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给排水系统 一站式解决方案

一体化预制泵站设计 使用手册

*DESIGN OF INTEGRATED PRE PUMP STATION
OPERATION MANUAL*

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目录 Contents

一、泵站简介 Brief introduction of pump station

- 1、泵站简述 01
Brief introduction of pump station
- 2、典型一体化预制泵站型式 04
Typical integrated prefabricated pump station type
- 3、泵站配置清单 07
Configuration list of pump stations

二、如何设计泵站 How to design pump station

- 1、设计顺序 09
Design order
- 2、泵站选型所需基础数据 10
Basic data needed for pump station selection
- 3、排放介质是什么? 10
What is the emission medium?
- 4、放置地点状况分析 11
Location analysis
- 5、泵站设计流量 15
Design flow of pump station
- 6、泵站设计扬程 18
Design head of pump station
- 7、如何选泵 21
How to select pump
- 8、单井筒泵站尺寸选型 22
Size selection of single well pump station
- 9、集水池有效容积计算 23
Calculation of effective volume of sump
- 10、 H_{min} ——最小有效容积的高差 28
 H_{min} -- Height difference of minimum effective volume
- 11、 H_s ——水泵淹没高度 29
 H_s -- submerged height of pump
- 12、 H_t ——泵站筒体高度计算 30
 H_t -- Calculation of pump station cylinder height
- 13、泵站设计注意事项及设计准则 31
Design considerations and design guidelines for pump stations

三、设备及配件说明 Description of equipment and fittings

- 1、GRP玻璃钢筒体 34
GRP FRP cylinder
- 2、JYWQ、WQ系列无堵塞潜水排污泵 35
JYWQ、WQ series non-clog submerged motor pumps
- 3、预制泵站控制系统 38
Precast pump station control system
- 4、远程SCADA监控系统 39
Remote SCADA monitoring system
- 5、格栅系统 43
Grille system
- 6、设备起吊装置 47
Equipment lifting device
- 7、电磁流量计 48
Electromagnetic flowmeter
- 8、等离子除臭仪 49
Plasma deodorization instrument

四、预制泵站安装及施工工法 Prefabricated pump station installation and construction method





1、泵站简述

Brief introduction of pump station

2、典型一体化预制泵站型式

Typical integrated prefabricated pump station type

3、泵站配置清单

Configuration list of pump stations

01

泵站简介

BRIEF INTRODUCTION OF
PUMP STATION

1

泵站简述 Brief Introduction Of Pump Station

正泉一体化预制泵站是一种新型的地理式污水、雨水、给水收集及提升系统，它安装方便，质量可靠，工程施工量少，占地面积少，自动化程度高，是传统混凝土泵站的最佳替代品，集成度高、容积优化是最显著特点。一体化预制泵站主体由 GRP 玻璃钢井筒、潜水 / 给水泵、提升链、管道、阀门、液位传感器、控制系统、格栅系统和通风系统等部件组成。根据不同工况选择合适的配置，以适应最佳使用条件。

预制泵站所有部件均在工厂完成，每一个部件都是为了长远可靠使用考虑，满足几十年的使用要求，并且彼此完美匹配；每一套都是根据客户定制，如果可以的话我们可以为您现场制作。

ZQ integrated prefabricated pump station is a new type of buried sewage, rainwater collection, water supply and upgrade system, convenient installation, reliable quality, less construction, small occupation area, high degree of automation, is the best substitute of traditional concrete pump, high integration, volume optimization is the most significant features. The main body of integrated prefabricated pump station is composed of GRP glass steel shaft, diving / feed pump, lifting chain, pipeline, valve, liquid level sensor, control system, grid system and ventilation system. According to the different conditions, choose the appropriate configuration to adapt to the best use conditions.

All parts of the prefabricated pump station are completed in the factory, each component is for long-term reliable use, to meet decades of use requirements, and perfect match each other; each set is customized according to the customer, if possible, we can make on-site for you.



● 应用领域 Application Area

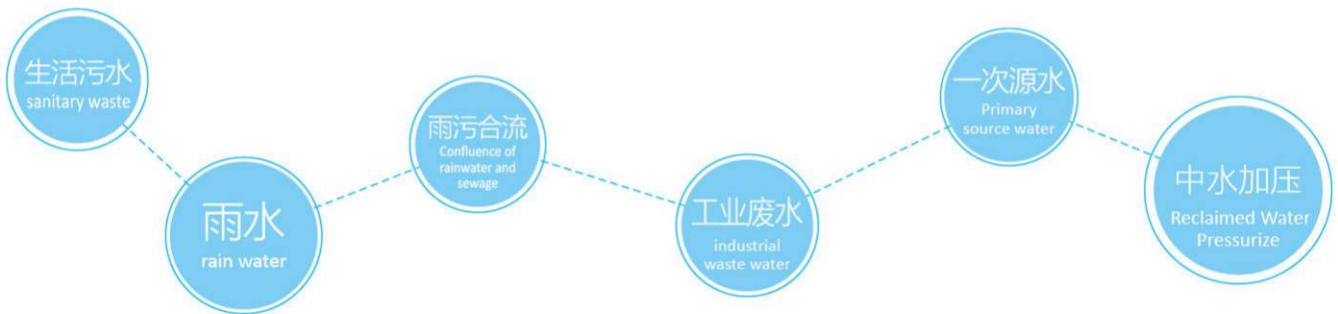
市政排水、工业、大型建筑、公路铁路下穿桥、应急排涝、中途供水泵站等等。

Municipal drainage, industry, large building, highway, railway under the bridge, emergency drainage, midway water supply pump station and so on.

● 应用说明 Application Description

主要用于重力流管道系统成本过高时(比如深度太大);长距离管路输送需要更加经济的方案时;向高程较高处提升输送水时……
It is mainly used when the gravity flow pipeline system is too expensive (for example, the depth is too large); the long distance pipeline transportation needs more economical scheme; when the elevation is higher, the water is transported.....

● 输送介质 Delivery Medium



● 设备参数 Equipment Parameters

筒体直径: 1000-4200mm
Barrel diameter:

筒体高度: 2000-18000mm
Cylinder height:

水泵功率: 0.75kw-160kw
Pump power:

抽排水量: 20-4000m³/h (单井筒)
Pumping and drainage: (Single shaft)

注: 性能参数根据实际工况确定, 并可根据用户的需求设计并制造各种个性化的预制泵站, 泵站整体一体化供应。

Note: the performance parameters are determined according to the actual working conditions, and all kinds of personalized precast pumping stations can be designed and manufactured according to the needs of users, and the integrated supply of pumping stations will be achieved.



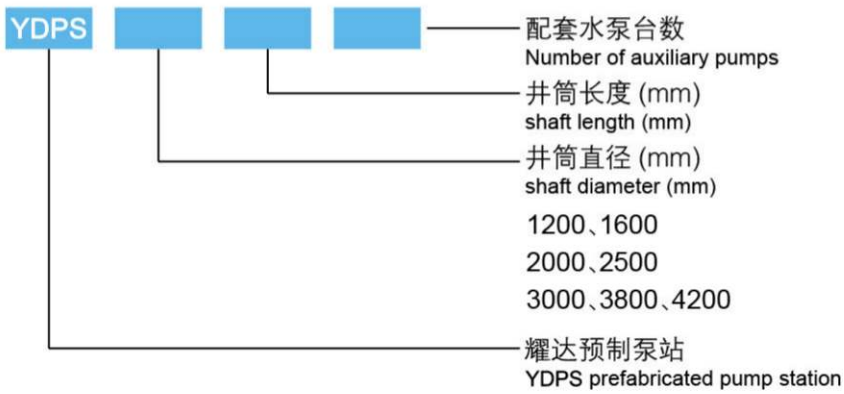
● 性能特征 Performance Characteristics

工作温度: $-20^{\circ}\text{C}\sim 60^{\circ}\text{C}$
Working temperature:

介质 PH 值: 4~10
Medium PH value:

相对湿度: 25%~85%
relative humidity:

● 型号说明 Model Description





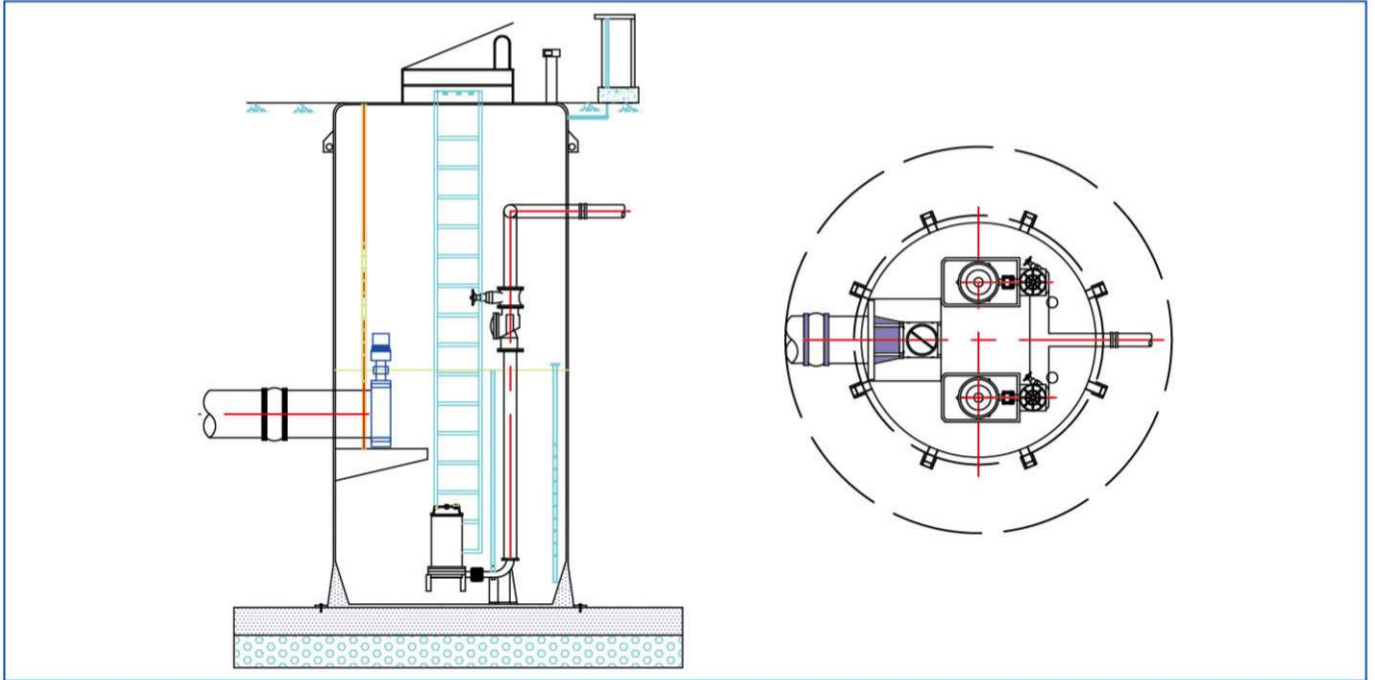
2

典型一体化预制泵站型式 Typical Integrated Prefabricated Pump Station Type

● 标准一体化预制泵站 Performance Characteristics

一体化预制泵站,使用普遍,简单易联。

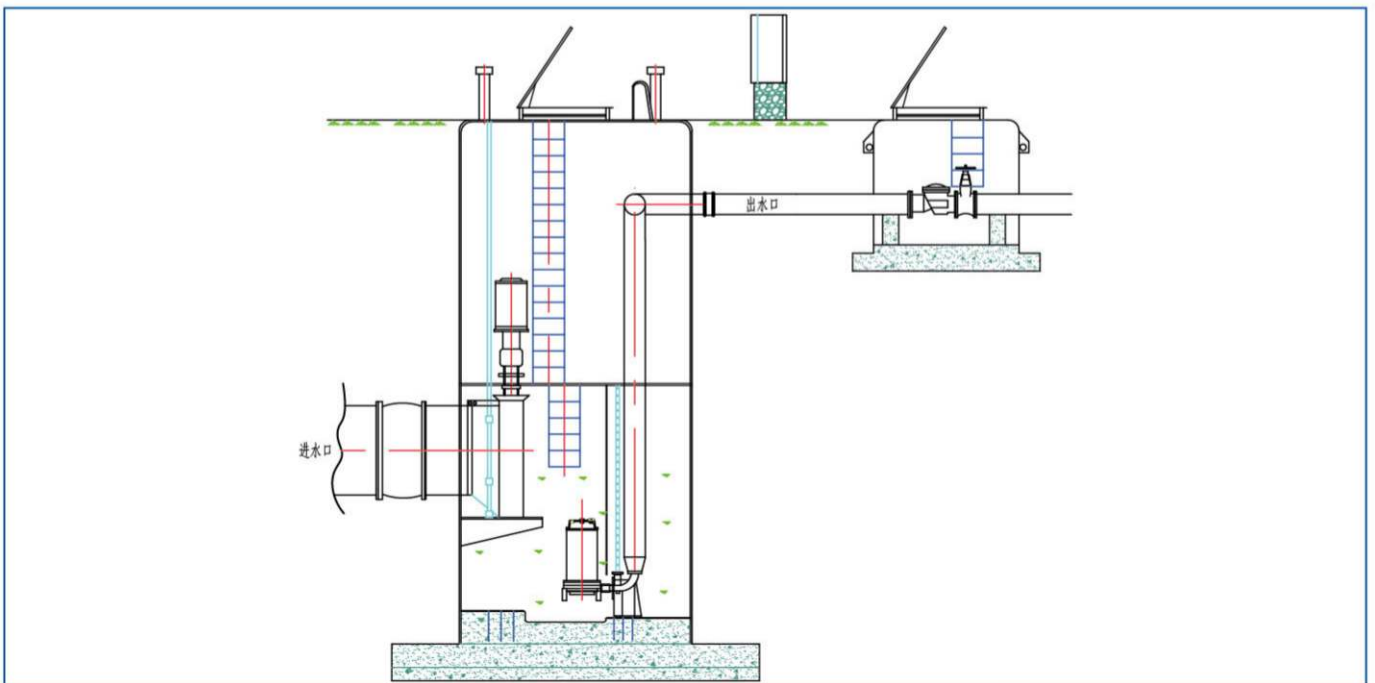
Integrated prefabricated pump station, the use of universal, simple and easy to connect.



● 外置阀门井一体化泵站 Integrated Pump Station With External Valve Shaft

用于污水提升,减少人员下井安全风险

For sewage lifting, reducing the safety risk of personnel down

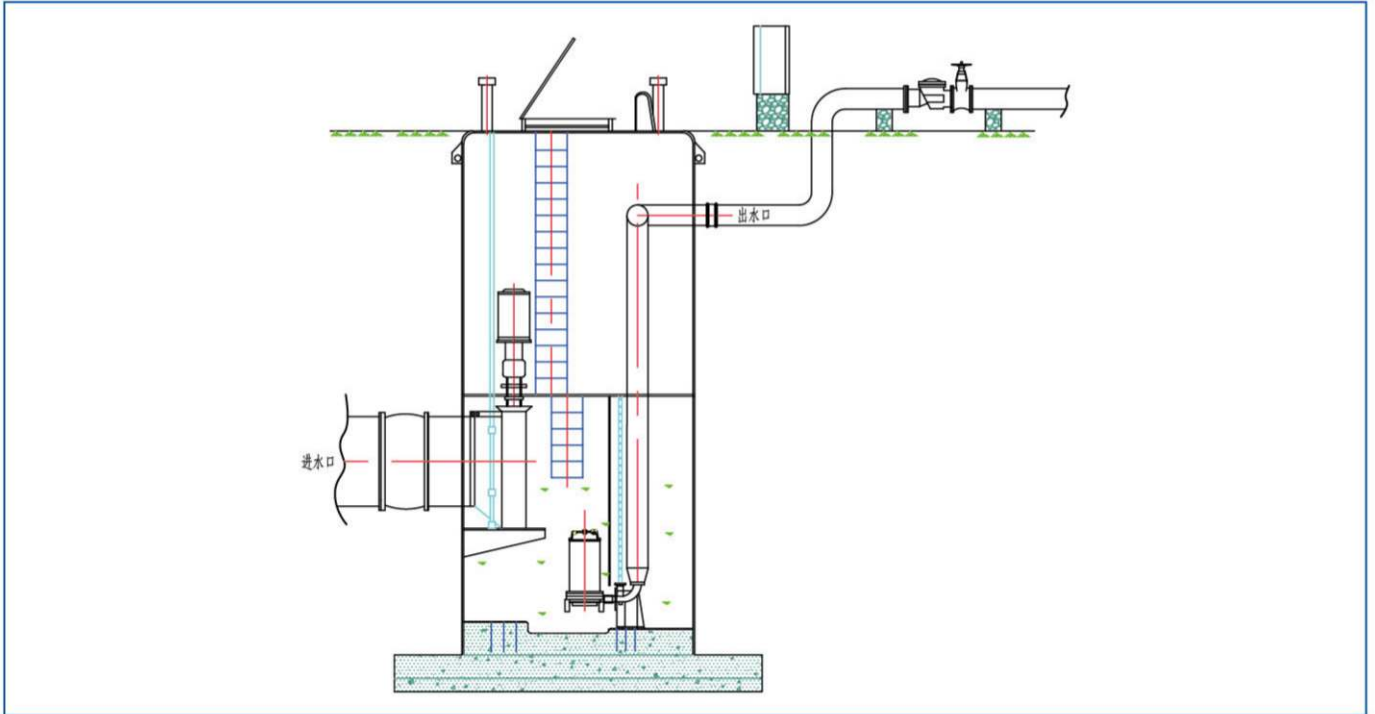




● 阀门外置一体化泵站 Integrated Pump Station With External Valve

用于条件合适的封闭环境,易于人员操作

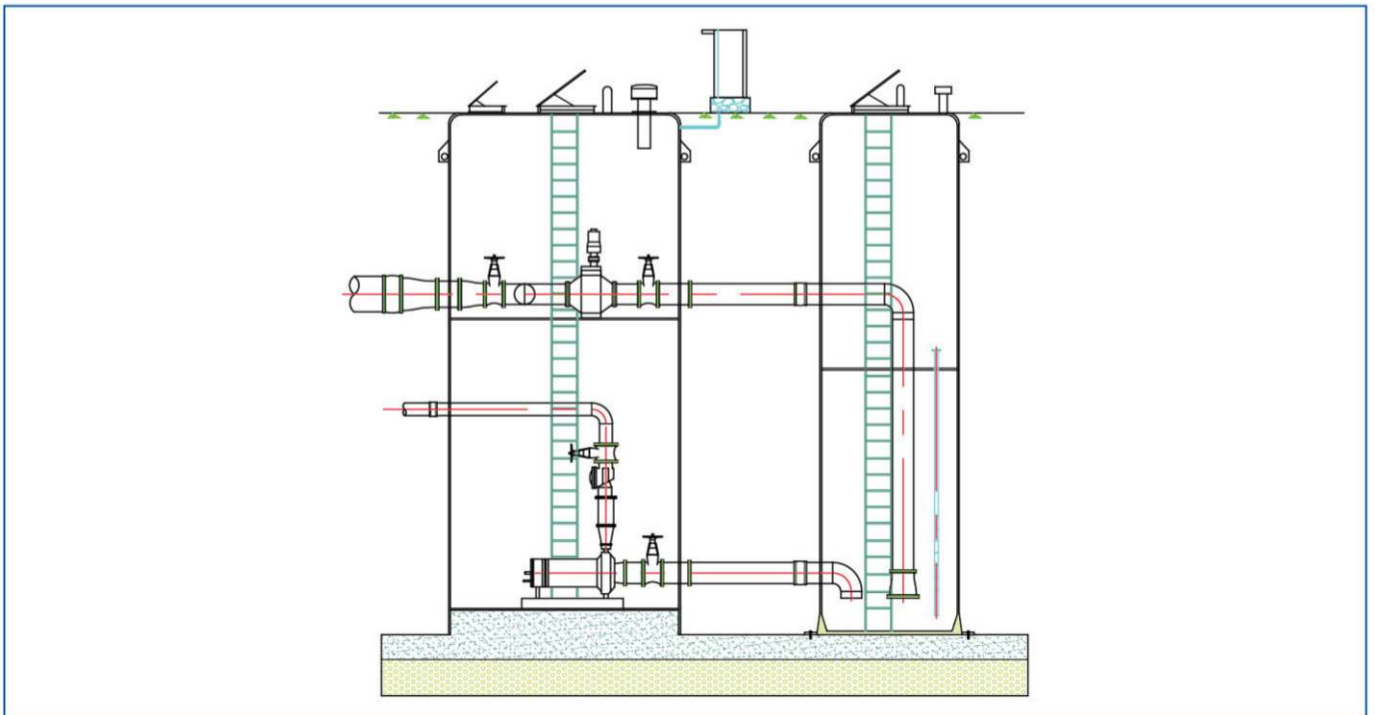
It is suitable for the closed environment with suitable conditions and easy for staff to operate



