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**Design code for softening and demineralization of industrial
water**

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1 General

1.0.1

This specification is formulated in order to improve the design level of industrial water softening and desalination, to achieve safety, reliability, advanced technology, and economical rationality.

1.0.2

This code is applicable to the design of newly built, expanded and reconstructed industrial water softening and desalination systems. This specification does not apply to the design of water pretreatment and wastewater treatment systems.

1.0.3

The design of industrial water softening and desalination systems should comply with the following principles.

1 System selection and layout should be carried out according to the planned capacity and production characteristics of the main project and determined by technical and economic comparison. When building in phases, the design should reserve expansion conditions.

2.Wastewater treatment facilities should be constructed as a complete set.

3 The expansion or reconstruction design of the industrial water softening and desalination treatment station should make rational use of the original facilities.

4 Actively and prudently adopt new techniques, new technologies, new materials, and new equipment in light of the specific conditions of the project.

1.0.4

The industrial water softening and desalting design shall not only comply with this specification, but also comply with the current relevant national standards.

2.0.1 Nanofiltration

Membrane screening and filtration technology, the filtration accuracy is 0.001μm~0.01μm.

2.0.2 Electrodeionization

Fill the anion and cation mixed ion exchange resin in the fresh water chamber of the electrodialyzer, combine electrodialysis and ion exchange, remove the ion content in the water, and use the polarization phenomenon in the electrodialysis process to electrochemically regenerate the ion exchange resin.

2.0.3 Softened water softened water

Water from which most or all calcium and magnesium ions have been removed.

3.1 General provisions

3.1.1

The general layout of the water treatment station shall meet the following requirements.

- 1 It should be close to the main water users, and the laying of water source and water pipelines should be considered at the same time;
- 2 The transportation should be convenient;
- 3 It should be far away from places with flying dust such as coal yards and ash yards, and should be located on the windward side of the perennial dominant wind direction of structures that emit harmful gases, smoke, and water mist.

3.1.2

The water treatment station should be an independent building, and it can also be built together with other buildings when conditions permit.

3.1.3

The water treatment station should be equipped with instrument control, chemical analysis, equipment maintenance, drug storage and auxiliary rooms. When there are central laboratories and maintenance workshops, the area of auxiliary rooms can be reduced accordingly.

3.1.4

The expansion project should be designed and arranged in combination with the original

systems, equipment layout and actual operation conditions.

3.1.5

Facilities for preventing chemical damage shall be provided in the area where acid-base equipment is arranged.

3.2 Equipment layout

3.2.1

The equipment layout of the water treatment station shall meet the following requirements.

- 1 It should be arranged in an orderly manner according to the process flow;
- 2 should save land;
- 3 The noise interference to the main operating area should be reduced;
- 4 It should be easy to operate and maintain.

3.2.2

The clarifier (device), filter (device) and various water tanks can be arranged outdoors, and a walkway or operating platform should be arranged on the top. Clarification and filtration equipment in cold or windy areas should be arranged indoors.

3.2.3

The ion exchange equipment for softening and desalination should be arranged indoors. When the water treatment equipment is arranged outdoors, its operation and operation parts, instruments, sampling devices, valves, etc. should be arranged in a centralized manner, and measures should be taken to prevent rain, freeze and sun.

3.2.4

When the softening and desalination ion exchange equipment is arranged face to face, the net distance between the operation channels after the valve is fully opened should not be less than 2m, and should meet the maintenance needs of the equipment. The net width of the patrol inspection channel should not be less than 0.8m, and the net distance between equipment should not be less than 0.4m.

3.2.5

For water treatment equipment and valves that are frequently overhauled, it is advisable to set up an overhaul platform, forklift or lifting device according to their structure, quantity, and weight of lifting parts.

3.2.6

Acid-base storage tanks can be arranged outdoors, and alkali storage tanks in cold regions should be arranged indoors. The acid-base storage tank should be close to the wastewater

neutralization tank.

3.2.7

The acid-base storage tank and water treatment chemicals should be stored near the water treatment room and be convenient for transportation.

3.2.8

Drug storage equipment and dosing equipment should be arranged in a separate area or room, and measures such as anti-corrosion and safety protection should be taken, and forced ventilation facilities should be installed indoors.

3.2.9

Air compressors, Roots blowers and water pumps should be arranged in separate rooms, and noise reduction measures should be taken.

3.2.10

The control room and laboratory should have daylighting and lighting, the control room and precision instrument room should be equipped with air-conditioning devices, and other laboratories should be equipped with air-conditioning devices.

3.2.11

Nanofiltration, reverse osmosis, and electric desalination devices should be arranged indoors. When two floors are required due to site constraints, their feed pumps should be arranged on the bottom floor.

3.2.12

There should be room for replacement of filter elements in the arrangement of security filters, and space for replacement of membranes not less than 1.5 times the length of a single membrane element should be left at both ends of nanofiltration and reverse osmosis membrane shells.

3.2.13

The electrostatic desalination device should be arranged reasonably according to its structure, and it should be convenient for maintenance and module replacement. The water supply tank of the electric desalination device should be arranged indoors.

3.3 Piping arrangement

3.3.1

The piping layout shall meet the following requirements.

1. The pipeline should be short, with few accessories, neat and beautiful;
- 2 It should be convenient for installation and maintenance;