRC

Table of Contents

Volume Explanation	1
Chapter 1 Derusting Engineering	4
1.1 Power tool derusting	7
1.2 Blast derusting	8
1.3 Chemical derusting	12
Chapter 2 Anticorrosion Coating Engineering	13
2.1 Nuclear power paints	13
2.2 Underwater curing coating 725L-H53-10 for marine structures	29
Chapter 3 Stainless Steel Pickling Engineering	30
3.1 Pickling with pickling solution	32
Chapter 4 Installation of Permanent Thermal Insulation Materials	35
4.1 Glass wool fibre pipe shells	39
4.2 Glass wool fibre boards	45
4.3 Glass wool fibre blankets with metal (wire) backing mesh	54
4.4 Stitched glass wool blankets	62
4.5 Polyurethane foam pipe shells	64
4.6 Polyurethane foam boards	70
4.7 Phenolic foam insulation pipe shells	78
4.8 Phenolic foam insulation boards	84
4.9 Aluminium silicate insulation pipe shells	91
4.10 Aluminium silicate insulation boards	97
4.11 Rubber-plastic pipe shells	105
4.12 Rubber-plastic boards	111
Chapter 5 Fabrication and Installation of Insulation Boxes	112
5.1 Fabrication and installation of double-wall removable insulation boxes	116
5.2 Fabrication and installation of single-wall removable insulation boxes	118
5.3 Fabrication and installation of single-wall semi-removable insulation boxes	122
Chapter 6 Installation of Protective Layers	126
6.1 Fabrication and installation of protective layers	128
Chapter 7 Installation of Moisture Barrier and Fire-Protection Layers	132
7.1 Installation of moisture barrier and fire-protection layers	134
Chapter 8 Insulation of Main Equipment	140

8.1 Insulation of main equipment	142
Chapter 9 Removable Glass Wool Insulation Blanket Jackets	152
9.1 Removable glass wool insulation blanket jackets	154
Chapter 10 Cathodic Protection	155
10.1 Installation of sacrificial anodes	157
10.2 Impressed current cathodic protection	160
Chapter 11 Non-Destructive Examination	161
11.1 X-ray radiography of welds	163
11.2 Gamma-ray radiography of welds	168
11.3 Ultrasonic examination	172
11.4 Magnetic particle examination	179
11.5 Penetrant examination	182
11.6 Leak testing	185
Chapter 12 Preheating and Post-Heating	186
12.1 Preheating and post-heating of metal vessels	188
12.2 Preheating and post-heating of piping	200
12.3 Heat treatment of pipe welds	256
12.4 Hardness measurement	308

Foreword

This document was issued on 22 March 2018 by the National Energy Administration of the PRC and takes effect on 1 September 2018.

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 F02.

It replaces NB/T 20358.10-2015, which is superseded.

NB/T 20358 Cost estimation of nuclear power plant construction project, together with NB/T 20355 Cost quota for nuclear island civil and installation works of nuclear power plant construction projects, NB/T 20356 Cost quota for conventional island civil and installation works of nuclear power plant construction projects and NB/T 20357 Machinery shift cost quota for nuclear power plant construction projects, forms the series of nuclear power cost quota standards supporting the budgeting and pricing of nuclear power construction projects.

NB/T 20358 Cost estimation of nuclear power plant construction project currently consists

of 16 parts, composed as follows.

Part 1: Nuclear island civil engineering; Part 2: Nuclear island decoration engineering; Part 3: Nuclear island steel structure engineering; Part 4: Nuclear island process equipment installation engineering.

Part 5: Nuclear island process piping installation engineering; Part 6: Nuclear island ventilation and air-conditioning installation engineering; Part 7: Nuclear island electrical equipment installation engineering; Part 8: Nuclear island automation control and instrumentation installation engineering.

Part 9: Nuclear island communication equipment installation engineering; Part 10: Anticorrosion and thermal insulation engineering for nuclear island; Part 11: Conventional island civil engineering; Part 12: Conventional island thermal equipment installation engineering.