● 粉碎格栅外置污水泵站 Crushing Grille External Sewage Pump Station

最有效的污水粉碎提升方案,多用于条件恶劣的污水环境

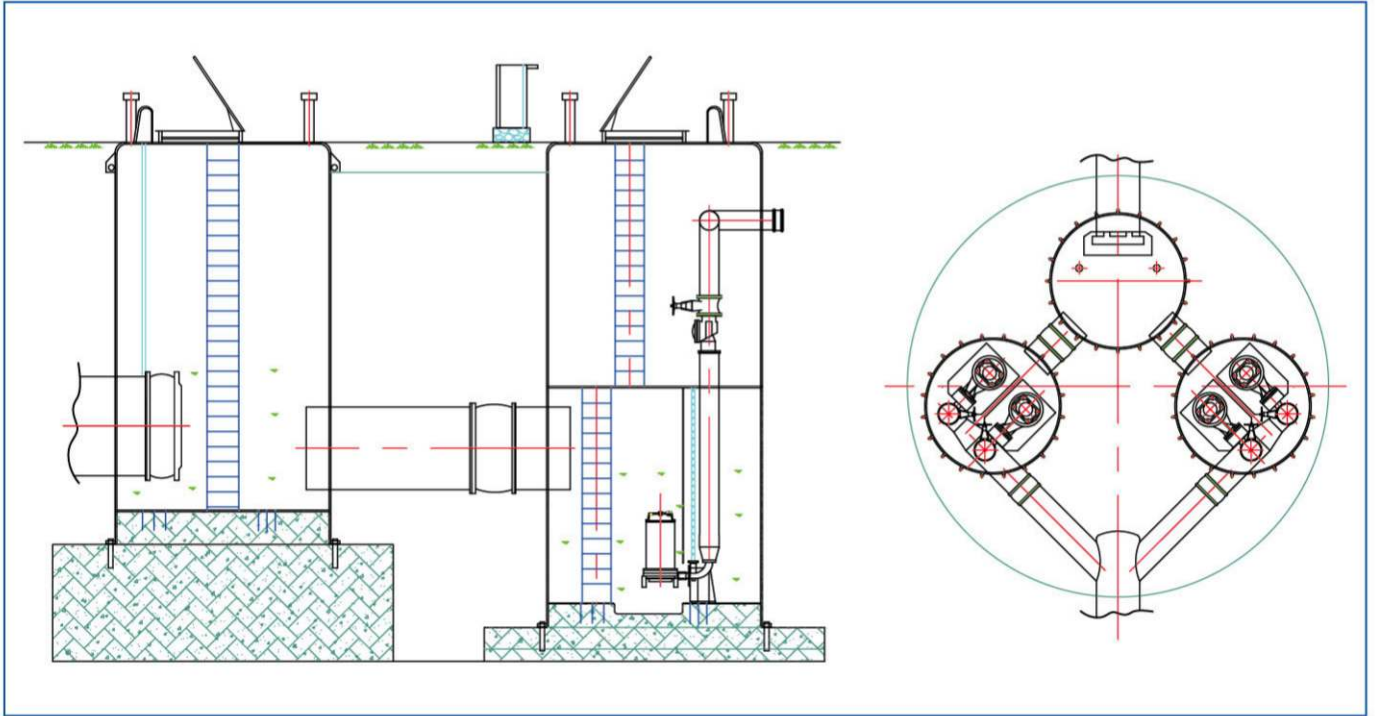
The most effective sewage grinding lifting scheme, mostly used in harsh sewage environment





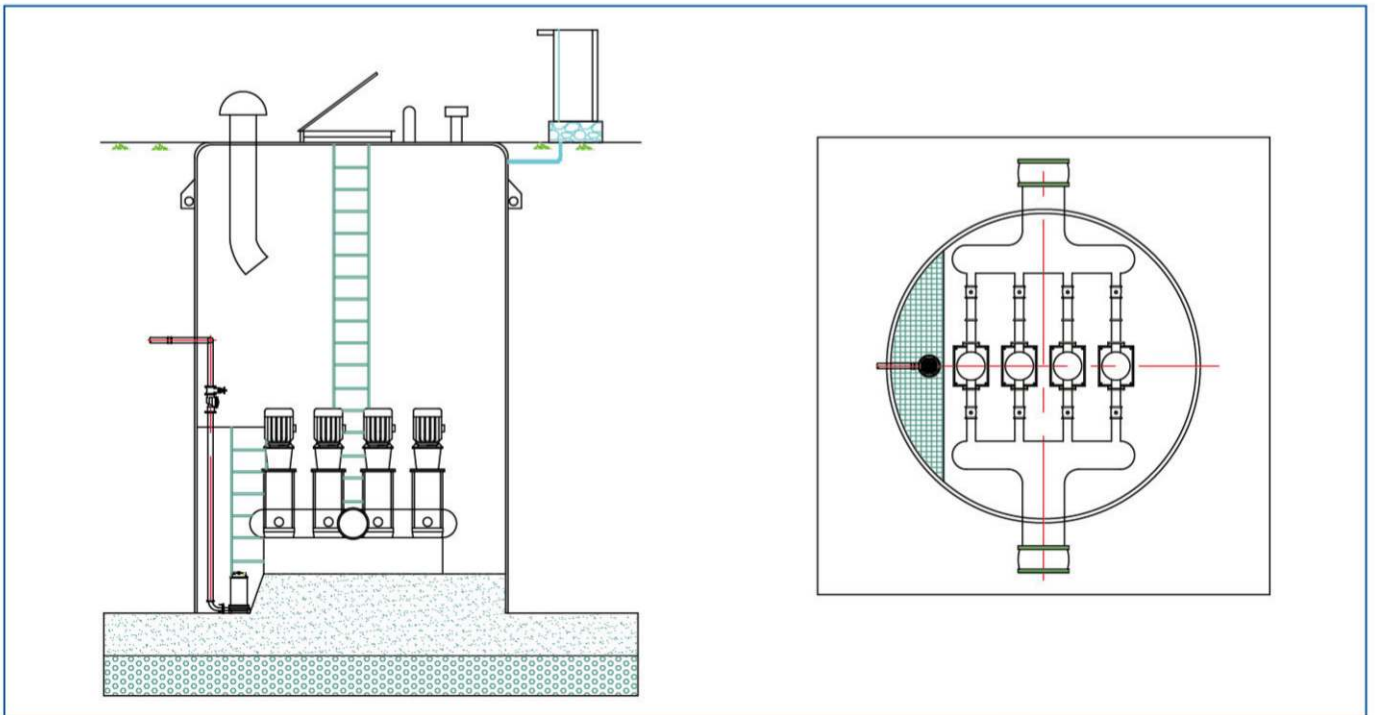
● **多井筒大流量雨水泵站 Multi Well And Large Flow Rainwater Pump Station**

多用于大流量雨水泵站
It is mainly used in large flow rainwater pump station



● **加压供水一体化泵站 Pressurized Water Supply Integrated Pump Station**

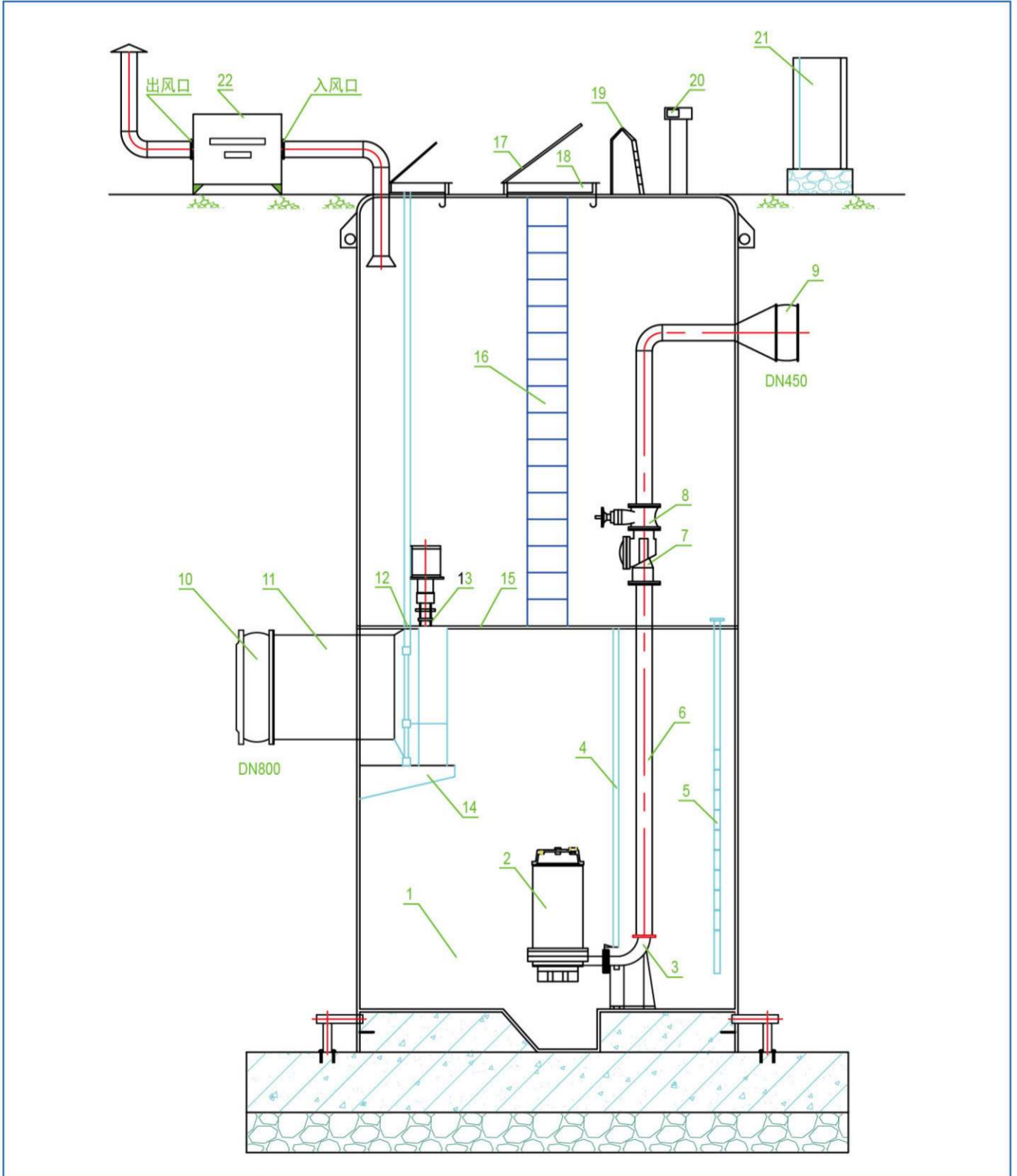
专用于中途给水加压,恒压变频控制;埋于地下,施工简单方便,无需盖房。
Dedicated to the middle water pressure, constant pressure control; buried underground, simple and convenient construction, no need to build houses.





3

泵站配置清单 Configuration List Of Pump Stations





序号 No.	名称 Name	标准说明 Standard description	备注 Remarks
1	泵站筒体 Pump barrel	GRP 加强型缠绕玻璃钢 GRP reinforced winding FRP	泵站筒体 FEA 强度有限元分析 Finite element analysis of FEA strength of pump station cylinder
2	潜水排污泵 Submersible sewage pump	要求详见技术说明 Technical specifications are required	可选进口品牌或国产品牌 Optional import brands or domestic brands Stephen
3	水泵自耦装置 Water pump auto coupling device	铸铁材质 Cast iron material	
4	水泵导轨 Water pump guide rail	不锈钢 SUS304 Stainless steel SUS304	
5	静压液位仪 Hydrostatic level gauge	不锈钢 SUS304 Stainless steel SUS304	
6	压力排水管路 Pressure drainage pipeline	不锈钢 SUS304 Stainless steel SUS304	公称压力: 10MPa Nominal pressure: 10MPa
7	旋启式止回阀 Swing check valve	GGG50, 环氧树脂涂层, 不锈钢 SUS304 GGG50, epoxy resin coating, stainless steel SUS304	
8	闸阀 Gate valve	GGG50, 环氧树脂涂层, 不锈钢 SUS304 GGG50, epoxy resin coating, stainless steel SUS304	
9	出水口软连接 Soft connection of water outlet	热镀锌法兰 / 橡胶 / 不锈钢 SUS304 Hot dip galvanized flange / rubber / stainless steel SUS304	公称压力: 10MPa Nominal pressure: 10MPa
10	进水口软连接 Inlet soft connection	热镀锌法兰 / 橡胶 / 不锈钢 SUS304 Hot dip galvanized flange / rubber / stainless steel SUS304	公称压力: 10MPa Nominal pressure: 10MPa
11	进水管段 Inlet pipe section	不锈钢 SUS304 或 GRP Stainless steel SUS304 or GRP	
12	粉碎格栅机导轨 Grinding grating machine guide	不锈钢 SUS304 Stainless steel SUS304	
13	粉碎格栅机 Grinding grille machine		(PLC 联动控制) (PLC linkage control)
14	粉碎格栅机附件 Accessories for grinding grating machine	不锈钢 SUS304 Stainless steel SUS304	
15	服务平台 Service platform	定制 GRP 格栅 + 不锈钢 SUS304 Custom GRP grille + stainless steel SUS304	
16	人行爬梯 Pedestrian ladder	不锈钢 SUS304 Stainless steel SUS304	
17	顶盖 (入口) Tectum (entrance)	轧花铝板 (定制) Embossed aluminum (custom)	
18	安全格栅网 Safety grille	定制 GRP 格栅 + 不锈钢 SUS304 Custom GRP grille + stainless steel SUS304	
19	扶手 Handrail	不锈钢 SUS304 Stainless steel SUS304	
20	通气帽 Breather cap	不锈钢 SUS304 Stainless steel SUS304	
21	泵站专用控制柜 Special control cabinet for pump station	户外型、不锈钢双开门柜体、人机交互、 Outdoor type, stainless steel double door cabinet, human-computer interaction, PLC 控制、智能远程监控系统 PLC control, intelligent remote monitoring system	
22	有害气体净化装置 Purification device for harmful gas	离子除臭工艺 Ion deodorization process	(PLC 联动控制) (PLC linkage control)

注: 以上配置清单可以根据用户要求选配。

Note: the above configuration list can be selected according to user requirements.



02 如何设计泵站 HOW TO DESIGN PUMP STATION

- 1、设计顺序 09
Design order
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Basic data needed for pump station selection
- 3、排放介质是什么? 10
What is the emission medium?
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Location analysis
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Design flow of pump station
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- 11、Hs——水泵淹没高度 29
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- 12、Ht——泵站筒体高度计算 30
Ht -- Calculation of pump station cylinder height
- 13、泵站设计注意事项及设计准则 31
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1 设计顺序 Design order

设计流程图 design flowchart





2

泵站选型所需基础数据 Basic data needed for pump station selection

类项 Item	标准说明 Standard description
适用场合 Applicable occasions	市政、建筑、工业、加压供水、其他 Municipal, building, industrial, pressurized water supply, others
排放介质 Emission medium	污水、雨水、合流、工业废水、供水、其他 Sewage, rainwater, confluence, industrial waste water, water supply, and others
设计流量 Design flow	污水 (m ³ /h)、雨水 (L/s)、供水 (m ³ /h) Sewage (m ³ /h), rainwater (L/s), water supply (m ³ /h)
地面标高: _____m Ground elevation	
进水管径: _____ DN; 进水管底标高: _____m Inlet pipe diameter Inlet pipe elevation	
出水管径: _____ DN; 出水管中标高: _____m Outlet pipe diameter Elevation of outlet pipe	
压水管路沿程: _____m Water pressure pipeline along the way	
压水管路最高点标高: _____m Maximum elevation of pressure water pipeline	
泵站位置 Pump Station location	旱地、洼地、盐碱地、河道旁、其他 Dry land, low-lying land, saline land, river side, others
其他特殊要求 Other special requirements	

3

排放介质是什么? What Is The Discharge Medium?

就是排的是什么水,雨水? 污水? 雨污水? 或者给水?
That's what water is, what's the rain? Sewage? Rain sewage? Or water?

污水分为: 市政污水和生活污水

Sewage is divided into municipal sewage and domestic sewage

市政污水通常前段加设有化粪池或者污水处理设施进行预处理, 所以预制泵站的进水口位置可以不加设粉碎格栅, 设置一个简单的提篮式格栅就可以满足。

Usually with some municipal sewage septic tank sewage treatment facilities or pretreatment, so the water inlet position of prefabricated pump station can not add a crushing grille, set up a simple basket type grille can meet.

生活污水一般情况下没有经过化粪池或者污水处理设施的预处理, 设计的时候通常会考虑在进水口加设粉碎格栅机, 对泵站内部的污物进行粉碎后再提升排放。

In general, there is no pretreatment of septic tanks or sewage treatment facilities in domestic sewage, and the design usually considers adding a grinding grille machine to the water inlet, and then the sewage inside the pump station is crushed and then discharged.

雨水可以在进水端加装粗格栅或者中格栅, 粗格栅规格 (50-100mm), 中格栅 (10-40mm); 应考虑流入口径应小于水泵进水口的 80%, 防止堵塞。

The rain can be installed on the inlet end or the coarse grid in grid, the coarse grid specifications (50-100mm), in the grid (10-40mm); should be considered into the water inlet of the water pump caliber should be less than 80%, to prevent clogging.

给水泵站进水端应考虑加装过滤器。

The filter should be considered in the inlet of the water pump station.

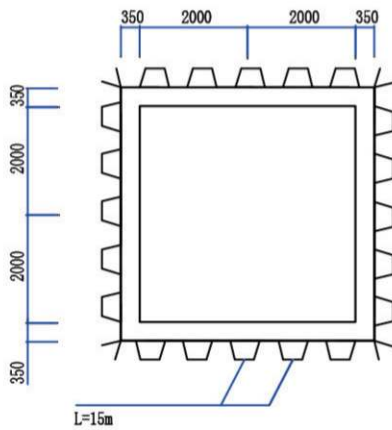


4 放置地点状况分析 Analysis Of Location Status

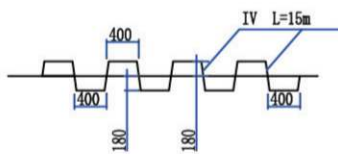
主要看地下水文情况,土壤是否干燥,泵站上面是否需要承重;针对有过量地下水的情况,筒体设计选型时高度不宜过高,如:放置于河道水系旁。宜采用钢板桩支护或者沉井(倒挂井)的安装方式。

Mainly depends on the underground hydrology, whether the soil is dry, whether the pump station needs bearing; for the situation of excessive groundwater, the height of the design and selection of the cylinder should not be too high, such as: placed beside the river system. The installation method of steel plate makeup support or sunk well (upside down well) should be adopted.

