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**Technical specification of constructed wetlands for wastewater
treatment engineering
(English Translation)**

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Foreword

To implement the "Environmental Protection Law of the People's Republic of China" and the "Water Pollution Prevention and Control Law of the People's Republic of China" this standard is formulated for the construction, operation, maintenance and management of water treatment projects.

This standard specifies the technical requirements for the design, construction and operation and maintenance of constructed wetland wastewater treatment projects.

This standard is the first release.

This standard was formulated by the Science and Technology Standards Department of the Ministry of Environmental Protection.

This standard was drafted. Shenyang Environmental Science Research Institute.

This standard was approved by the Ministry of Environmental Protection on December 17, 2010.

This standard has been implemented since March 1, 2011.

This standard is explained by the Ministry of Environmental Protection.

Technical specification for constructed wetland sewage treatment engineering

1 Scope of application

This standard specifies the technical requirements for the overall requirements, process design, construction and acceptance, operation and maintenance of constructed wetland wastewater treatment projects.

begging.

This standard is applicable to urban domestic sewage, urban sewage treatment plant effluent and other sewage treatment projects with similar properties to domestic sewage.

As the technical basis for the completion, environmental protection and acceptance of the design, construction and construction of the constructed wetland sewage treatment project and the operation and maintenance after the completion.

2 Normative references

The contents of this standard refer to the terms in the following documents. For undated references, the valid version applies to this standard.

GB 12348 Environmental noise emission standards for industrial enterprises GB/T 12801 General requirements for safety and hygiene of production processes GB 14554 Odor Pollutant Discharge Standard GB 18918 Pollutant discharge standard for urban sewage treatment plants GB 50003 masonry structure design specification GB 50011 seismic design code for buildings GB 50013 Outdoor Water Supply Design Code GB 50014 Outdoor Drainage Design Code GB 50015 Building Water Supply and Drainage Design Code GB 50016 Building Design Fire Code GB 50019 Heating, Ventilation and Air Conditioning Design Code GB 50034 Industrial Enterprise Lighting Design Specification GB 50040 power machine basic design specification GB 50052 design specification for power distribution system GB 50053 10 kV and below substation design specifications GB 50054 Low Voltage Distribution Design Specification GB 50069 Water supply and drainage engineering structure design specification GB 50070 concrete structure design specification GB 50140 Building Fire Extinguisher Configuration Design Specification GB 50204 Concrete Structure Engineering Construction Quality Acceptance Specification General specification for construction and acceptance of GB 50231 mechanical equipment installation engineering GB 50268 Water supply and drainage pipeline engineering construction and acceptance specifications GB 50335 Wastewater Recycling Engineering Design Specification GB J 87 Industrial Enterprise Boundary Noise Control Design Specification GB J 141 Code for construction and acceptance of water supply and drainage structures GB/T 13663 polyethylene (PE) pipe for water supply HJ/T 15 Environmental Protection Product Technical Requirements Ultrasonic Open Channel Sewage Flowmeter HJ/T 96 pH water quality automatic analyzer technical requirements HJ/T 101 Ammonia

Nitrogen Water Quality Analyzer Technical Requirements HJ/T 103 Total Phosphorus Water Quality Automatic Analyzer Technical Requirements HJ/T 353 water pollution source online monitoring system installation technical specification HJ/T 354 water pollution source online monitoring system acceptance technical specification Technical specification for operation and assessment of HJ/T 355 water pollution source online monitoring system HJ/T 377 Environmental Protection Products Technical Requirements Chemical Oxygen Demand (CODCr) Water Quality Online Automatic Monitor CJJ 17 Technical Specifications for Urban Domestic Waste Sanitary Landfill CJJ 60 Urban Wastewater Treatment Plant Operation, Maintenance and Safety Technical Regulations Measures for the Administration of Environmental Protection Acceptance for Completion of Construction Projects (Order No. 13 of the State Environmental Protection Administration)

3 Terms and definitions

The following terms and definitions apply to this standard.

Constructed wetland Constructed wetland Refers to the artificial construction of pools or trenches, the laying of anti-seepage and water-repellent layers on the bottom, filling the substrate layer of a certain depth, planting aquatic plants, and utilizing the triple synergy of the physical, chemical, and biological interactions of the substrate, plant, and microorganisms allows the sewage to be purified. According to the way of sewage flow, it is divided into surfaces Flowing constructed wetlands, horizontal subsurface flow constructed wetlands and vertical submerged artificial wetlands.

Surface flow constructed wetland surface flow constructed wetland Refers to the artificial wetland where the sewage flows above the surface of the substrate layer and flows horizontally from the inlet end of the tank body to the outlet end.

Horizontal subsurface flow constructed wetland Refers to the artificial wetland where the sewage flows below the surface of the substrate layer and flows horizontally from the inlet end of the tank body to the outlet end.

Vertical subsurface flow constructed wetland Refers to the constructed wetland where the sewage passes vertically through the matrix layer in the cell body.

Pretreatment

Refers to the treatment set in front of the constructed wetland in order to meet the overall requirements of the project, the requirements for the influent water quality of the constructed wetlands and the reduction of the wetland pollution load.

Art, such as grille, grit, primary sedimentation, homogenization, hydrolysis and acidification, stable pond, anaerobic, aerobic and so on.

Post-treatment

Refers to the treatment process set after the constructed wetland, such as activated carbon adsorption, coagulation and sedimentation, in order to meet the requirements for discharge or reuse of the discharged water.

Filtration, disinfection, stabilization of the pond, etc.

Matrix bed filler

Refers to the filling materials that provide the wetland plants and microbial growth and filter and absorb the pollutants, including soil, sand, gravel, Zeolite, limestone, shale, plastic, ceramics, etc.

Hydraulic retention time Refers to the average residence time of sewage in constructed wetlands. The hydraulic retention time of the subsurface flow constructed wetland is calculated according to formula (1).

$$t = \frac{V}{Q} \quad (1)$$

Where. t --hydraulic residence time, d;

V --the volume of the constructed wetland substrate in its natural state, including the matrix entity and its opening, closed pores, m³;

E --porosity, %;

Q --Design wetland design water volume, m³/d.

Surface organic load Refers to the five-day biochemical oxygen demand removed per unit square of constructed wetland per unit time. Calculated according to formula (2).

$$L_s = \frac{Q(C_0 - C_e)}{A} \quad (2)$$

L_s -- surface organic loading, kg/(m² · d);

Q --Design wetland design water quantity, m³/d;

C_0 - artificial wetland influent BOD₅ mass concentration, mg/L;

C_e - artificial wetland effluent BOD₅ mass concentration, mg/L;

A --Artificial wetland area, m².

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Surface hydraulic load Refers to the amount of sewage that can be received per unit square of constructed wetland per unit time. Calculated according to formula (3).

Where. Q_s -- surface hydraulic load, m³/(m² · d); Q --Design wetland design water quantity, m³/d;

A --Artificial wetland area, m².