Part 13: Conventional island electrical equipment installation engineering; Part 14: Commissioning engineering; Part 15: Fabrication of modules and steel containment vessels; Part 16: Assembly and installation of modules and steel containment vessels.

This part is Part 10 of NB/T 20358.10-2018 Cost estimation of nuclear power plant construction project, namely Anticorrosion and thermal insulation engineering for nuclear island (hereinafter referred to as this part). It was issued by Announcement No. 2 [2018] of the National Energy Administration, with an approval date of 22 March 2018 and an implementation date of 1 September 2018.

This part was proposed by the Nuclear Power Standardization Technical Committee of the Energy Industry and is under the administration of the Nuclear Industry Standardization Research Institute.

Main drafting organizations of this part: China Nuclear Power Engineering Co., Ltd.; China Nuclear Power Engineering Co. (CGN) Ltd.; Electric Power Planning and Engineering Institute; China Nuclear Industry 23rd Construction Co., Ltd.; China Nuclear Industry Huaxing Construction Co., Ltd.; China Nuclear Industry 22nd Construction Co., Ltd.

Main drafters of this part: Nie Yi, Chen Lijuan, Li Wenan, Tang Qinghui, Zheng Baojun, Shang Xin, Bo Meifang, Yu Rong, Kong Liang, He Ming, Liu Ming, Liu Qingbin, Yin Peiping, Zhang Shuijing, Liu Qingbo.

Volume Explanation - Scope

This part specifies the budget quotas for nuclear island anticorrosion and thermal insulation engineering within the cost estimation of nuclear power plant construction projects.

This part applies to the nuclear island engineering of newly built and expanded pressurized water reactor nuclear power units, and to those sub-items of the balance-of-plant (BOP)

works that carry nuclear safety requirements: the nuclear island waste liquid storage tank building, the conventional island waste liquid storage tank building, the auxiliary building for treatment of radioactive solid waste, the temporary solid waste storage facility, the radioactive machinery repair shop and the decontamination workshop. Other reactor types and other nuclear engineering projects may use it for reference.

Volume Explanation - General Provisions

1. This part is applied in conjunction with Cost quota for nuclear island civil and installation works of nuclear power plant construction projects (NB/T 20355) and Machinery shift cost quota for nuclear power plant construction projects (NB/T 20357).
2. This part is the basis for preparing construction drawing budgets, for project fund allocation and completion settlement, for tendering and bidding and for bill-of-quantities pricing; it is also the basis for compiling estimate quotas.
3. This part has been compiled for normal natural conditions and environment, on the basis of construction organization design and construction machinery allocation that are reasonable at the present stage, with reasonable cross-operation taken into account, and in accordance with the relevant technical standards for pressurized water reactor nuclear power plants, the construction and acceptance codes, the quality outline and safe operating procedures, and the requirements for civilized and safe construction and environmental protection on site.
4. The labour, material and construction machinery consumption quantities in this part reflect the technical and organizational level of nuclear power construction at the present stage. Except where adjustment is expressly permitted in the quota, no adjustment shall be made on account of differences in construction organization, operating method or material loss on a particular project.
5. Labour cost is specified as follows. Labour is expressed in comprehensive work-days, without distinction of trade or skill grade, each comprehensive work-day being based on an eight-hour working system. The comprehensive unit price is applied at a production worker wage of 135 yuan per work-day, which includes basic wage, wage-type allowances, auxiliary wage, employee welfare cost and labour protection cost.
6. This part has been compiled for the following normal construction conditions. Equipment, materials, finished products, semi-finished products and components are complete and undamaged, comply with quality standards and design requirements, are accompanied by certificates of conformity and test records, and their supply meets the installation schedule.

Cross-operation between the installation works and the civil works is normal, and the civil works do not affect the normal execution of the installation works.

The installation location, buildings, equipment foundations and reserved openings all