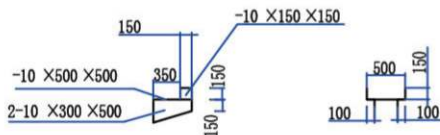
钢板桩支护 Steel Sheet Pile Support



工作井平面布置图

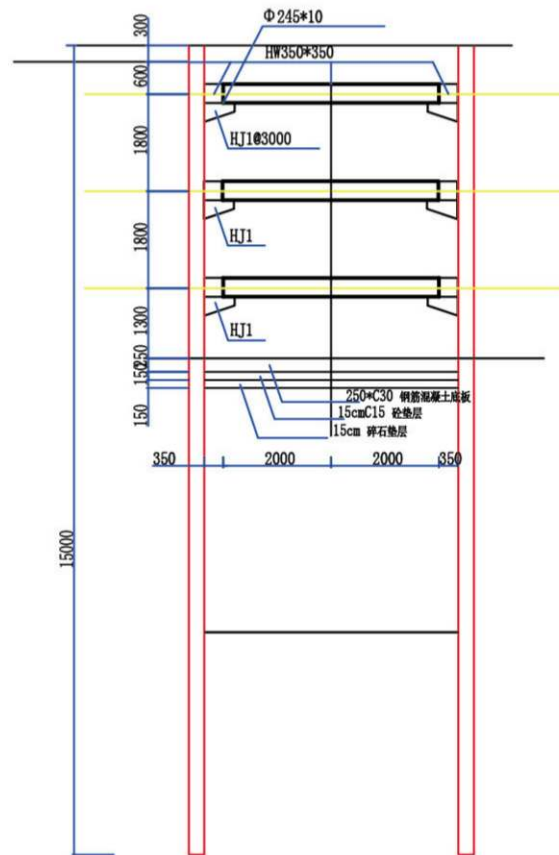


钢板桩搭接大样



HJ1

2-2



1-1

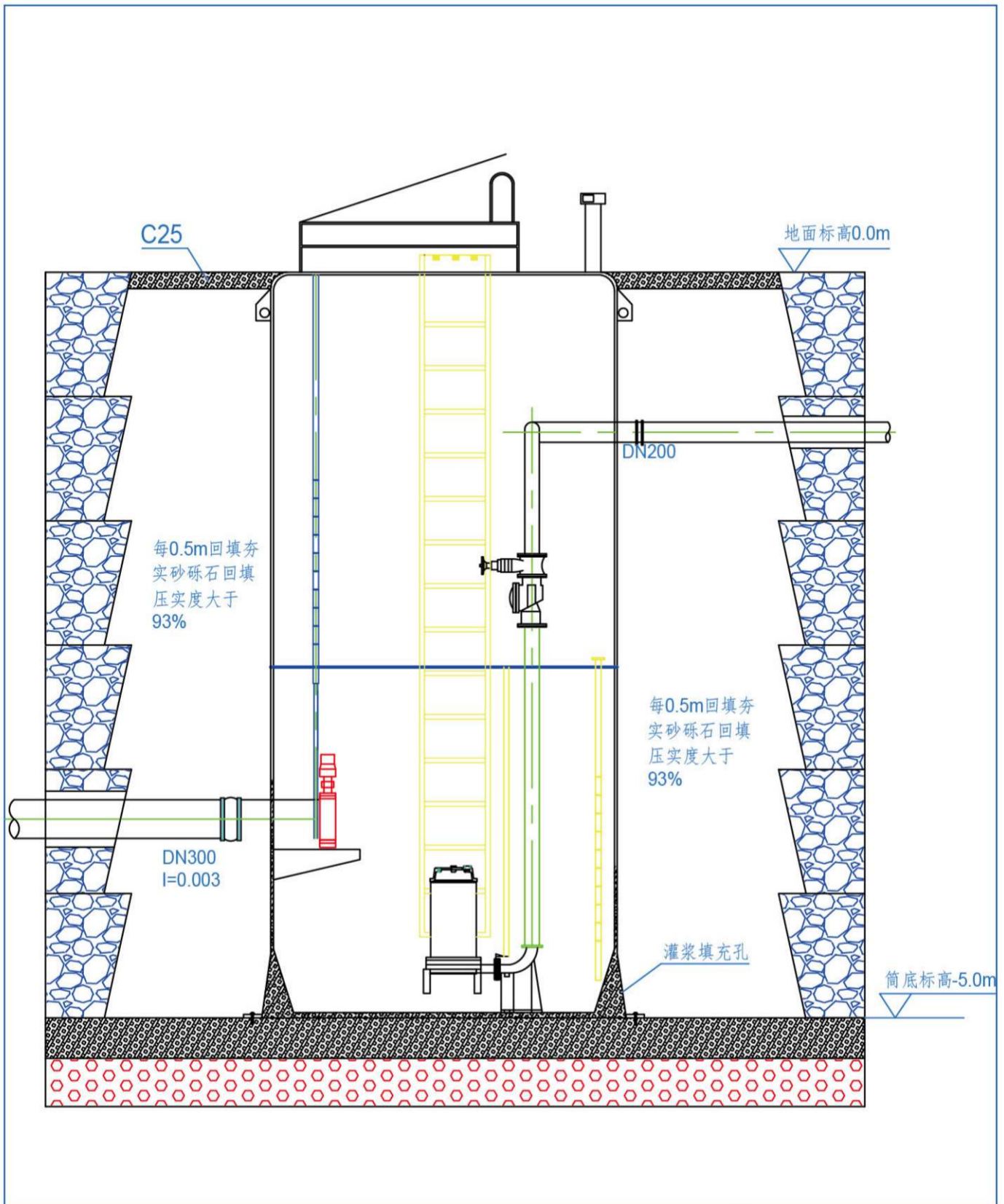
自然村泵站基础开挖

说明:

1. 本图中尺寸除注明及标高以m计外,其余均以mm计。
2. 本图适用于自然村泵站工作坑设计。
3. 钢管撑与腰梁接触处、腰梁之间连接采用满焊连接; HJ1与钢板桩连接处采用角焊缝连接(h=8mm)。
4. 回填上部80cm采用素土回填,下部与塑料检查井四周回填相同。对于拔出钢板桩留下的空隙采用回灌细砂或者注浆回填密实。



● 沉井 (倒挂井) Opening Well (Upside Down Well)





● 工程实例

Engineering Example





● 马路下结构泵站 Underground Structure Pump Station

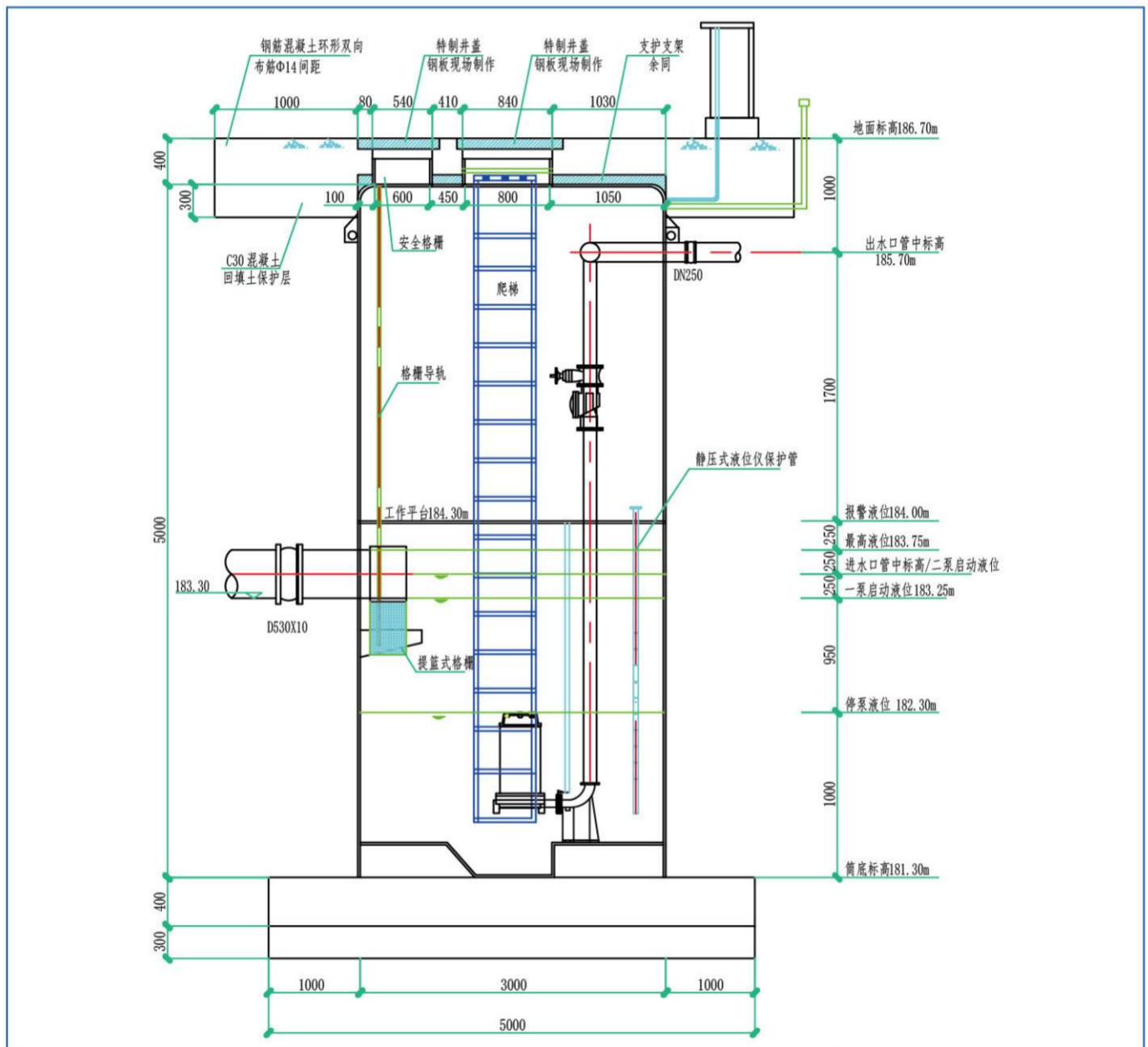
放置于马路下的预制泵站,路面可通车;针对这种特殊的情况,需要进行结构包层设计。上盖活荷载:汽—10级(汽车总重10T,后轮压3.5T)。

The prefabricated pump station placed under the road can be opened to traffic; in view of this special situation, it is necessary to design the structural cladding. Live load on top: steam 10 (gross weight 10T, rear wheel press 3.5T).

● 设计参考图纸 Design Reference Drawings

对于埋在道路上的泵站,顶盖采用铸铁材质,顶盖和泵站主体应采用分体设计,两者之间的距离建议不小于0.5m。

For the pump station buried on the road, the top cover is made of cast iron, the top cover and the main body of the pump station should be designed separately, and the distance between them should be no less than 0.5m.





5

泵站设计流量 Design flow of pump station

根据流量大小来选择预制泵站的筒体规格,需要用直径多少的筒体可以满足。

城市污水的流量是不均匀的,污水量在全天的变化规律也是难以确定的。因此,污水泵站的设计流量一般按照最高日最大时污水量计算的。

雨水泵站的设计流量,应按泵站进水管的设计流量计算确定。当立交道路设有盲沟时,其渗流量应单独计算。

According to the size of the flow, the size of the prefabricated pump station can be selected, and the diameter of the cylinder can be satisfied.

The flow rate of urban sewage is uneven, and the variation law of sewage quantity in the whole day is also difficult to determine. Therefore, the design flow of sewage pump station is generally calculated according to the maximum daily maximum amount of sewage.

The design flow of the rainwater pump station should be determined according to the design flow of the inlet main pipe of the pump station.

When there is blind ditch in interchange, the amount of seepage water should be calculated separately.

● 污水设计流量 Sewage Design Flow

- 生活污水量+工业废水量+ (地下水渗入量)
The amount of domestic sewage + industrial waste water + (groundwater infiltration)
- 最大日最大时(高日高时)污水流量
Maximum daily maximum (high daily high clock) sewage flow
- 流量单位——L/S (升/秒)
Flow unit ——L/S (liter / sec)
- 污水量变化系数: $K_z = K_d \times K_{时} = \frac{\text{高日}}{\text{均日}} \times \frac{\text{高日高时}}{\text{高日均时}} = \frac{\text{高日高时}}{\text{均日均时}}$
Variation coefficient of sewage quantity

● 污水设计流量的基本计算公式 The Basic Calculation Formula Of Sewage Design Flow

$$\text{设计流量} = \frac{\text{排水个数} \times \text{排水额定} \times \text{变化系数}}{\text{排水时间} \times \text{单位换算}}$$

Design flow = $\frac{\text{Drain number} \times \text{drainage rated} \times \text{variation coefficient}}{\text{Drainage time} \times \text{unit conversion}}$

● 生活污水设计流量的计算公式 The Basic Calculation Formula Of Sewage Design Flow

$$Q_1 = \frac{K_z N q_1}{24 \times 3600}$$

式中: Q_1 ——居住区生活污水设计量(L/s);
 q_1 ——居民生活污水额定(L/人.d); 80-90%用水定额
 N ——设计人口(人); 设计人口=人口密度×服务面积
 K_z ——生活污水量总变化系数

Type: Q_1 -- Design amount of domestic sewage in residential area (L/s);
 q_1 -- domestic sewage rating (L/ person.D) and 80-90% water quota
 N - Design population (person); design population = population density x service area
 K_z -- total change coefficient of domestic sewage

居民生活污水定额是指居住区内排水系统设计中采用的每人每日所排出的平均水量,它与给水量标准、室内卫生设备情况、气候、居住条件、生活水平等有关,一般采用《生活水量标准》。

Living sewage drainage quota is a residential area in the system design of the per capita average daily discharge of water, it is related with the water standard, indoor sanitation, climate, living conditions and living standards, generally use the <<living water standard>>.



设计人口指污水排除系统涉及期限终期人口，是设计依据的人口值。该值取决于城乡和工业企业发展规模，通常根据城乡人口密度（即单位面积上的居民数）来推求。

Design population refers to the final population of the sewage disposal system, which is the design based population value. The value depends on the scale of urban and rural development and industrial enterprises, and is usually calculated according to the population density of urban and rural areas (i.e. the number of residents per unit area).

由于污水量标准是一个平均值，而实际上污水排放系数中的污水量是经常变化的，既有逐日变化也有逐时变化，因此为了合理的确定污水流量，必须计算其总变化系数。总变化系数 K_z 为最高日最高时的污水量与平均日平均时的污水量的比值：

Because the sewage standard is an average value, in fact, the amount of sewage in sewage discharge coefficient is always changing, both daily and hourly. Therefore, in order to reasonably determine the discharge of sewage, the total variation coefficient must be calculated. The total variation coefficient (K_z) is the ratio of the maximum daily maximum amount of sewage to the average daily average amount of sewage:

$$K_z = \frac{2.7}{Q^{0.11}}$$

式中：Q——平均日平均时污水流量，L/s

Type: Q - average daily mean hourly effluent flow, L/s

表：生活污水量总变化系数值 K_z

Table: the total variation coefficient of domestic sewage K_z

污水平均日流量(L/s) Average daily flow of sewage (L/s)	5	15	40	70	100	200	500	≥ 1000
总变化系数 K_z Total variation coefficient K_z	2.3	2.0	1.8	1.7	1.6	1.5	1.4	1.3

● 雨水设计流量 Design Flow Of Rainwater

雨水流量取决于设计所采用的暴雨强度、径流系数和汇流面积。

The rain water flow depends on the storm intensity, runoff coefficient and confluence area adopted by the design.

雨水设计流量计算公式：

Rainwater design flow calculation formula:

$$Q = \Psi \cdot q \cdot F$$

式中：Q——雨水设计流量，L/s

Type Q: rainwater design flow, L/s

Ψ ——径流系数，< 1的经验数值

Ψ : runoff coefficient, numerical < 1 experience

q——设计暴雨强度，L/(s · Hm²)

q: design storm intensity, L / (s · Hm²)

F——汇水面积，hm²

F: catchment area, hm²

注：当有允许排入雨水管道的生产废水排入雨水管道时，应将其水量计算在内。

Note: when the waste water discharged into the storm sewer is allowed to be discharged into the storm sewer, the amount of water should be calculated.

暴雨径流系数 Ψ 定义为暴雨产生的径流量与降雨量的比值，其影响因素众多，如排水面积上的植物被覆、土壤的渗水能力、地面坡度、降雨历时、降雨强度等。目前尚不能精确地确定径流系数 Ψ ，在设计中可参考下表：

The rainstorm runoff coefficient is defined as the rainstorm runoff and rainfall ratio, the influence factors, such as vegetation cover, drainage area on soil infiltration capacity, ground slope, rainfall duration, rainfall intensity etc.. It is not only to accurately determine the runoff coefficient, can refer to the following table in design:

地面种类 Ground type	Ψ
各种屋面、混凝土和沥青路面 Various roofing, concrete and asphalt pavements	0.90
大块石铺砌路面和沥青表面处理的碎石路面 Gravel pavement and asphalt surface treated macadam pavement	0.60
级配碎石路面 Graded Macadam Pavement	0.45
干砌砖石和碎石路面 Dry masonry and Macadam Pavement	0.40
非铺砌土路面 Unpaved pavement	0.30
公园和绿地 Parks and green spaces	0.15



当汇流面积较大，且建筑物分布的差异也较大时，可分成不同类型的小区，分别进行径流系数计算。然后根据各区汇水面积上的地面覆盖情况及占有面积的比例，由下式计算综合径流系数 Ψ_p ：

When the confluence area is large, and the difference of building distribution is large, it can be divided into different types of residential areas, and the runoff coefficient is calculated respectively. Then cover and districts under the catchment area of the ground occupied area ratio, calculating the comprehensive runoff coefficient Ψ_p by the formula:

$$\Psi_p = \frac{\sum f_i \Psi_i}{F}$$

式中： f_i ——为汇流面积上各类地面的面积

Ψ_i ——为与各类地面相应的径流系数

F——为全部汇水面积

Type: f_i ——the area of the ground surface for the confluence area

Ψ_i ——corresponding with all kinds of surface runoff coefficient

F——for all the catchment area

表：综合径流系数 Ψ 值

Table: the comprehensive runoff coefficient ratio value

区域情况 Regional situation	Ψ
城镇建筑密集区 Urban built-up area	0.60-0.70
城镇建筑较密集区 Densely populated areas of urban construction	0.45-0.60
城镇建筑稀疏区 Sparse area of urban buildings	0.20-0.45

设计暴雨强度 q 计算公式：

Q formula for designing rainstorm intensity

$$q = \frac{167A_1(1+C \lg P)}{(t+b)^n}$$

式中： q ——设计暴雨强度，L/(s·hm²)；

P——设计重现期，年；

t——降雨历时，min；

A1、C、b、n为地区参数，根据当地雨水量资料。

Type: Q: design storm intensity, L/(s·Hm²);

P: design return period, year;

T: rainfall duration, min;

A1, C, B and N are the regional parameters, according to the local rainfall data.

具有 20 年以上自动雨量记录的地区，排水系统设计暴雨强度公式应采用年最大值法。

另外，如果排水系统内设有调节池，排水泵站及排水管道的规模和投资都可以大为减少。因此，在设计中，应尽量利用天然洼地、湖泊、池塘作调节池。

For the area with more than 20 years of automatic rainfall records, the annual maximum method should be adopted in the design of storm intensity formula for drainage system design.

In addition, if the drainage system is equipped with a regulating pool, the size and investment of drainage pump station and drainage pipe can be greatly reduced. Therefore, in the design, we should make use of natural depressions, lakes, ponds as the regulatory pool.



6

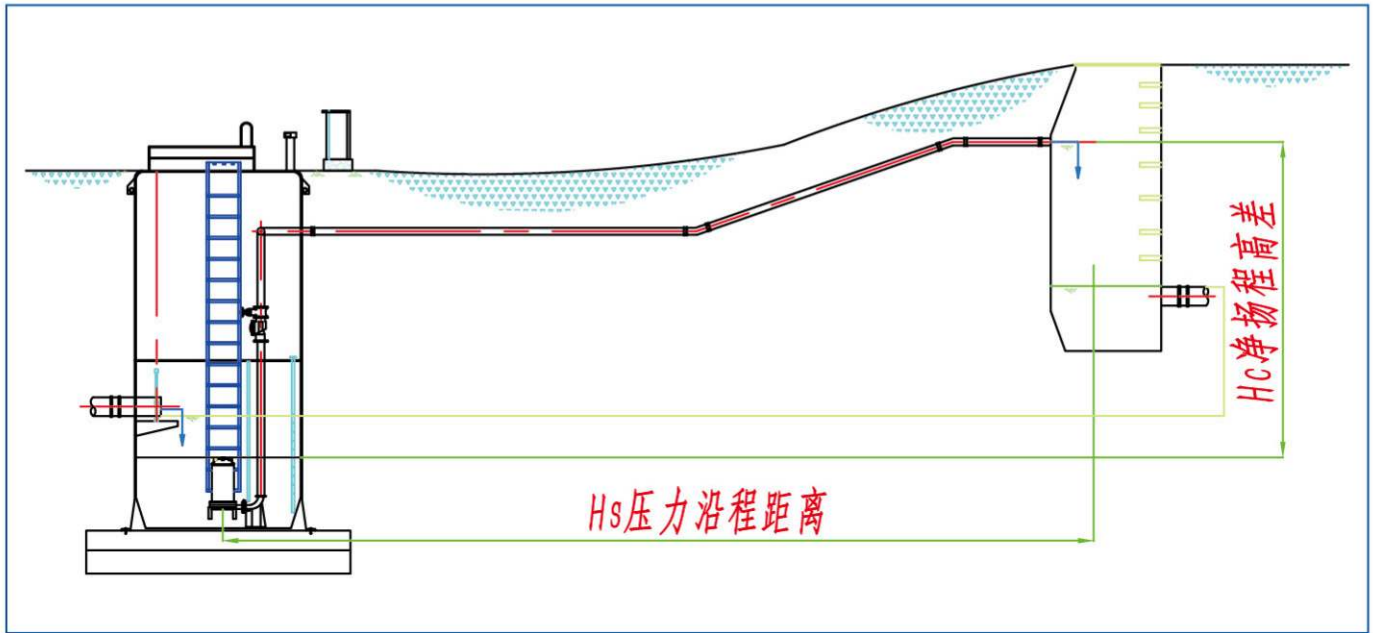
泵站设计扬程 Design Head Of Pump Station

雨水泵的设计扬程，应根据设计流量时的集水池水位与受纳水体平均水位差和水泵管路系统的水头损失确定。

污水和合流污水泵的设计扬程，应根据设计流量时的集水池水位与出水管渠水位差和水泵管路系统的水头损失以及安全水头确定。

The design head of the rainwater pump should be determined according to the water level of the collector pool and the average water level difference of the receiving water body and the head loss of the water pipeline system at the design flow.

The design head of sewage and combined sewage pump should be determined according to the water level of the collector pool and the water level difference of the outlet canal, the head loss of the water pipeline system and the safety head.



● 泵站的扬程H可按下式计算：The Head Of The Pump Station Can Be Calculated By The Press Type H.

$$H = H_c + H_s + H_{sd}$$

式中：H_c——净高水位差(m)，为集水池最低水位与出水管最高点的高程差；

Type: the height of the water level difference (m), the lowest water level for the elevation sump and the water outlet pipe, the highest point of difference;

H_s——压力管路的沿程水头损失(m);
head loss (m) of pressure piping;

H_{sd}——压力管路的局部水头损失(m)。
local head loss (m) of pressure piping.

泵站所供给的能量不仅需要把水提升到要求的高度、或达到一定的压力，而且还需要克服管道的各种阻力，从而使泵站的需要扬程增加。因此，在确定泵站需要扬程时，应该计算管道的损失扬程。

The energy supplied by the pump station needs not only to raise the water to the required height, or to achieve a certain pressure, but also to overcome the various resistance of the pipeline, so as to increase the required head of the pump station. Therefore, when determining the pumping head, the loss head of the pipeline should be calculated.

管道损失扬程可分为沿程损失和局部损失。因流体内部和流体与管壁摩擦引起的能量消耗称为沿程损失扬程,因管道形状尺寸产生旋涡引起的能量消耗称为局部损失扬程。

The loss head of pipeline can be divided into the loss along the path and the local loss. The energy consumption caused by the friction between fluid and pipe wall is called the head of the loss along the path. The energy consumption caused by the vortex generated by the shape and size of the pipe is called the local loss head.



沿程损失扬程 Along The Path Loss Head

在水力学中，沿程损失的计算方法很多，应根据不同管材和管内流态加以选用。通用公式： $h_f = f \frac{L}{D^b} Q^m$

In hydraulics, there are many calculation methods for the loss along the path, which should be selected according to the different pipes and the flow patterns inside the tube. General formula:

式中： h_f ——为管道沿程水头损失，m;
Type: head loss for pipeline, m;
 f ——为摩擦阻力系数;
coefficient of friction;
 L ——为管道长度，m;
for pipe length, m;
 D ——为管道内径，m;
inside diameter of pipe, m;
 Q ——为管道内通过的流量， m^3/s ;
for the pipeline through the flow, m^3/s ;
 b ——为管径指数;
diameter index;
 m ——为流量指数。
flow index.

各种管材的 f, m 及 b 值见下表:

The f, m and b values of various pipes are listed below:

管材 tubing	f	m	b
混凝土、钢筋混凝土 Concrete and reinforced concrete			
$n=0.013$	1.74×10^{-3}	2	5.33
$n=0.014$	2.02×10^{-3}	2	5.33
$n=0.015$	2.23×10^{-3}	2	5.33
旧钢管、旧铸铁管 Old steel pipe and old cast iron pipe	1.78×10^{-3}	1.90	5.10
石棉水泥管 Asbestos cement pipe	1.18×10^{-3}	1.85	4.89
硬塑料管 Hard plastic pipe	9.15×10^{-4}	1.77	4.77
铝管、铝合金管 Aluminium tube and aluminium alloy tube	8.08×10^{-4}	1.74	4.74

注： n 为粗糙系数
Note: n is the roughness coefficient

局部损失扬程 Local Loss Head

在泵站工程中，由于装置形式的不同，往往免不了有转弯、扩散、收缩、阀件等等。水流通过这些异型管或各种阀件等管路附件时会产生局部阻力。克服这些阻力需要消耗一定的能量，这就是管道局部损失扬程 h 。

In the pump station engineering, due to the different device forms, often without turning, diffusion, contraction, valves and so on. Local resistance is produced when water flows through the pipe fittings such as special pipes or valves. To overcome these resistances, it is necessary to consume a certain amount of energy, which is the local loss head h of the pipeline.

局部损失扬程计算公式 Calculation Formula Of Local Loss Head

$$h_j = \sum \xi_i \frac{V_i^2}{2g}$$

式中： ξ_i ——为第 i 管段附件的局部阻力系数
Type: Local resistance coefficient for the attachment of section i
 v_i ——为第 i 管段附件的平均流速， m/s 。
For the average velocity of i segment attachment, m/s .



● 污水管道水力计算的基本公式 Basic Formulas For Hydraulic Calculation Of Sewage Pipes

$$Q = A \cdot v = A \cdot C \sqrt{R \cdot I} = \frac{1}{n} \cdot A \cdot R^{\frac{2}{3}} \cdot I^{\frac{1}{2}}$$

式中: Q—流量(m³/s)

Type: Q traffic (m³/s)

A—过水断面面积(m²)

A water cross section area (m²)

v—流速(m/s)

V- flow velocity (m/s)

R—水力半径(m)

R- hydraulic radius (m)

I—水力坡度; I=h/L,其中h为水头损失, m; L为管路长度, m;

I- hydraulic gradient; I=h/L, where h is head loss, m; L is pipeline length, m;

C—流速系数

C- velocity coefficient

n—管壁粗糙系数 (钢筋混凝土管取0.014, 塑料管及玻璃钢夹砂管取0.01)

The wall roughness coefficient n- (reinforced concrete pipe 0.014, plastic pipe and glass steel sand was 0.01)

"污水管道在设计充满度下最小设计流速为0.6m/s,雨水管道和合流管道在满流时最小设计流速为0.75m/s"。

Under the design fullness, the minimum design flow rate of sewage pipe is 0.6m/s, and the minimum design flow rate is 0.75m/s when the rainwater pipe and confluence pipe are full flow.

表: 重力流污水管道最大设计充满度

Table: maximum design fullness of gravity flow sewer

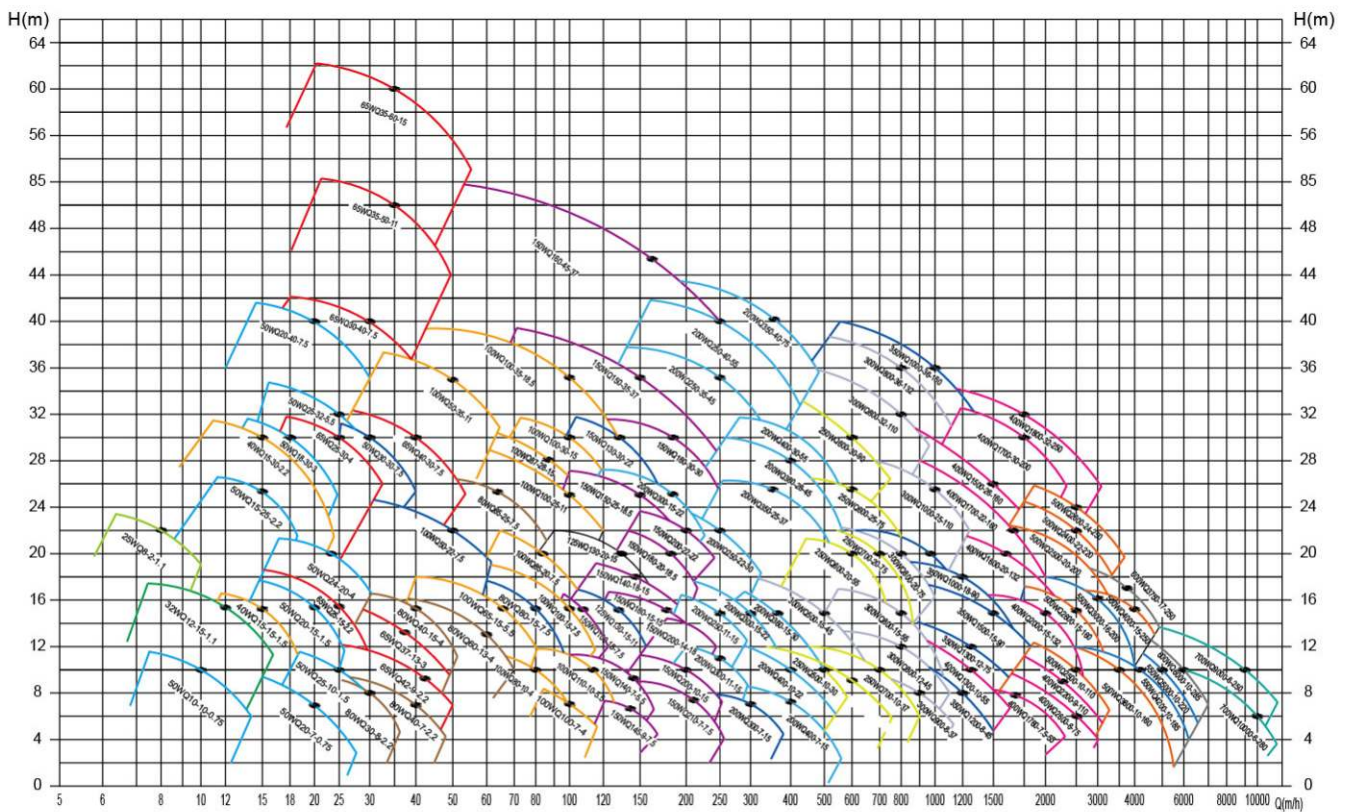
管径(mm) Pipe diameter (mm)	最大设计充满度 Maximum design fullness
200-300	0.55
350-450	0.65
500-900	0.70
≥ 1000	0.75



7 如何选泵 How To Select Pump

水泵选型原则 Pump Selection Principle

- 01**
 必须满足需要的流量和扬程等要求；
 Must meet the requirements of flow and lift requirements;
- 02**
 所选水泵应在高效范围内运行；
 The selected pump should be operated in a high efficiency range;
- 03**
 同等条件下，应选效率较高的水泵；
 Under the same conditions, choose high efficiency water pump;
- 04**
 所选水泵型号、功率和台数应以节约投资为考虑因素；
 The selection of pump type, power and unit number should be taken into consideration in saving investment;
- 05**
 尽量选择同一型号的水泵；
 Try to choose the same type of pump;





8

单井筒泵站尺寸选型 Size Selection Of Single Well Pump Station

类型 Type	筒径 Barrel diameter (mm)	进水流量 Inlet flow (L/s)	筒体高度 Barrel height (m)	水泵台数 Number of pumps
预制泵站 Prefabricated pump station	1200	25L/s	2米~20米 根据实际应用选型 2 m ~20 m. According to the actual application type selection	1-2
	1600	80L/s		2-3
	2000	120L/s		2-3
	3000	450L/s		2-3
	3800	1350L/s		2-4
	特殊定制或多井筒 special customization or multi well	4000L/s	特殊定制 special customization	2-4

注：上述数据作为参考，并不作为选型唯一依据。
Note: the above data as a reference, not as the only basis for selection.

一体化泵站平面布置设计准则 Design Criteria For Plane Layout Of Integrated Pump Station

潜水自耦式安装的水泵，其平面布置可不考虑水泵维修空间，只满足水泵安装和水力流态要求；
The water pump of the submersible self coupling installation can not only consider the maintenance space of the pump, but only meet the requirements of the installation of the pump and the hydraulic flow pattern;

一体化泵站选择直径大小时，平面尺寸和布置应满足水泵和格栅等主要设备安装、提升和日常运行要求，应提前查看内部设备的平面图纸尺寸，提前规划好平面设置。
The size of the integrated pump station is large, and the plane size and layout should meet the requirements of installation, promotion and daily operation of the main equipment such as water pump and grille. The size of the plane drawings of the internal equipment should be observed ahead of time, and the plane settings should be planned ahead of time.

潜水自耦式安装的水泵各泵最小中心距应为泵壳宽度的1.5倍，泵中心与墙壁之间的最小距离为泵壳宽度的0.8倍。2个井筒外径最小距离不得小于0.5m。也就是水泵与水泵之间的最小间距为水泵蜗壳宽度的一半；筒壁到泵的距离不低于蜗壳宽度的30%。
The minimum center distance should be 1.5 times of the width of the pump shell, and the minimum distance between the pump center and the wall is 0.8 times of the width of the pump shell. The minimum distance of the 2 outer diameters of the wellbore shall not be less than 0.5m. That is, the minimum distance between the pump and the pump is half of the width of the pump volute; the distance from the cylinder wall to the pump is not less than 30% of the width of the volute.

当泵站采用多个井筒组合时，平面布置应满足泵站整体安装和运行的要求，各个井筒内宜安装相同型号和数量的水泵。
When the pump station adopts multiple shaft combinations, the plane layout should meet the requirements of the overall installation and operation of the pump station, and the same type and amount of pumps should be installed in each shaft.





9

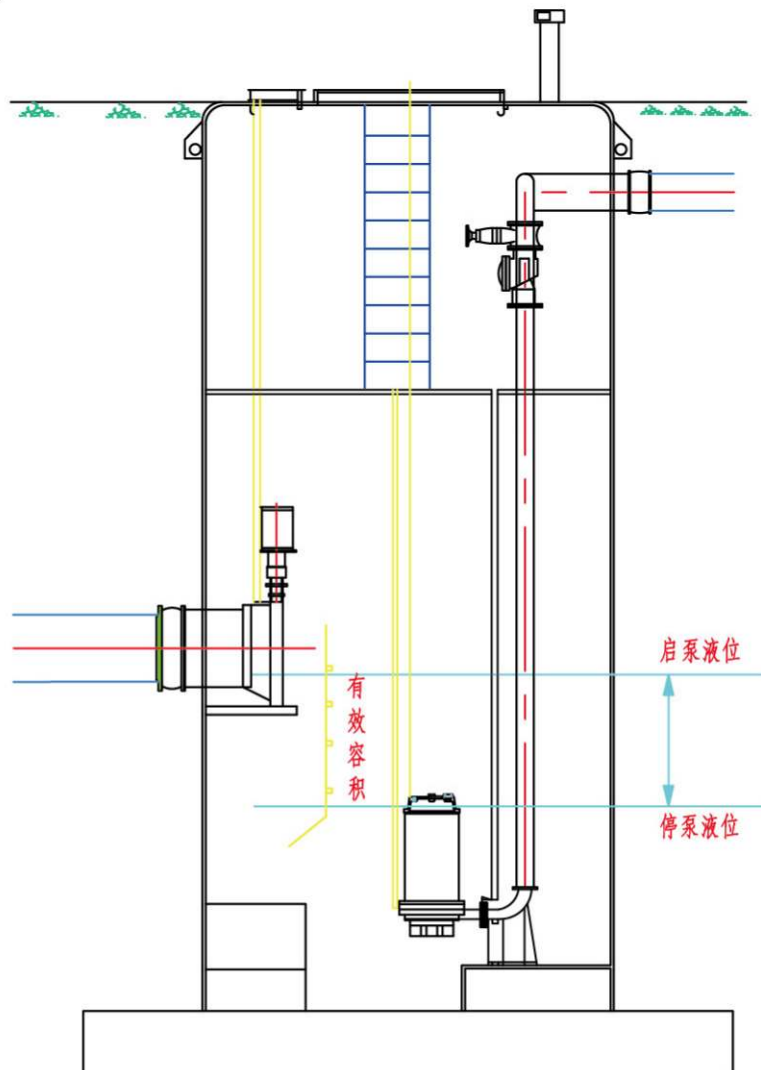
集水池有效容积计算 Calculation Of Effective Volume Of Sump

泵站集水池具有一定的有效容积，是为了满足泵站安全正常运行的需要。满足水泵启动及运行中所需的水量，并可避免水泵的频繁启闭。如果调节容积过小，则水泵开停频繁(甚至满足不了秒换水系数的要求)；如果容积过大,显然会增加工程量和工程造价。

Pump Station sump has a certain effective volume, in order to meet the safety and normal operation of pump station. It can meet the water quantity needed in starting and running of pump and avoid frequent opening and closing of pump. If the adjustment volume is too small, the pump stops frequently (or even can not meet the requirements of water change coefficient); if the volume is too large, it will obviously increase the amount of engineering and project cost.

集水池的型式和构造将直接影响污水泵吸水的效果。要保证水泵工作时良好的水利条件，如果池内水流条件差,会出现滞流和涡流，不利于水泵运行，会产生气蚀现象、水泵特性改变、效率下降、出水量减少等问题；电动机超载运行,增加能耗；运行不稳定，产生噪声和振动等故障。因此，集水池的设计必须尽量使水泵的进水条件稳定,符合运行要求，减少滞流和涡流。并且水流的流动过程不产生突然扩大或改变方向的情况。

The type and structure of the sump will directly affect the water absorption effect of the sewage pump. When the water pump works to ensure good water conditions, if the flow conditions in the pool, there will be stagnation and turbulence, is not conducive to the operation of the pump, will have the characteristics of pump cavitation and change, reduced efficiency, reduce the amount of water and other issues; motor overload, increase energy consumption; unstable operation, produce noise and vibration fault. Therefore, the design of the collecting tank must try to make the water pump stable conditions, meet the operational requirements, reduce the viscous flow and vortex. And the flow of water does not produce sudden expansion or change direction.





为了保证排水泵站安全正常运行，集水池的贮水部分必须有适当的有效容积。以集水池的启动水位和停泵水位之间的容积为有效容积，常用集水池最小有效容积有三种计算方法。

In order to ensure the safe and normal operation of the pump station, the water storage part of the sump must have an appropriate effective volume. With the volume of the starting water level and the pump stopping water level as the effective volume, there are three calculation methods for the minimum effective volume of the common water collecting tank.

● 水泵启动次数法(n法) Pump Start Frequency Method

控制单台水泵1小时内的启动次数。水泵的启动次数是根据电动机功率大小、变压器容量和电负荷情况而定。一般小功率电机采用直接启动，次数可相对频繁一点，对于大功率的采用降压启动、软启动或者变频启动，由于减压启动器需要冷却处理，就不允许频繁启动。

Control the starting times of a single pump within 1 hours. The starting frequency of the pump is determined according to the motor power, the transformer capacity and the electric load. The general small power motor adopts the direct start, the frequency can be relatively frequent, for high power use step-down start, soft start or frequency conversion start, because the decompression starter need cooling treatment, not allowed to frequent start.

● 计算公式 Calculation Formula

$$V_T \geq \frac{Q_b}{4 \times n}$$

式中： V_t ——集水池的最小有效容积(m^3)
 Type Minimum effective volume (m^3) of a sump
 Q_b ——水泵的设计流量(m^3/h)
 Design flow (m^3/h) of water pump
 n ——水泵每小时最大启停次数
 Maximum starting and stopping times per hour of water pump

注：常规应按照每小时不得大于6次启动计算。

Note: routine shall be calculated in accordance with the start up of not more than 6 hours per hour.

根据《建筑给水排水设计规范》GB50015-2003（2009年版）第4.7.8条1款：“集水池有效容积不宜小于最大一台污水泵5min的出水量，且污水泵每小时启动次数不宜超过6次。”

According to <building water supply and drainage design code> GB50015-2003 (2009 Edition) 4.7.8 Article 1: "collection tank effective volume should not be less than the largest sewage pump 5min water output, and the sewage pump starts per hour should not exceed 6 times."

● 储水时间法(t法) Water Storage Time Method

规定储水时间是一种经验法。

Setting water storage time is an empirical method.

● 计算公式 Calculation Formula

$$V_T = \frac{t}{60} \times Q_b$$

式中： V_t ——集水池的最小有效容积(m^3)
 Type Minimum effective volume (m^3) of a sump
 Q_b ——最大一台泵的出水量(m^3/h)
 Maximum pump output (m^3/h)
 t ——规定储水时间(min)
 Specified water storage time (min)



根据《室外排水设计规范》GB50014-2006(2014年版)第5.3.1条：①污水泵站集水池的容积，不应小于最大一台水泵5min的出水量；②雨水泵站集水池的容积，不应小于最大一台水泵30s的出水量；③合流污水泵站集水池的容积，不应小于最大一台水泵30s的出水量。

According to the "standard" design of outdoor GB50014-2006 (2014 Edition) section 5.3.1: sewage pump station sump volume should not be less than the maximum amount of a water pump 5min; the water pump station sump volume should not be less than the maximum amount of a water pump 30s; the flow volume and sewage pump station in the pool, should not be less than the maximum capacity of a water pump 30s.

秒换水系数法(K法) Second Water System Number Method

秒换水系数法是大中型排水泵站计算集水池最小有效容积常用的方法。

The method of changing stream number per second is a commonly used method for calculating the minimum effective volume in large and medium-sized drainage pump stations.

计算公式 Calculation Formula

$$V_T = K \times Q_b$$

式中： V_T ——集水池的最小有效容积(m^3)
Type Minimum effective volume (m^3) of a sump

Q_b ——水泵的设计流量(m^3/s)
design flow (m^3/s) of water pump

K ——秒换水系数; =30~50
second water transfer coefficient; =30~50

“泵规”第7.2.7条：“进水池的水下容积可按共用该进水池的水泵30~50倍设计流量确定。”

"Pump regulation" 7.2.7: "the underwater volume of the intake tank can be determined according to the design flow of 30~50 times of the water pump shared with the intake tank."

三种计算方法的分析比较 Analysis and comparison of three calculation methods

三种方法的计算基点都与 Q_b 有关，但 Q_b 又有一定的区别。水泵启动次数 n 法以每次开动的水泵次数作为控制点，对应开泵台数，可以认为 Q_b 是水泵的设计流量；储水时间 t 法是以规定储水时间作为控制点，非常明确 Q_b 是最大一台水泵的出水量；秒换水系数 K 法以秒换水系数作为控制点， Q_b 是水泵的设计流量。

The calculation points of the three methods are related to Q_b , but Q_b has some differences. The number of pump pump start times to start each n method as the control point, the corresponding pump units, can be considered the design flow pump; water storage time t method is based on the provisions of the water storage time as the control point, Q_b is very clear water out of a water pump maximum; second water exchange coefficient K method in seconds for water the coefficient of Q_b is designed as a control point, flow pump.

单泵运行 n 、 t 和 K 相比较：

Comparison of single pump operation with N , t and K :

$$\frac{1}{4 \times n} = \frac{t}{60} = \frac{K}{3600} \quad (4)$$

为了便于比较，以单泵为例，所有计算方法的 Q_b 相同， n 、 t 和 K 三者关系为：

For easy to compare, the single pump is used as an example, and the Q_b of all calculation methods is the same. The relationship between N , t and K is as follows: (4)
根据式(4)，对常用规范规定数值分别计算出参数 n 、 t 和 K 值，下为《常用规范规定数值计算 n 、 t 和 K 值汇总表》：

According to the formula (4), the parameters N , t and K are calculated according to the commonly used specifications, and the N , t and K values are calculated according to the commonly used specifications:



集水池位置 Sump location	集水池储水时间 Storage time of sump t(mm)	水泵1h内启动次数 n(次/h) The starting frequency of pump 1H is n (sub/h)	水泵秒换水系数K The number of water pumps per second K	集水池 最小容积 $V_T(m^3)$ Minimum volume of a sump	适用范围 Applicable scope
污水泵站 Sewage pump station	$\geq 5^*$	≤ 3	≥ 300	$\geq 1/12Q_b$	小型 small size
	≥ 2.5	$\leq 6^*$	≥ 150	$\geq 1/24Q_b$	
雨水、合流污水泵站 Rainwater and combined sewage pump station	$\geq 0.5(30s^*)$	≤ 30	≥ 30	$\geq 1/120Q_b$	中、小型 Medium and small size
排水泵站 Drainage pump station	0.5-0.83	30-18	30-50*		大、中型 Large and medium size

t、n法主要用于小型排水泵站集水池最小有效容积的计算，K法主要用于大中型排水泵站集水池最小有效容积计算。

T and N are mainly used to calculate the minimum effective volume of the sump of small drainage pump station. The K method is mainly used in the calculation of the minimum effective volume of the large and medium-sized drainage pump station sump.

在t法计算中， Q_b 是最大一台水泵的出水量，计算集水池最小有效容积不考虑同时工作的水泵数量，也就是说不管泵站水泵配置如何，只要最大一台水泵的出水量相同。集水池最小有效容积 V_T 计算值就相同：如出现多泵同时运行的泵站，水泵（单泵）的n、K值就会出现很大的波动。由上表中可知：如三泵（同型号）同时运行的污水泵站为例，由t法推算的单泵的n值为9次/h；两泵（同型号）同时运行的雨水、合流污水泵站为例，由t法推算的单泵的n值为60次/h（未考虑进水段容积），K值仅为15。可见，t法集水池最小有效容积计算方法不够严密，如不认真核算容易造成n、K值不符合要求。要避免这种情况出现，也应该把 Q_b 定义为水泵的设计流量，而不是最大一台水泵的出水量，这样就能保证水泵配置方式不同，集水池最小有效容积计算值也不同。

In t calculation, Q_b is the largest water pump output, calculation of the minimum effective volume of the pool does not consider the number of pumps working at the same time, that is, regardless of the pump station water pump configuration, as long as the maximum amount of a pump water output is the same. Collecting tank minimum effective volume V_T calculation value is the same: if the emergence of multi pump running at the same time, the pump (Dan Beng) n, K value will appear great fluctuations. From table three: if the pump (same type) sewage pump station running at the same time, for example, calculated by the T method of single pump n value is 9 /h; two (same type) pump running at the same time, rainwater sewage pump station as an example, calculated by the T method of the n value of single pump 60 /h (without considering the water volume), K value is only 15. It can be seen that the minimum effective volume calculation method of T collecting basin is not rigorous enough, if not carefully calculated, it is easy to cause the N and K values do not meet the requirements. To avoid this situation, Q_b should also be defined as the design flow of the pump, rather than the maximum output of a pump, so that the water pump can be configured differently, and the minimum effective volume of the sump is also calculated.

在n法计算中， Q_b 是水泵的设计流量，计算集水池最小有效容积考虑到同时工作水泵的台数，也就是说集水池最小有效容积的大小与排水泵站水泵配置方式有关，不同的水泵配置方式会导致最小有效容积计算值就不相同。如两泵（同型号）同时运行的排水泵站集水池最小有效容积 V_T 为单泵两倍；三泵（同型号）同时运行的排水泵站集水池最小有效容积 V_T 为单泵三倍。可见，n法集水池最小有效容积计算方法严密，不论排水泵站如何配置，当n值确定后，K值保持不变，而最小有效容积 V_T 是随着 Q_b 变化的。

The calculation in the n method, Q_b is the design flow of the pump, set the minimum effective volume calculation considering the number of water pump at the same time, that is to say about the size and configuration of the drainage pump station pump sets the minimum effective volume of tank, pump configuration in different ways will lead to the minimum effective volume calculation value is not the same. For example, the minimum effective volume V_T of the drainage pump station with two pumps (the same type) running at the same time is two times of the single pump; and the minimum effective volume V_T of the drainage pump station with three pumps (the same model) is three times of that of the single pump. It can be seen that the minimum effective volume calculation method of N method is rigorous, no matter how the drainage pump station is configured, when the n value is determined, the K value remains unchanged, while the minimum effective volume V_T varies with the Q_b .



t、n、K法比较结论及建议 Comparison Conclusions And Suggestions Of T, N And K Methods

①经过比较可知，n法计算严密，集水池最小有效容积VT随着水泵配置方式不同而变化，符合实际需求；如取一组同时运行的水泵(单泵取 $n \leq 6$)，如两台同时运行的模式，可采用总 $n \leq 12$ 。小型排水泵站集水池最小有效容积的计算方法建议采用n法，t法不够严密；②集水池最小有效容积不但要满足计算要求，还应满足水泵布置要求；集水池最小有效容积计算时， Q_b 应统一采用水泵的总设计流量。③大中型排水泵站最小有效容积的计算方法应以K法为主，K值范围30~50；如果是一组同时运行水泵，单泵取 $n \leq 3$ 。

The result shows that the n method to calculate the tight pool minimum effective volume VT changes with the pump configuration in different ways, in line with the actual needs; such as a set of simultaneous operation of water pump (single pump $n = 6$), such as the two mode of operation at the same time, the total n is less than or equal to 12. N method is recommended to calculate the minimum effective volume of small drainage pump station. The T method is not rigorous enough;(2) the minimum effective volume of the sump should not only meet the calculation requirements, but also meet the requirements of the pump layout; when the minimum effective volume of the sump is calculated, the total design flow of the pump should be adopted in Q_b .The calculation method of the minimum effective volume of the large and medium-sized pump stations should be based on the K method, the K value range of 30~50; if it is a group of single pump pump running at the same time, n is less than or equal to 3.





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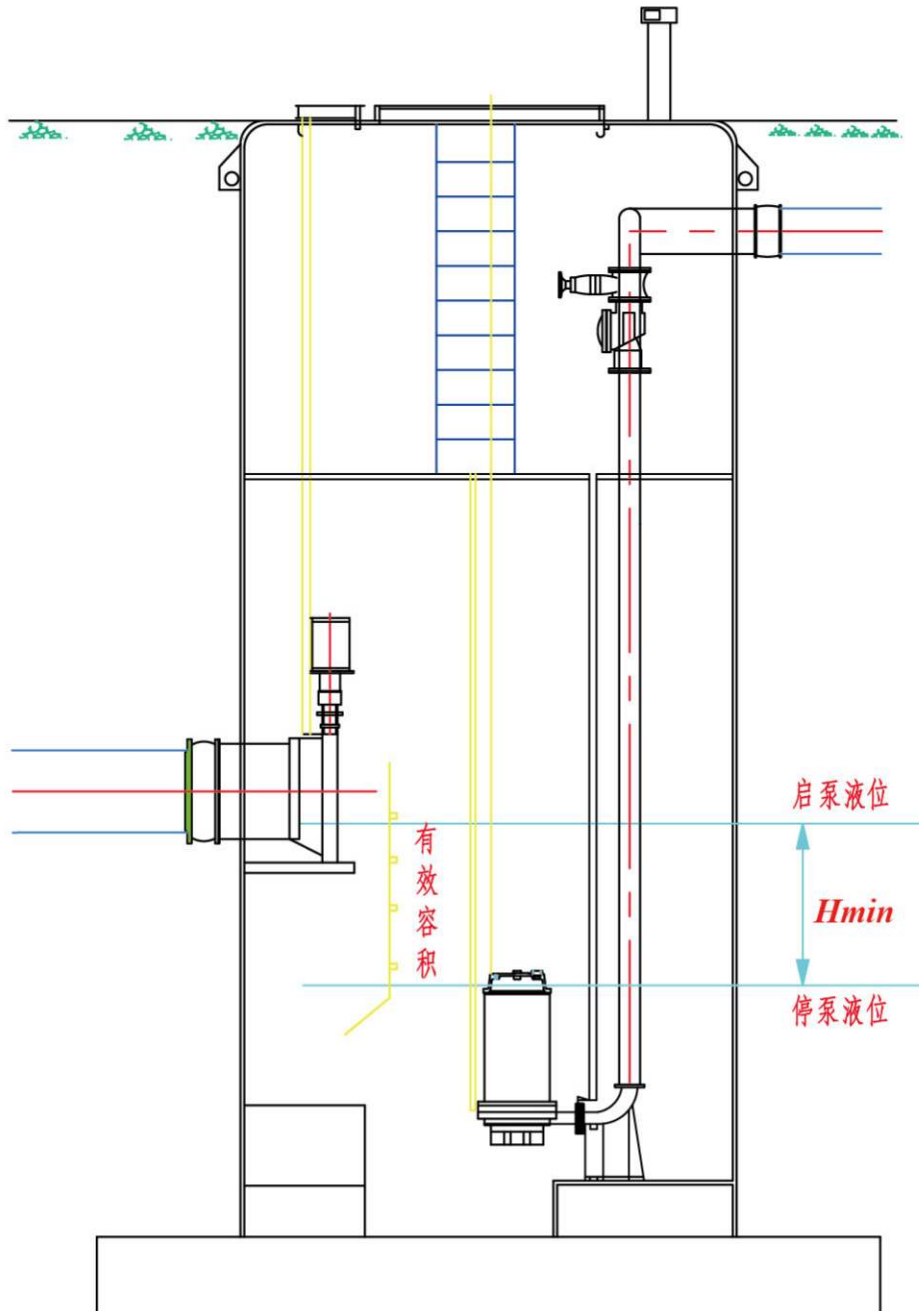
H_{min} ——最小有效容积的高差 Height Difference Of Minimum Effective Volume

H_{min} 是泵站停泵液位和启泵液位之间的距离。由下面的公式来确定。
$$H_{min} = \frac{V_{min}}{A}$$

式中： H_{min} ——泵站有效容积的高差，m；
elevation difference of effective volume of pump station, m;

V_{min} ——最小有效容积， m^3 ；
minimum effective volume, m^3 ;

A ——泵井的截面积， m^2 。
cross sectional area of pump well, m^2 .



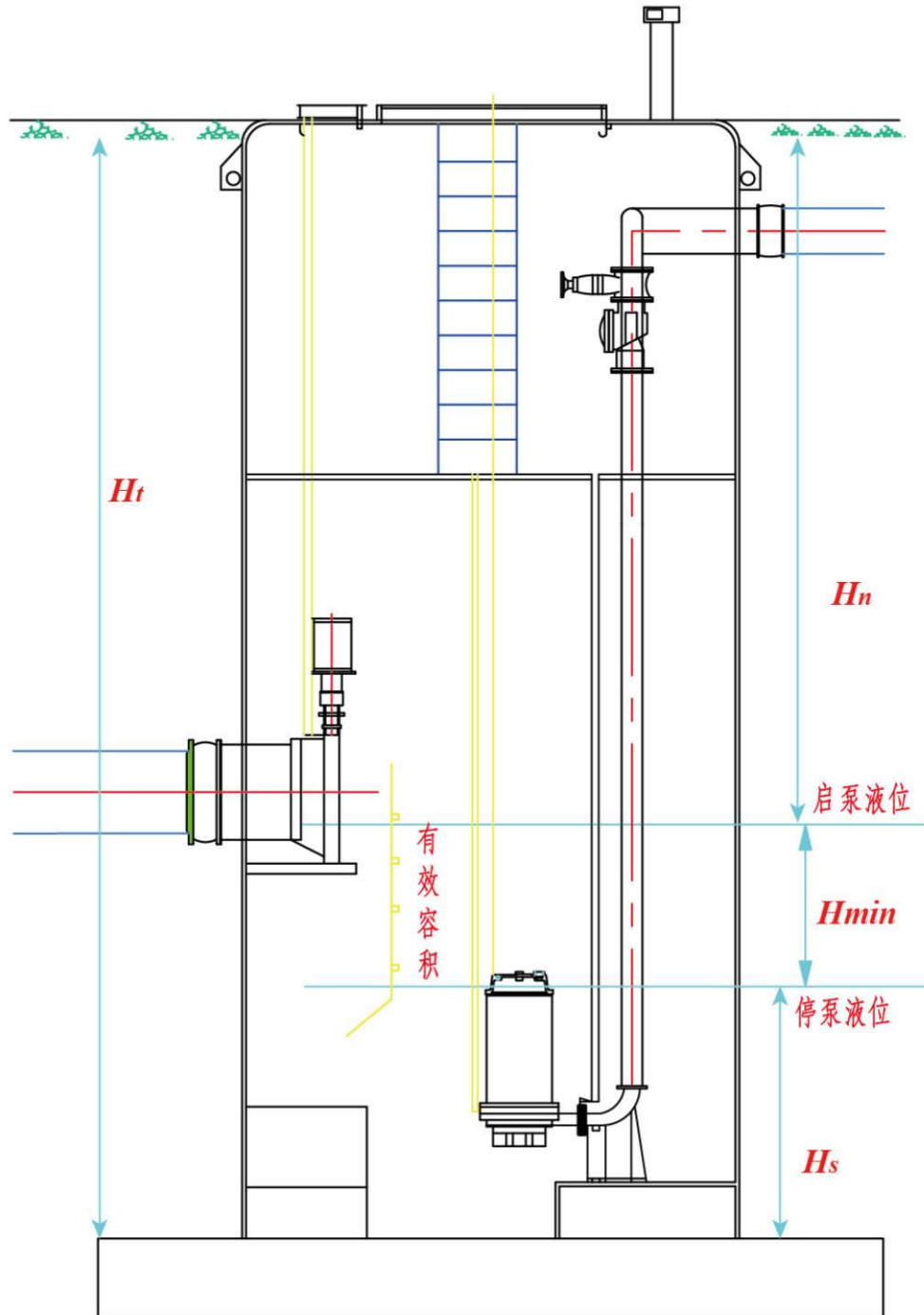


11

Hs水泵淹没高度 Submerged Height Of Pump

多数污水泵电机是水冷却方式，为了防止电机烧坏，要保持液位始终淹没电机，所以泵站停泵液位设置在淹没高度 H_s 。而部分污水泵加装冷却夹套之后，电机可以裸露在外，所以停泵液位可以设置更低 H_e ，但是必须保证液位不能低于叶轮位置。

Most of the sewage pump motor is water cooling way, in order to prevent the motor burn out, to maintain the liquid level always submerged the motor, so the pump stop pump level is set in the submerged height H_s . And some sewage pumps add cooling jacket, the motor can be exposed outside, so the pump level can be set lower H_e , but must ensure that the liquid level can not be lower than the impeller position.





12

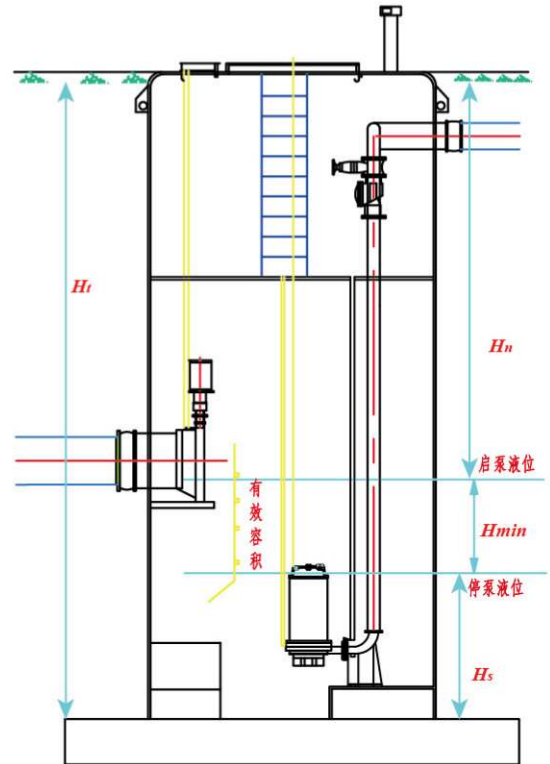
Ht泵站筒体高度计算 Calculation Of Pump Station Cylinder Height

● 泵站筒体高度 H_t 是由三部分组成，下面为计算公式：

The cylinder height of pump station H_t is composed of three parts, and the following is the calculation formula:

$$H_t = H_n + H_{min} + H_s$$

式中： H_{min} ——泵站有效容积的高差，m；
 Type: Elevation difference of effective volume of pump station, m;
 H_t ——泵站筒体高度，m；
 Height of pump station cylinder, m;
 H_s ——水泵淹没高度(或者参考 H_e 高度)，m。
 Pump submergence height (or reference H_e height), m.



● 一体化泵站竖向高程设计准则 Vertical Elevation Design Criteria For Integrated Pump Station

1. 泵站最高和最低水位之间的有效高度,由泵站有效容积和平面尺寸确定；

The effective height between the highest and lowest water level of pump station is determined by the effective volume and plane size of pump station;

2. 泵站最低水位到泵坑底部的距离应大于配套水泵最小停泵高度；

The distance from the lowest water level to the bottom of the pump pit should be greater than the minimum stopping height of the pump;

3. 多井筒设计的并联泵站宜采用相同的最高和最低水位；

The same maximum and minimum water level should be adopted in parallel pump stations designed with multi shafts;

4. 污水泵站集水池的设计最高水位,应按进水管充满度计算。

The highest water level should be calculated according to the filling degree of the intake pipe in the sump of sewage pump station.

5. 雨水泵站和合流污水泵站集水池的设计最高水位,应与进水管管顶相平。当设计进水管为压力管时,集水池的设计最高水位可高于进水管管顶；

The design water level of rainwater pump station and sump sump should be equal to the top of inlet pipe. When the inlet pipe is designed as a pressure pipe, the designed maximum water level of the sump is higher than the top of the inlet pipe;



13

泵站设计注意事项及设计准则 Design Considerations And Design Guidelines For Pump Stations

一体化预制泵站的的形式应根据设置的地理位置,地形条件和地质情况等因素综合选用。

泵站场地应具备必要的交通条件、施工吊装作业条件。

预制泵站设计应根据工程所在地相应管网建设规划,结合给水、排水工程规模、近、远期建设情况,经技术经济比较后确定。

The form of the integrated prefabricated pump station should be comprehensively selected according to the geographical location, topographic conditions and geological conditions.

The site of pump station should have necessary traffic conditions and construction hoisting operation conditions.

The design of prefabricated pump station should be based on the corresponding pipe network construction planning of the project site, combined with the water supply and drainage engineering scale, near and long-term construction situation, determined by technical and economic comparison.



1. 污水泵站的进水端应设置阀门或截流装置,以在泵坑清洗或是水泵检修时使用。
2. 泵站内部的布置,应考虑改善水泵吸水的水利条件,减少滞流和涡流,以保证水泵正常运行。
3. 水泵的吸水口及叶轮应有足够的淹没深度,防止空气吸入或形成润流时吸入空气。
4. 泵站进水口的流速和水泵吸入口处的流速尽可能缓慢,尽量保持水流均匀顺畅无旋涡。应在进水口出安装导流装置。
5. 对于污水泵站,应设置备用泵;对于雨水泵站,可不设置备用泵,也可以多购置一台泵在库房冷备。
6. 一体化预制泵站的水泵设置不多于4台;
7. 泵站宜接近远期规划相结合原则,确定适宜的工程规模。可以多设置一台水泵,预留好耦合、管路及相关控制系统,暂不购置水泵。
8. 湿式安装的潜水泵,水泵宜配套电机冷却系统,干式安装的水泵,可采用防护等级IP54或以上水冷或风冷电机。

1. the inlet end of sewage pump station should be equipped with valves or cut-off devices, which can be used in pump sump cleaning or pump maintenance.
2. pump station layout, should be considered to improve the water pump water conditions, reduce the viscous flow and vortex, in order to ensure the normal operation of the pump.
3. the suction port and impeller of the water pump should have enough submergence depth to prevent the air from inhaling or forming the flowing air.
4. the flow velocity at the inlet of the pump station and the velocity at the suction port of the pump are as slow as possible, so as to keep the flow even and smooth without vortex. A diversion device should be installed at the intake.
5. for the sewage pump station, the standby pump should be set up; for the rainwater pump station, the standby pump can not be set up, or one pump can be purchased in the warehouse for cold standby.
6. integrated prefabricated pump station set up no more than 4 sets of pumps;
7. pump stations should be based on the combination of near and forward planning principles to determine the appropriate scale of the project. A pump can be set up, the coupling, pipeline and related control system are reserved, and the pump is not purchased temporarily.
8. wet installation of submersible pumps, pumps should be equipped with motor cooling system, dry installed water pump, can use the protection level of IP54 or above water-cooled or air-cooled motor.



9. 泵站控制柜可安装在泵站井口地面上，距离井口2~5m为宜，控制柜应安装于高于地面50cm以上的基础之上；考虑到震动，不建议安装在筒体上；如果安装在干式泵站井筒内，应考虑通风、散热和除湿。

10. 泵站控制柜的电缆及信号线应采用下进下出穿管接线方式，为了避免信号干扰,电源线和信号线应分别穿在两根不同套管内，信号线必须采用有接地保护作用的钢管。

11. 对于采用重力管网的泵站宜采用液位自动控制，采用压力管网的泵站宜采用压力自动控制。所有泵站都应具备手动控制、自动控制和远程SCADA控制功能，并应具备自由切换控制方式的功能。

12. 单台水泵功率较大时，宜采用软启动或变频启动，泵站流量和扬程变化较大时可采用变频调速装置。

13. 一体化泵站干式安装方案中，井内应设置集水坑和排水泵,用于排除井内积水。

14. 泵站设计应对泵站结构形式和材质、配套设备的选型，泵站的平面布置，泵站竖向布置和泵站配套仪表、电气和控制设备等分别进行设计。

15. 湿式安装的雨水泵站宜采用自然通风，并设置通风管2个，管径不小于150mm;污水泵站应采用轴流风机等机械通风设施或者加装等离子除臭设备；而对于干式安装泵站应采用轴流风机达到散热要求。

9. Pump control cabinet can be installed on the wellhead pump station on the ground, the wellhead distance should be 2~5m and the control cabinet should be installed at 50cm above the ground on the basis of above; considering the vibration, installed in the cylinder is not recommended; if installed in the pump dry wellbore should consider ventilation, cooling and dehumidification.

10. The cable and signal line of the pump control cabinet should adopt the way of down, down and out of pipe connection. In order to avoid the signal interference, the power line and signal line should be respectively worn in two different bushings, and the signal line must adopt the steel pipe with the ground protection function.

11. The automatic control of liquid level should be adopted for the pump station with gravity pipe network, and the pressure automatic control should be adopted for the pump station adopting the pressure pipe network. All pump stations should have the functions of manual control, automatic control and remote SCADA control, and should have the function of free switching control mode.

12. When the power of single pump is large, the soft start or frequency conversion should be adopted, and the variable frequency speed regulating device can be adopted when the pump flow and head changes greatly.

13. In the dry installation scheme of the integrated pump station, sump sump and drainage pump should be set up in the well to eliminate the seeper in the well.

14. The design of pump station should be designed according to the structure and material of pump station, the selection of supporting equipment, the layout of pump station, the vertical arrangement of pump station and the instrument, electrical and control equipment of pump station.

15. Wet rain water pump installation station should adopt natural ventilation, and set the ventilation pipe 2, the diameter is not less than 150mm; the sewage pump station should adopt axial flow ventilator mechanical ventilation facilities or installing plasma deodorization equipment; and the installation should be used for dry pump axial flow fan and heat dissipation requirements.



1、GRP玻璃钢筒体	34
GRP FRP cylinder	
2、JYWQ、WQ系列无堵塞潜水排污泵	35
JYWQ、WQ series non-clog submerged motor pumps	
3、预制泵站控制系统	38
Precast pump station control system	
4、远程SCADA监控系统	39
Remote SCADA monitoring system	
5、格栅系统	43
Grille system	
6、设备起吊装置	47
Equipment lifting device	
7、电磁流量计	48
Electromagnetic flowmeter	
8、等离子除臭仪	49
Plasma deodorization instrument	

03

设备及配件说明

DESCRIPTION OF EQUIPMENT

AND ACCESSORIES



1 GRP玻璃钢筒体 GRP FRP cylinder

筒体以无碱玻璃纤维无捻粗纱及其制品为增强材料，热固性树脂为基体，采用计算机缠绕工艺制成的玻璃钢管，厚度均匀。巴氏硬度应达至40HBa及以上，抗压强度应达到120MPa及以上，环向拉伸强度150MPa，轴向拉伸强度60MPa。

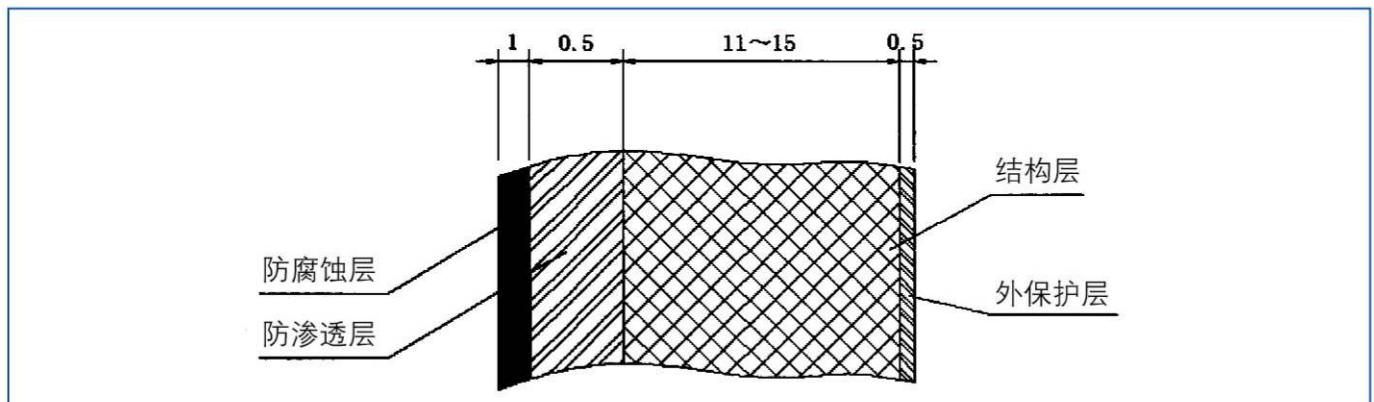
内衬层包括次内层和内表层，总厚度不小于2mm，其中内表层厚度不小于0.3mm。管壁的最小厚度应不小于经规定程序批准的图样和技术文件规定的标称厚度。

The cylinder with E-glass fiber roving and its products for enhancing material, thermoset resin, FRP pipe winding process made by computer, uniform thickness. Due to the hardness of 40HBa and above, the compressive strength should be above 120MPa, 150MPa ring to tensile strength, axial tensile strength of 60MPa.

The inner lining layer includes sub inner layer and inner surface layer, the total thickness is not less than 2mm, and the inner surface layer thickness is not less than 0.3mm. The minimum thickness of the pipe wall shall not be less than the nominal thickness specified in the drawings and technical documents approved by the prescribed procedures.



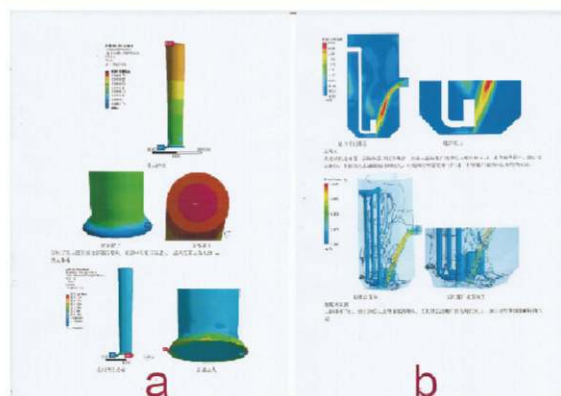
筒体玻璃钢材料结构示意图 Structure Of Glass Fiber Reinforced Plastic For Cylinder



GRP玻璃钢筒体使用寿命应达到50年以上;筒体强度应经过计算机校核,并提供国家机构提供的FEA有限元分析报告以及防渗漏测试报告。

The service life of GRP FRP cylinder should be more than 50 years. The strength of the cylinder should be checked by computer, and the FEA finite element analysis report provided by the state organization and the leakage test report are provided.

附图：玻璃钢筒体强度FEA有限元分析报告 Drawing: FEA finite element analysis report of FRP cylinder strength





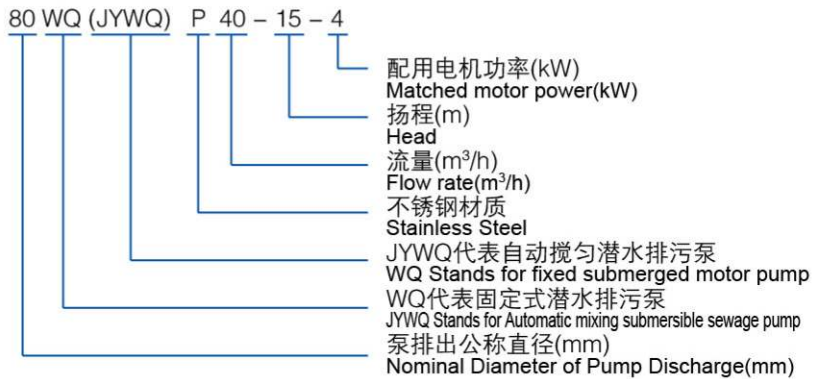
2 JYWQ、WQ系列无堵塞潜水排污泵 JYWQ、WQ series non-clog submerged motor pumps



● 产品简介 Product profile

JYWQ、WQ系列无堵塞潜水排污泵严格按照有关国家标准进行设计、制造和检验。供排送工商业污水、生活污水、城市污水处理厂排水系统、人防系统排水站、自来水管的给水之用。输送液体的流量范围为5-6000m³/h，扬程范围为5-60m，配套功率范围为0.55-315kW，口径范围为φ25~φ600mm。
WQ and QW series non-clog submerged motor pumps are strictly designed, manufactured and tested according to relative national standards. They are applicable for commercial wastewater, daily wastewater, drainage system of city wastewater.

● 型号意义 Type Meaning

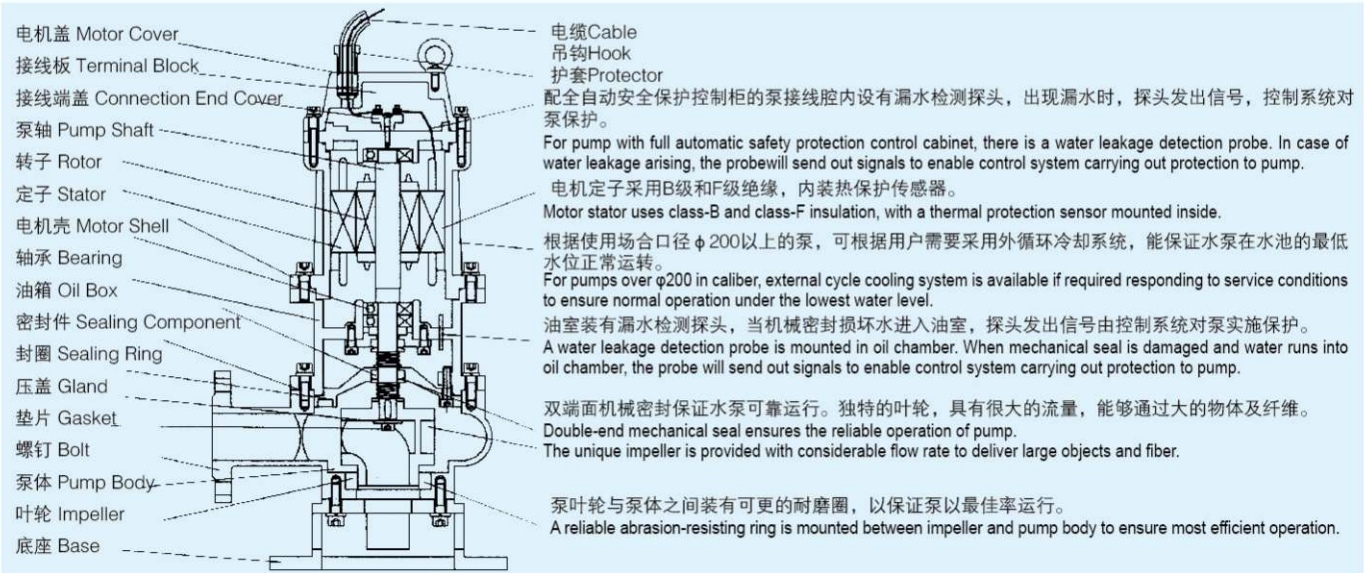


● 适用范围 Applicability

JYWQ、WQ系列无堵塞潜水排污泵适用于工厂商业污染废水的排放、住宅区的污水排污站、城市污水处理厂排水系统、人防系统排水站、自来水管的给水设备、宾馆的污水排放、市政工程建筑工地、勘探、矿山配套附机、农村沼气池、农田灌溉等行业，输送带颗粒的污水、污物，也可用于清水及带腐蚀性介质。

JYWQ and WQ series non-clog submerged motor pumps are applicable for the discharge of seriously polluted wastewater in factories and commercial sites, sewage draining station in residential area, drainage system in city wastewater treatment plant, draining station for civil defense, water supply in tap water plant, sewage discharge in hospitals and hotels, construction sites of municipal projects, exploration, mines, rural methane pool, agricultural irrigation etc. to deliver wastewater and pollutants containing granules, as well as clean water and corrosive mediums.

● 泵结构 Pump Structure




性能参数 Performance parameter

型号 Type	流量 Flow (m³/h)	扬程 Head (m)	转速 RPM (r/min)	功率 Power (kw)	自动耦合器 Automatic Coupler	型号 Type	流量 Flow (m³/h)	扬程 Head (m)	转速 RPM (r/min)	功率 Power (kw)	自动耦合器 Automatic Coupler
50WQ20-7-0.75	20	7	2900	0.75	GAK-50	100WQ65-15-5.5	65	15	1450	5.5	GAK-100
50WQ10-10-0.75	10	10	2900	0.75		100WQ100-15-7.5	100	15	1450	7.5	
50WQ20-15-1.5	20	15	2900	1.5		100WQ85-20-7.5	85	20	1450	7.5	
50WQ15-30-2.2	15	30	2900	2.2		100WQ100-25-11	100	25	1450	11	
50WQ42-9-2.2	42	9	2900	2.2		100WQ100-30-15	100	30	1450	15	
50WQ30-10-2.2	30	10	2900	2.2		100WQ100-35-18.5	100	35	1450	18.5	
50WQ17-25-3	17	25	2900	3		150WQ145-9-7.5	145	9	1450	7.5	GAK-150
50WQ40-15-4	40	15	2900	4		150WQ110-15-7.5	110	15	1450	7.5	
50WQ25-32-5.5	25	32	2900	5.5		150WQ200-10-15	200	10	1450	15	
50WQ20-40-7.5	20	40	2900	7.5		150WQ180-15-15	180	15	1450	15	
65WQ25-15-2.2	25	15	2900	2.2	150WQ180-20-18.5	180	20	1450	18.5		
65WQ37-13-3	37	13	2900	3	150WQ150-26-18.5	150	26	1450	18.5		
65WQ25-30-4	25	30	2900	4	150WQ180-25-22	180	25	1450	22		
65WQ30-30-5.5	30	30	2900	5.5	150WQ200-25-30	200	25	1450	30		
65WQ30-40-7.5	30	40	2900	7.5	150WQ200-30-37	200	30	1450	37		
65WQ35-50-11	35	50	2900	11	150WQ150-35-37	150	35	1450	37		
65WQ35-60-15	35	60	2900	15	150WQ180-40-45	180	40	1450	45	GAK-200	
80WQ40-7-2.2	40	7	1450	2.2	200WQ300-7-11	300	7	980	11		
80WQ43-13-3	43	13	2900	3	200WQ250-11-15	250	11	1450	15		
80WQ50-7-3	50	7	2900	3	200WQ250-15-18.5	250	15	1450	18.5		
80WQ40-15-4	40	15	2900	4	200WQ400-10-22	400	10	1450	22		
80WQ50-20-5.5	50	20	2900	5.5	200WQ300-15-22	300	15	1450	22		
80WQ65-25-7.5	65	25	2900	7.5	200WQ400-13-30	400	13	1450	30		
80WQ80-15-7.5	80	15	2900	7.5	200WQ300-18-30	300	18	1450	30		
100WQ70-7-3	70	7	1450	3	200WQ250-22-30	250	22	1450	30		
100WQ85-10-4	85	10	1450	4	200WQ300-25-37	300	25	1450	37		
100WQ60-15-4	60	15	1450	4	200WQ400-20-45	400	20	1450	45		



● 性能参数 Performance parameter

型号 Type	流量 Flow (m³/h)	扬程 Head (m)	转速 RPM (r/min)	功率 Power (kw)	自动耦合器 Automatic Coupler	型号 Type	流量 Flow (m³/h)	扬程 Head (m)	转速 RPM (r/min)	功率 Power (kw)	自动耦合器 Automatic Coupler
200WQ250-35-45	250	35	1450	45	GAK-200	400WQ1690-12-90	1690	12	980	90	GAK-400
200WQ400-30-55	400	30	1450	55		400WQ2000-10-90	2000	10	980	90	
200WQ200-60-75	200	60	1450	75		400WQ2000-13-110	2000	13	980	110	
250WQ600-9-30	600	9	980	30		400WQ2000-15-132	2000	15	980	132	
250WQ600-12-37	600	12	1450	37	GAK-250	400WQ1700-22-160	1700	22	980	160	GAK-400
250WQ600-15-45	600	15	1450	45		400WQ2000-18-160	2000	18	980	160	
250WQ600-20-55	600	20	1450	55		400WQ1950-23-185	1950	23	980	185	
250WQ600-25-75	600	25	1450	75		400WQ1980-26-220	1980	26	980	220	
300WQ800-12-45	800	12	980	45	GAK-300	400WQ1800-32-250	1800	32	980	250	GAK-450
300WQ480-15-45	480	15	1450	45		450WQ2300-10-90	2300	10	740	90	
300WQ400-20-45	400	20	1450	45		450WQ2250-11-110	2250	11	740	110	
300WQ600-20-55	600	20	1450	55		450WQ2100-12-110	2100	12	740	110	
300WQ800-20-75	800	20	1450	75	GAK-350	450WQ2260-14-132	2260	14	740	132	GAK-450
300WQ950-20-90	950	20	1450	90		450WQ2280-20-185	2280	20	740	185	
300WQ950-24-110	950	24	1450	110		450WQ2300-25-250	2300	25	740	250	
350WQ1500-7-45	1500	7	740	45		450WQ2300-29-280	2300	29	740	280	
350WQ1100-10-55	1100	10	980	55	GAK-400	450WQ2100-36-315	2100	36	740	315	GAK-500
350WQ1180-13-75	1180	13	980	75		500WQ2500-10-110	2500	10	740	110	
350WQ1200-15-90	1200	15	980	90		500WQ2500-16-160	2500	16	740	160	
350WQ1130-18-90	1130	18	980	90		500WQ2500-18-185	2500	18	740	185	
350WQ1250-20-110	1250	20	980	110	GAK-400	500WQ2500-12-132	2500	12	740	132	GAK-500
350WQ1500-20-132	1500	20	980	132		500WQ2400-22-220	2400	22	740	220	
350WQ1500-26-160	1500	26	980	160		500WQ2650-24-250	2650	24	740	250	
400WQ2000-6-55	2000	6	740	55		500WQ2400-28-280	2400	28	740	280	
400WQ1800-7-55	1800	7	740	55	GAK-400	600WQ5400-8-185	5400	8	580	185	GAK-600
400WQ2500-7-75	2500	7	740	75		600WQ4000-12-200	4000	12	580	200	
400WQ1800-10-75	1800	10	740	75		600WQ3550-15-200	3550	15	740	200	



3

预制泵站控制系统 Prefabricated Pump Station Control System



专门为排水泵站设计的完整的控制系统,满足功能的拓展需要,并有可靠的支持。
For the drainage pump station design of complete control system, to meet the needs of the expansion of functions, And reliable support.

集约化的设计,从此告别人员值守。
Intensive design, farewell to personnel duty.

智能化的远程控制,运行尽在掌握之中。
Intelligent remote control, the operation is in control.

控制柜采用户外型设计,可安装在泵站顶部,也可以独立安装地面上。
The control cabinet adopts outdoor design, which can be installed on the top of the pump station, and also can be installed independently on the ground.

完整的、即插即用的控制柜。
Integrated plug and play control cabinet.

起停液位的设置,一台潜水泵必须设置2个液位使用,2台潜水泵至少设置3个液位使用。

Setting up stop level, one submersible pump must be used in 2 level, 2 submersible pumps set at least 3 use of liquid level.

● 关键功能特点 Key Functional Characteristics

- 304不锈钢,户外型、防雨、防尘、防盗
304 stainless steel, outdoor type, rainproof, dustproof, burglarproof
- 水泵的自动并联控制
Automatic parallel control of water pump
- 手动操作运行
Manual operation
- 水泵启停自动控制
Automatic control of starting and stopping of water pump
- 当液位过高时,水泵并联启动快速排水
When the liquid level is too high, the pump starts in parallel to quickly drain water
- 任意设置启停液位
Start and stop liquid level at any settings
- 可显示泵站的入流量以及水泵排水量
It can show the flow rate of pump station and the displacement of pump
- 设定定时清空功能,防止淤泥堵塞
Set timing emptying function to prevent sludge clogging
- 定时轮换功能,在多泵控制中,科学分配每台水泵的运行时间
Timing rotation function, in the multi pump control, the scientific allocation of each pump running time
- 防雷击保护功能
Lightning protection function
- 增加UPS不间断电源接口
Adding UPS uninterruptible power supply interface
- 远程监控:外部RS485接口, GPRS/GSM无线远程通讯功能并提供配套SCADA远程监控平台,实现对泵站的监视功能
Remote monitoring: external RS485 interface, GPRS/GSM wireless remote communication function, and provide a supporting SCADA remote monitoring platform, to achieve the monitoring function of the pump station
- 人性化的人机操作界面,简易、便捷
User-friendly man-machine interface, simple and convenient
- 系统结构图形直观显示,可从系统图中直接显示出各泵运行故障情况及转速、泵站液位可读
The system structure diagram is visually displayed, which can directly display the pump fault and speed, and the pump level can be read from the system diagram



4 远程SCADA监控系统 Remote SCADA Monitoring System

SCADA(Supervisory Control and Data Acquisition)系统即监控与数据采集系统,是将先进的计算机技术、工业控制技术、通信技术有机的结合在一起,主要作用是对泵站运行的各个参数进行实时采样,并将数据及时处理并形成科学的运行方案,通过PLC发出指令,对泵站进行实时控制,是保障泵站安全、高效运行的必要措施。

The SCADA system is the monitoring and data acquisition system is the advanced computer technology and industrial control technology and communication technology to combine together, the main role is to real-time sampling of the various parameters of pump station, and the data processing and timely formation of running a scientific case, instructions issued by PLC, the real-time control of pump station is that necessary measures to guarantee the safe and efficient operation of pump station.

一般由设备层、现场控制层、管理(调度)层构成。该系统中的泵站设备现场监控层采用PLC及I/O、A/D模块构成测控主体。主要监控的设备和信号:水泵的各项数据、格栅机、前端启闭机、离子除臭仪、排风装置、集水井水位、流量、电机电流、运行时间、运行状态、出水口压力、配电柜各项参数等等。泵站控制柜安装有触摸屏操作终端,通过现场总线连接PLC,可直接对泵站的设备进行监控。

Generally composed of equipment layer, field control layer, management (scheduling) layer. The monitoring layer of the pump station in the system is composed of PLC, I/O and A/D blocks, which constitute the main body of measurement and control. Main monitoring equipment and signal: water pump data, grille machine, front-end hoist, ion deodorization instrument, exhaust device, water level, flow, motor current, running time, running state, outlet pressure, power distribution cabinet parameters, etc.. The control cabinet of the pump station is equipped with touch screen operation terminal, which connects the PLC through the field bus, which can directly monitor the equipment of the pump station.

SCADA系统原理图 Schematic Diagram Of SCADA System



展示页面 Display page





● 控制主界面 Control Main Page

此页面为默认画面，显示液位、泵设备状态显示(文本、指示灯、动态)、文本滚动、报警以及进入其他画面工具栏。
 This page is the default picture, display liquid level, pump device status display (text, indicator light, dynamic), text scrolling, alarm, and access to other screen toolbar.

一体化预制泵站监控系统

日期 2017-05-06 16:42:25
 欢迎您,管理员! 通信故障

粉碎格栅
运行电流A
12.5

粉碎格栅正转

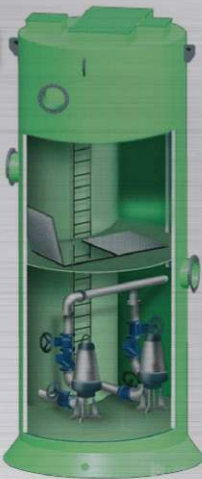
粉碎格栅反转

等离子除臭

等离子风机

帮助

液位m
5



与PLC通信故障!

一号泵	运作状态: 静止	
	故障信息: 无	
二号泵	运作状态: 静止	
	故障信息: 无	
三号泵	运作状态: 静止	
	故障信息: 无	
四号泵	运作状态: 静止	
	故障信息: 无	

主画面

泵

液位浮球

粉碎格栅

等离子除臭
等离子风机

故障信息

运行记录

登录/注销

● 水泵控制界面 Pump Control Screen

泵控制

日期 2017-05-06 16:43:15
 欢迎您,管理员! 通信故障

手动/自动模式选择

手动

一号泵禁用
启用

一号泵禁用
启用

一号泵禁用
启用

一号泵禁用
启用

泵轮转时间设置min
350

一号泵	漏水保护	过热保护	缺相保护
静止	正常	故障	正常
二号泵	漏水保护	过热保护	缺相保护
静止	正常	故障	正常
三号泵	漏水保护	过热保护	缺相保护
静止	正常	故障	正常
四号泵	漏水保护	过热保护	缺相保护
静止	正常	故障	正常

IO状态

故障信息

帮助

返回



● 液位控制画面 Liquid Level Control Picture

日期 2017-05-06 16:45:14

欢迎您, 管理员! 通信故障

液位浮球

泵液位/浮球控制模式

液位控制

当前水位m

5.12

液位控制模式

回差水位设置m

0.1

报警水位设置m

6.1

浮球控制模式

一泵启动浮球	四泵启动浮球
静止	静止
二泵启动浮球	三泵启动浮球
静止	静止

IO状态

故障信息

帮助

返回

一泵启动水位设置m	1.0	二泵启动水位设置m	1.4
三泵启动水位设置m	1.8	四泵启动水位设置m	2.0

● 粉碎格栅控制画面 Screen Control Screen

日期 2017-05-06 16:48:35

欢迎您, 管理员! 通信故障

粉碎格栅

当前运行电流A

12.1

手动/自动模式选择

手动

粉碎格栅正转

静止

粉碎格栅反转

静止

堵转电流设置A

15.0

反转时间设置min

9.0

反转次数设置

10

运行时间设置min

16.0

启动时间设置

10

运行水位设置m

1.0

漏水保护

正常

过热保护

故障

缺相保护

正常

IO状态

故障信息

帮助

返回



故障报警画面 Failure Alarm Screen



故障信息 日期: 2017-06-06 18:10:18
 欢迎您, 管理员! 通信故障

时间	对象名	报警类型	报警事件	当前值	界限值	报
05-06 18:09:55	PLC通信故障	开关量报警	报警产生	开	开	与PLC

报警删除
 导出报警
 帮助
 返回

消音 故障复位

故障发生时,所有画面左上角闪烁显示▲,页面滚动文字显示故障信息,控制柜故障指示灯亮、蜂鸣器鸣响。同时,3G通信模块自动发送故障信息到管理人员手机上。

When the fault occurs, all the upper left corner of the screen flashing display, page scrolling text display fault information, control cabinet fault indicator light, buzzer ringing. At the same time, the 3G communication module sends the fault information to the manager's mobile phone automatically.

设备IO点状态 Device IO Point Status



IO故障 日期: 2017-06-06 19:13:15
 欢迎您, 管理员! 通信故障

10.0 一号泵漏水保护	正常	Q0.0故障指示灯	故障
10.1 一号泵过热保护	故障	Q0.1蜂鸣器	故障
10.2 一号泵缺相保护	正常	Q0.2一号泵运行	故障
10.3 二号泵漏水保护	正常	Q0.3二号泵运行	故障
.	.	Q0.4三号泵运行	故障
.	.	Q0.5四号泵运行	故障
.	.	Q0.6粉碎格栅正转	故障
12.0 粉碎格栅过热保护	故障	Q0.7粉碎格栅反转	故障
12.1 粉碎格栅相序保护	正常	Q1.0等离子除臭运行	故障
12.1 粉碎格栅漏水保护	正常	Q1.1等离子风机运行	故障

故障信息
 帮助
 返回

此画面显示PLC的IO状态,可帮助调试设备和故障排除。

This screen displays the IO state of the PLC, which helps debug the device and troubleshoot.

地图定位功能 Map Positioning Function



一号泵站
 液位: 0.5m
 一号泵: 静止
 二号泵: 静止
 粉碎格栅: 静止
 等离子除臭: 静止
 等离子风机: 静止
 故障信息: 无



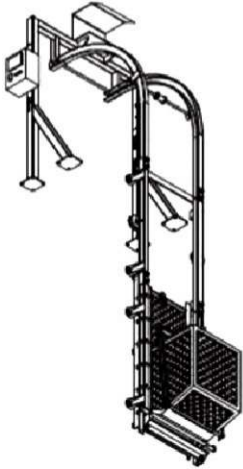
5

格栅系统 Grille system

一体化预制泵站可采用提篮式格栅和粉碎式格栅机。

The integration of prefabricated pump station can be used basket type grille grille and crushing machine.

提篮式格栅 Basket Type Grille



进水杂质较少时，宜采用提篮式格栅；
The water less impurity, should adopt the basket type grille;

提篮式格栅应耦合在进水管法兰面上，并配套导杆和提升链；
Basket type grille should be coupled in the inlet flange, and supporting the guide rod and the lifting chain;

格栅和挡水板等消能装置应分开设置；
The energy dissipation devices, such as grids and baffle plates, should be set separately;

格栅网间距不小于40mm；
The grid spacing is not less than 40mm;

格栅可人工手动或者轻型起吊装置提升，倾倒栅渣；
The grille can be lifted by manual or light lifting device, and the grid slag is dumped;

提篮式格栅的材质应采用不锈钢304材质。
Basket type grille material should be 304 stainless steel material.

粉碎型格栅机 Crushing Type Grille Machine

进水杂质较多时，宜采用粉碎型格栅机；

When the influent impurities are more, the crushing type grille machine should be adopted;

粉碎格栅应耦合在进水管法兰面上或者安装在预制格栅井内；

The grinding grille shall be coupled to the inlet flange surface or installed in the precast grille well;

配套粉碎格栅机的溢流格栅应加开检修孔，并配套导杆、提升链、进水渠和支撑架；

The overflow grille grille machine should be additional supporting crushing manholes, and supporting the guide rod, lifting chain, water drainage and support;

格栅支撑框架的强度应满足机械和液压符合要求；

The strength of the grid supporting frame should meet the requirements of mechanical and hydraulic requirements;

粉碎格栅机应配套提篮式格栅，以便检修时替换使用；

Grinding machine should be supporting the basket type grille grille, to replace the use of maintenance;

设置于污水和合流泵站的粉碎格栅机，应具备24h连续运行的能力

The grinding grid machine installed in sewage and confluence pump station should have the capability of continuous operation of 24h

设置于雨水泵站的粉碎格栅机，可以采用液位计控制启停。

The grinding grid machine which is set at the rain pump station can be controlled by the liquid level meter.

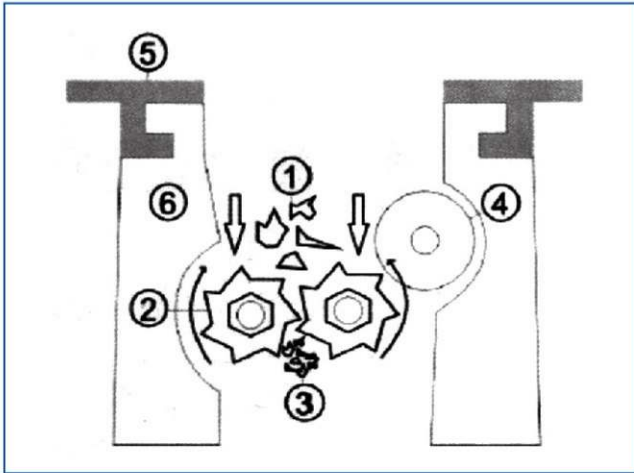


粉碎型格栅是一套完整独立的，通过电力或液压驱动的双轴剪切粉碎装置，能够把流体系统里经过的固体剪切成要求尺寸的较细小的颗粒(能够通过流体系统的泵阀等阻拦性设备的狭小流道)，使固液混合流体能够更容易的通过并排放。它能够有效的取代传统污水泵送排放处理系统里的各类阻拦或打捞式机械格栅。和传统各类机械格栅相比它设备尺寸小对场地的占地需求和土建规模都大幅降低，安装也极为简便，降低了系统的建设运行成本提高系统运行效率和可靠性。

Comminutor is a complete set of independent, biaxial shear driven by electrical or hydraulic crushing device can make the fluid system in solid shear through the required size into smaller particles (through the narrow channel fluid system such as valve block of equipment), the solid-liquid mixed fluid can be easily passed and discharge. It can effectively replace all kinds of blocked or salvaged mechanical grille in the traditional sewage pumping and discharging system. Compared with the traditional mechanical grille, it has a small size of equipment, a large reduction in the size of the site and the size of the civil construction, and the installation is also very simple, reducing the cost of construction and operation of the system, improving the efficiency and reliability of the system.

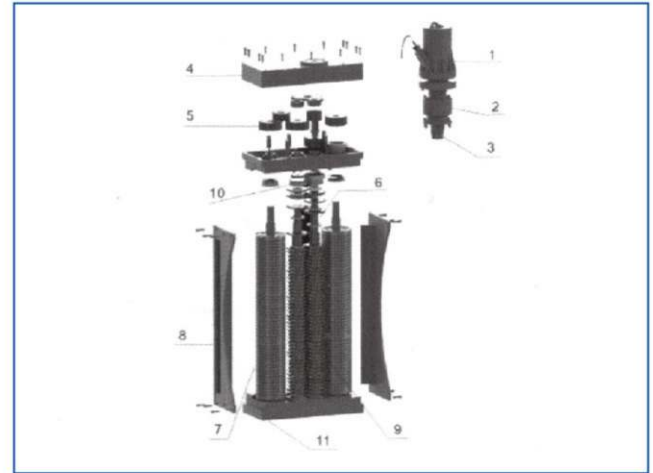


粉碎型格栅工作原理
Working Principle Of Grinding Grille



- | | | |
|----------------|------------------------|-------------|
| 1. 大块固体 | 2. 刀片组 | 3. 粉碎后的细小颗粒 |
| 1. large solid | 2. blade set after | 3. crushing |
| 4. 过流转鼓 | 5. 安装导轨系统 | 6. 机体 |
| 4. flow drum | 5. install rail system | 6. body |

粉碎型格栅由以下部件构成
The Grinding Grille Is Made Up Of The Following Parts:



- | | | | | |
|----------------|------------|---------------|----------------|---------------------|
| 1. 驱动电机 | 2. 减速机 | 3. 联轴器 | 4. 齿轮箱 | 5. 齿轮组 |
| 1. drive motor | 2. reducer | 3. couplings | 4. gearbox | 5. gear set |
| 6. 主轴 | 7. 转鼓 | 8. 侧板 | 9. 刀片组 | 10. 密封轴承担 |
| 6. main shaft | 7. drum | 8. side plate | 9. blade group | 10. sealing bearing |
| | | | | 11. 底座 |
| | | | | 11. base |

动力装置 Power Device

每一台粉碎型格栅都会配置一套电动机或液压马达作为驱动动力，为刀片组提供驱动能量。

Each grinding grille will be equipped with a set of motors or hydraulic motors as driving power to provide drive energy for the blade group.

端壳 Shell End

刀片组的主轴安装在底部和顶部的端壳里，特殊设计的端壳有坚固的力学性能为主轴提供有效支点，承受刀片剪切时产生的巨大径向负荷。同时专利设计的动态旋转密封装置在主轴旋转时不仅可以承受主轴的轴向负荷，也提供了可靠的动态密封，在主轴旋转时有有效的保护主轴轴承不被水和固体物侵蚀，延长轴承及驱动齿轮装置的使用寿命，提高设备可靠性。

The spindle of the blade is mounted on the bottom and top end shell, and the specially designed end shell has a strong mechanical performance to provide an effective fulcrum for the spindle, and bear the huge radial load when the blade is sheared. At the same time, the axial load dynamic sealing device in the patent design not only can withstand the spindle spindle, also provides a reliable dynamic seal in the protection of the spindle bearing spindle is not effective when water and solid material erosion, bearing and driving gears of the life, improve equipment reliability.

刀片&垫片组 Blade & Gasket Group

两套独立的刀片和垫片安装在两根平行的主动、被动旋转轴上，交替重叠，成螺旋状排列，能有效的粉碎垃圾等固体物，优化设计的刀尖结构可以提供最大的剪切捕获能力，轻易捕捉各种不规则固体物，优选的刀片材料和加工热处理工艺使刀片具有最锋利的剪切刃口和工作寿命，在恶劣环境下可以更持久的保持优良的剪切性能。

Two independent sets of blades and gasket installed in two parallel active and passive rotating shaft, overlapping, spirally arranged, can crush waste solids effectively, optimize the tool structure design provides maximum shear ability to capture, capture easily all kinds of irregular solids, preferably blade materials and processing of heat the treatment process of the blade has a cutting edge and the edge of the working life, can maintain lasting shear with excellent performance in harsh environments.





● 侧栏 Side Bar

引导剪切介质进入切割室；精密配合的梳齿可以将刀组上滞留的残留物清理干净。

The cutting medium is guided into the cutting chamber, and the fine fit comb can clean the remained residue on the knife set.

● 增流转鼓 Flow increasing drum

配合侧栏引导剪切介质进入切割室,经过工程优化设计的螺旋型转鼓还具有分配剪切介质的功能,使刀片组的剪切负荷分布均匀,提高刀片的剪切效率。同时转鼓的空隙可以有效的拓展格栅的流体通过流量。(单转鼓或双转鼓结构有转鼓)

With the side bar leading shear medium into the cutting chamber, the spiral drum with the optimized design has the function of distributing shear medium, so that the shear load distribution of the blade group is uniform, and the cutting efficiency of the blade is improved. At the same time, the gap of the drum can effectively expand the flow of the grille through the flow. Drum with single drum or double drum structure

● 自耦合安装器 Self Coupling Mounting Device

将自耦合安装器安装在格栅的工作工位后,就可以轻松方便的将格栅安放在工位上长期工作运行或是轻松的将格栅从工位上取出进行检修维护。

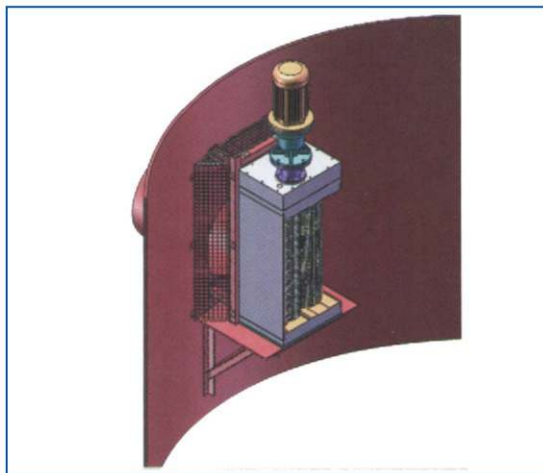
After installing the self coupling mounting device on the working station of the grid, the grid can be easily and conveniently placed on the work station for a long time, or the grid can be removed from the work station for maintenance and repair easily.

● 多功能控制箱 Multifunctional Control Box

控制并保护粉碎格栅运行。专为格栅运行定制的专业控制箱,为格栅运行过程中可能出现的故障提供了完善保护,以保证格栅的安全运行。为适应使用格栅的系统中的自动一体化控制,可要求选配485数据总线对格栅进行远程监管控制。

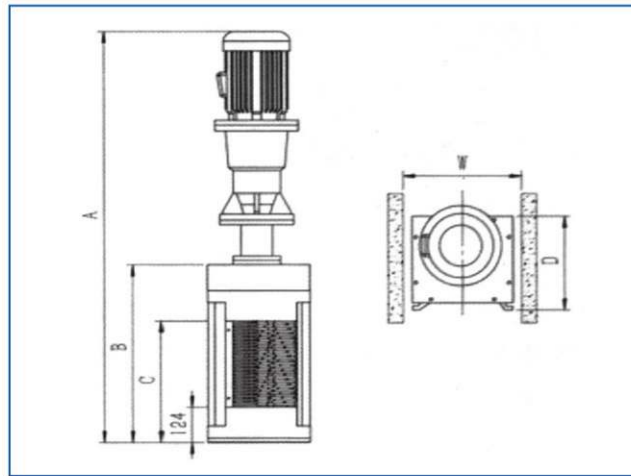
Control and protect the grinding grille operation. The special control box specially designed for the grid provides perfect protection for the possible faults in the operation of the grid, so as to ensure the safe operation of the grid. In order to adapt to the automatic integrated control in the grid system, the 485 data bus can be selected for remote supervision and control of the grid.

● 粉碎格栅机安装在预制泵站内部示意图 Sketch Map Of Grinding Grille Machine Installed In Prefabricated Pump Station





● 粉碎格栅结构及尺寸 Structure And Size Of Grinding Grid



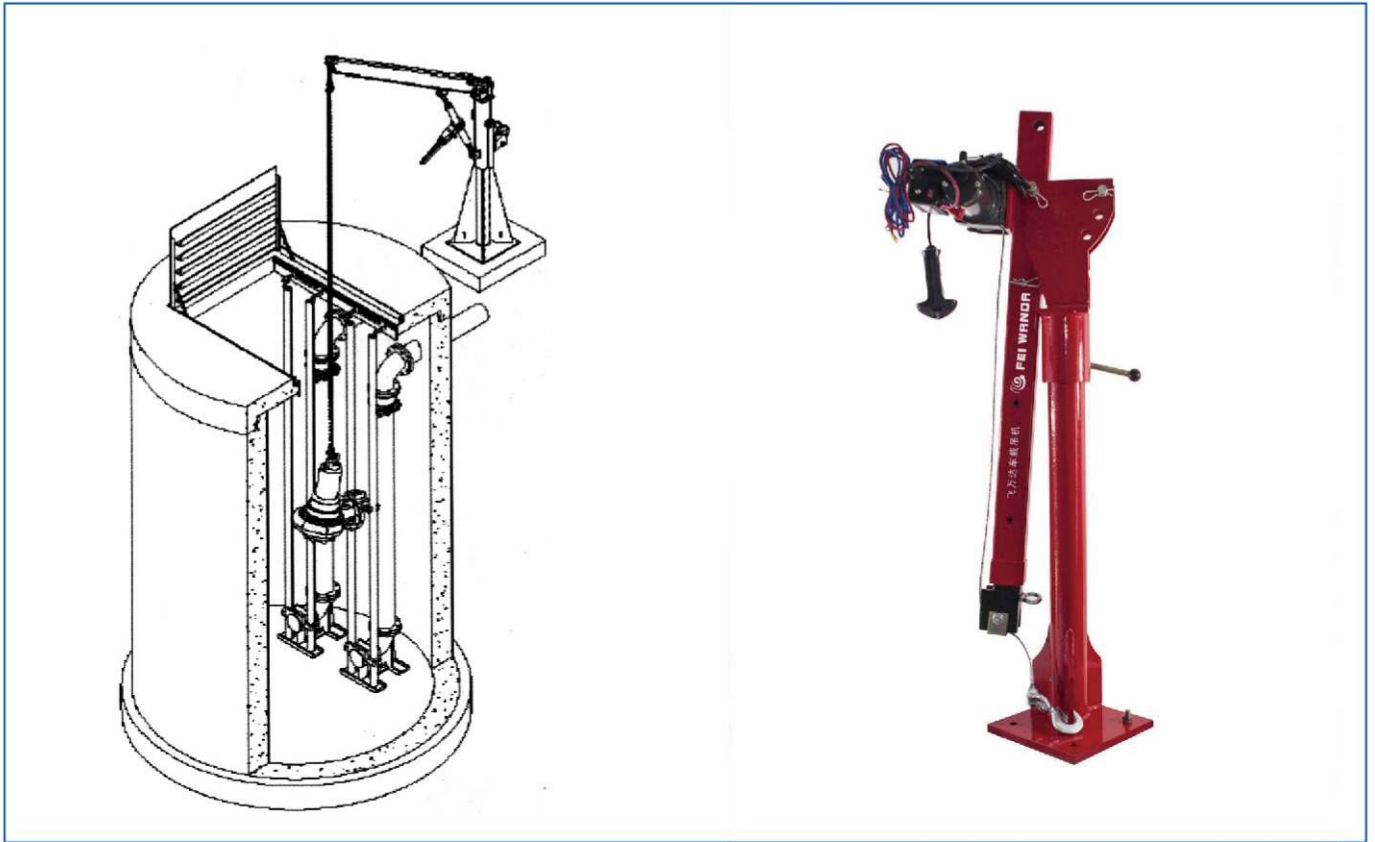
型号 Type	流量 Flow (m ³ /h)	水头损失 Head loss (mm)	功率 Power (kw)	规格尺寸 Specification size (mm)				最小渠宽 Min.channel width (mm)	大约净重 About weight (kg)	类型 Style
				A	B	C	D			
Sanicut-W500	50-180	100~400	2.2	1237	500	326	226	300	220	无鼓 No drum
Sanicut-W800	100-400	100~400	2.2	1538	787	627	246	300	280	无鼓 No drum
Sanicut-D600	200-500	100~300	3.7	1400	631	433	330	350	380	单鼓 Single drum
Sanicut-D800	600~800	100~300	3.7	1538	773	601	330	350	500	单鼓 Single drum
Sanicut-DI000	800-1000	100~300	3.7	1778	1013	815	330	350	700	单鼓 Single drum
Sanicut-D1200	1000-1300	100~300	3.7	1978	1213	1015	330	350	850	单鼓 Single drum
Sanicut-SI000	1700	100	3.7	1778	1031	815	350	750	580	双鼓 Double drum
Sanicut-S1200	2100	100	4	1978	1213	1015	350	750	680	双鼓 Double drum
Sanicut-S1400	2600	100	4	2178	1420	1220	450	1050	800	双鼓 Double drum
Sanicut-S1600	3100	10	4	2380	1625	1425	450	1050	1280	双鼓 Double drum



6

设备起吊装置 Equipment Lifting Device

——适用于小泵或者提篮式格栅
Suitable for small pump or basket type grille



额定起重量 Rated lifting capacity (T)	有效起重高度 (距泵站顶部) Effective lifting height (from the top of the pump station)	悬臂长度 Cantilever length (m)	钢丝绳直径 Diameter of wire rope (mm)	适用范围 (口径) Scope of application (caliber)
0.1 T	0.8m	0.6m	5mm	≤DN300
0.3 T	1.2m	0.8m	5mm	DN300~600
0.6 T	1.8m	1m	8mm	DN700~1000

**7****电磁流量计 Electromagnetic Flowmeter**

电磁流量计是利用法拉第电磁感应定律制成的流量计，当被测的导电液体，在测量管内以平均速度切割磁力线时，便产生感应电势。感应电势的大小与磁力线密度和导体运动速度成正比，所以当磁力线密度一定时，流量将与产生的电动势能成正比。测出电动势，即可算出流量。

Electromagnetic flowmeter is a flowmeter made by Faraday's electromagnetic induction law. When the conductive liquid is measured, the induction potential is produced when the magnetic field is cut at the average speed in the measuring tube. The magnitude of the induced potential is proportional to the density of the magnetic line and the velocity of the conductor, so that when the density of the magnetic line is constant, the flow will be proportional to the potential energy generated. The electromotive force can be calculated and the flow can be calculated.

**电磁流量计的特点 Characteristics Of Electromagnetic Flowmeter**

- 其传感器结构简单，工作可靠；
- 水头损失小，仅是测量管内的沿程水头损失，且不易堵塞，电耗少。
- 无机械惯性，反应灵敏，可以测量脉动流量，流量范围大，低负荷亦可测量，输出信号与流量成线性关系；测量精度约为 $\pm 1.5\%$ 。
- 安装方便，重量轻，体积小，占地小。

The sensor is simple in structure and reliable in operation;

The head loss is small, it is only the head loss along the measuring pipe, and it is not easy to jam, and the power consumption is less.

No mechanical inertia, sensitive response, can measure pulsating flow, large flow range, low load can also be measured, the output signal and the flow of linear relationship; measuring accuracy is about 1.5%.

It is easy to install, light weight, small size, small footprint.

安装注意事项 Installation Notes

- 环境温度： $-25\sim 60^{\circ}\text{C}$ 范围内；
- 相对湿度在10%~90%范围内
- 避免阳光直射和高温场所
- 避免电磁场干扰,远离大电器设备,如发动机、变压器等
- 为了保证测量精度，流量计前端要有一定长度直管段,90°弯头、T形管、同心异径管、全开闸阀后，需要离电极中心线5倍管径的直管;不同开度的阀则需要10倍于直径的管段。流量计后端直管段为2~3倍于直径的长度。
- 对于地下埋设的管道,流量计应安装在阀门井(预制井筒或现浇混凝土)内,上有盖板,并防止水的浸泡。
- 为了避免信号干扰，流量计的电源线和信号线应分别穿在两根不同套管内，信号线必须采用有接地保护作用的钢管。
- 在流量计下游应安装伸缩接头，便于维护拆装。

Ambient temperature: $-25\sim 60^{\circ}\text{C}$ range;

The relative humidity is within 10%~90%

Avoid direct sunlight and high temperature places

Avoid electromagnetic interference, away from large electrical equipment, such as engines, transformers and so on

In order to ensure the measurement accuracy, the front end of the flowmeter must have a certain length straight pipe section, 90 degree elbow, T shaped pipe, concentric diameter pipe, fully open gate valve, need to leave the center line of the pipe diameter of 5 times the diameter of the straight pipe; different opening valve needs 10 times the diameter of the pipe section. The length of the straight pipe at the rear end of the flowmeter is 2~3 times the diameter.

For underground pipelines, the flowmeter shall be installed in the valve shaft (prefabricated shaft or cast-in-place concrete), with a cover plate, and to prevent water immersion.

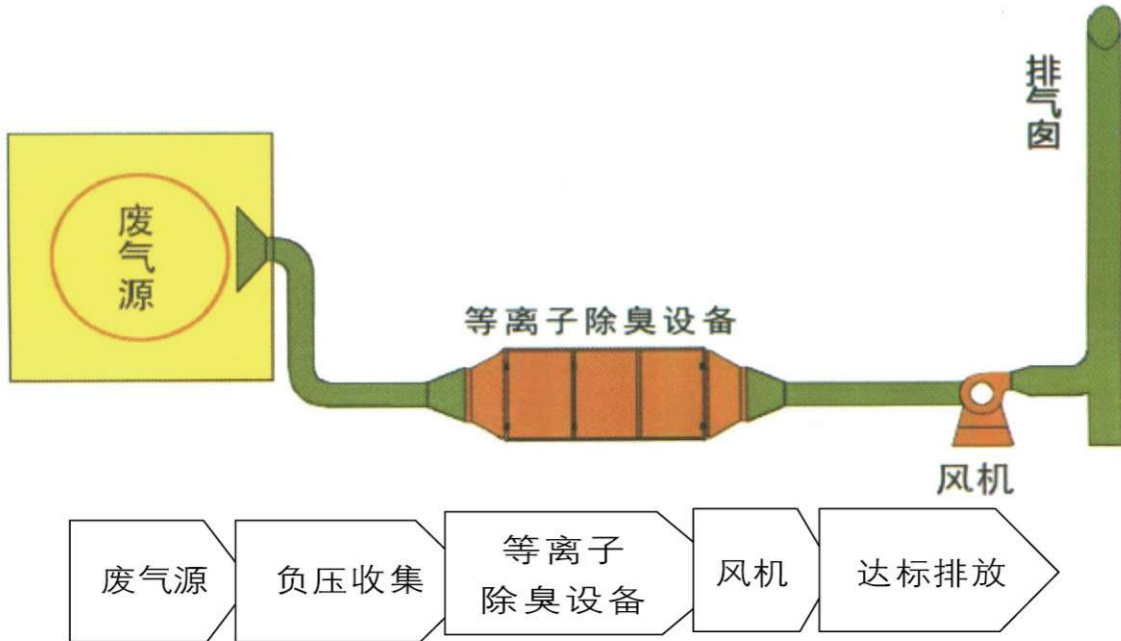
In order to avoid signal interference, the power line and signal line of the flowmeter should be respectively worn in two different bushings, and the signal line must adopt the steel pipe with grounding protection.

The expansion joint should be installed at the downstream of the flowmeter, which is easy to maintain and disassemble.



8

等离子除臭仪 Plasma Deodorization Instrument





低温等离子体是继固体、液态、气态之后的物质的第四态，当外加电压达到气体的着火电压时，气体被击穿，产生包括电子、各种离子、原子和自由基在内的混合体。放电过程中虽然电子温度很高，但重粒子温度很低，整个体系呈现低温状态，所以称为低温等离子体。

低温等离子体降解污染物是利用这些高能电子、自由基等活性粒子和废气中的污染物作用，使污染物分子在极短的时间内发生分解，并发生后续的各种反应以达到分解污染物的目的。

低温等离子体工业废气处理成套设备和技术作为一种新型的气态污染物的治理技术是一个集物理学、化学、生物学和环境科学于一体的交叉综合性电子化学技术，由于容易使污染物分子高效分解且处理能耗低等特点，是目前国内外大气、污染治理中最行之有效的技术方法之一，其使用和推广前景广阔，为工业领域VOC类有机废气及恶臭气体的治理开辟了一条新的思路。

Low temperature plasma is the fourth state of matter after solid, liquid and gaseous. When the applied voltage reaches the ignition voltage of the gas, the gas is breakdown and produces a mixture including electrons, ions, atoms and radicals. Although the electron temperature is very high in the discharge process, the temperature of heavy particles is very low, and the whole system presents a low temperature state, so it is called the low temperature plasma.

Low temperature plasma degradation of pollutants is the use of these high-energy electrons, free radicals and other active particles and pollutants in the exhaust gas, so that the pollutants molecules in a very short period of time to decompose, and subsequent reactions occur to achieve the purpose of decomposition of pollutants.

Low temperature plasma industrial waste gas treatment equipment and technology as a new technology of treatment of gaseous pollutants is a set of physics, chemistry, biology and Environmental Science in one of the cross integrated electronic chemical technology, due to the pollutants and molecular efficient decomposition of low energy consumption, is one of the most effective methods at home and abroad of the atmosphere at present, pollution control, its use and promotion prospects, opens up a new way of governance for industrial VOC organic exhaust gas and malodorous gas.

设备型号 Equipment type	配用电机 Matching motor		电压 Voltage (V)	转数 RPM (r/min)	风量 Air volume (m ³ /h)	全压 Total pressure (pa)	适用泵站 Suitable pump station
	型号 Type	功率 Power (kw)					
3.15A	Y801-2	0.75-2	380	2900	390-810	1919-1953	DN1200
3.55A	Y90S-2	1.5-2	380	2900	560-760	2545-2590	DN2000
4A	Y90L-2	2.2-2	380	2900	824-1264	3584-3597	DN3000
	Y100L-2	3-2	380	2900	1410-1704	2507-3253	DN3800
4.5A	Y112M-2	4-2	380	2900	1174-2062	4603-4447	
	Y132S1-2	5.5-2	380	2900	2281-2504	4297-4112	
5A	T132S1-2	7.5-2	380	2900	3166-3488	5697-5323	
	T160M1-2	11-2	380	2900	1610-3488	5323-5080	
5.6A	T160M-2	11-2	380	2900	2262-3619	7182-7109	
	T160L-2	18.5-2	380	2900	3996-4901	6954-6400	

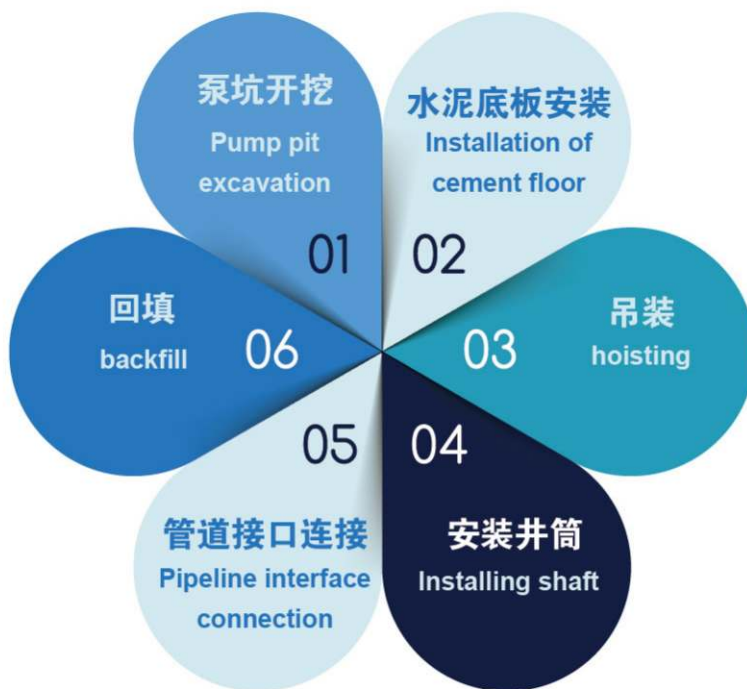


04

PREFABRICATED PUMP STATION INSTALLATION AND CONSTRUCTION METHOD

预制泵站安装及施工工法

● 施工工艺流程 Construction Technological Process





1 泵坑开挖 Pump Pit Excavation

泵井挖掘方式(要考虑斜坡的稳定性,可能的排水方式等)应适于当前的土壤环境。坑底边缘可做一个小型集水井,随时排水,保证坑底平面无积水。必须按设计图纸开挖,并制定开挖方案,在开挖时要密切关注基坑的安全。泵坑底部必须是干燥的,不允许有水,如有,必须采取适当的降水措施。采取合适的基坑维护方式,避免泵坑坍塌。坑底要挖平,如果有需要,铺上一层鹅卵石层,用夯实机压实,压实程度达到90%的压实试验结果。基坑开挖结束后,确认泵站进出水管连接管以及电缆等现场条件具备,才能进行泵站安装。

Pumping well excavation methods (considering the slope stability, possible drainage methods, etc.) should be suitable for the present soil environment. The bottom edge to a small set of wells, to ensure no water drainage, the bottom plane. The excavation must be designed according to the design drawings, and the excavation plan shall be worked out, and the safety of the foundation pit should be paid close attention to during excavation. The bottom of the pump pit must be dry and water is not allowed. If necessary, proper dewatering measures must be taken. Take proper pit maintenance to avoid collapse of pump pit. At the bottom of the pit to dig, if necessary, covered with a layer of gravel layer with no stone, ramming machine compaction, compaction degree of compaction test results 90%. After the excavation of the foundation pit, it is confirmed that the site conditions of the pump station, the inlet and outlet pipes, the connecting pipes and the cable, etc., can be used for the installation of the pump station.

● 泵站安装 Instalation Of Pump Station

- 按图纸设计的平面位置、标高及几何尺寸进行施工放样。
- 将基坑控制桩延长于基坑外2米处加以固定。
- 基坑开挖应保持有良好的排水,基坑外设置集水井,以利于基底排水。
- 用挖机开挖至中部,将上层填土挖除,然后用毛砂回填至基底高程。
- 基坑开挖后应检验基底承载力(基底承载力要求大于150kpa),若承载力达不到要求,应按监理工程师的指示处理。
- 基坑开挖过程中,若发现围护结构有渗漏必须及时封堵。
- Construction lofting according to the plane position, elevation and geometric size designed by the drawings.
- The foundation pit control pile is extended at 2 meters outside the foundation pit to be fixed.
- Well drainage should be maintained in foundation pit excavation and water collecting well is set up outside the foundation pit to facilitate drainage of foundation.
- For digging excavation to the middle of the upper filling excavation, and then use hair sand backfill to the base elevation.
- After foundation pit excavation, the bearing capacity of the foundation should be checked (the bearing capacity of the foundation is more than 150kPa). If the bearing capacity is not up to the requirements, it should be handled according to the instructions of the supervising engineer.
- In the process of foundation pit excavation, if the leakage of the retaining structure is found, it is necessary to plug it in time.



井底准备 Bottom Hole Preparation



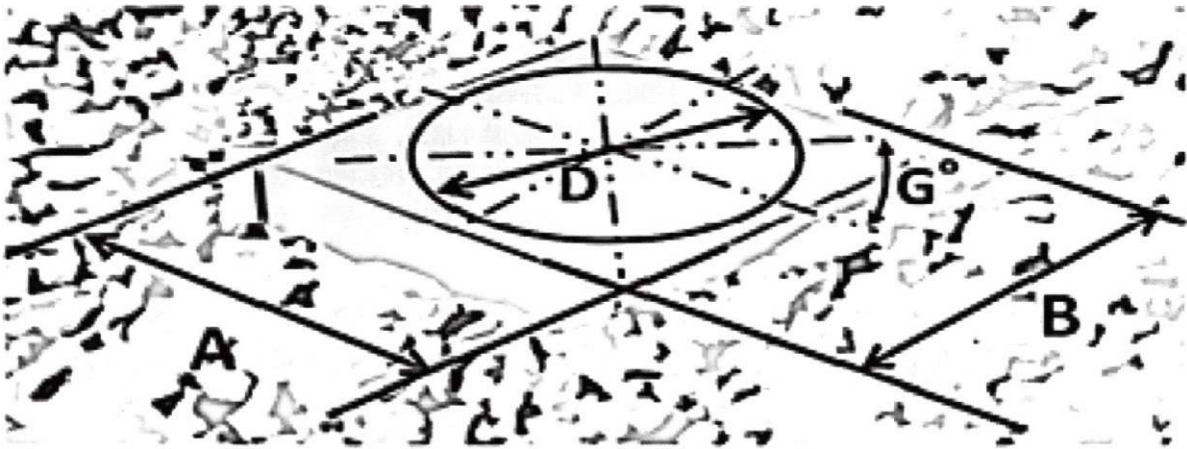
铺平井底,灌沙并夯实。如果有需要,铺上一层鹅卵石或碎石,用夯压机压实,压实程度达到90%的压实实验结果,如果是敏感性地基,在执行压实操作时,必须特别小心。检查并确认表面平坦、均匀一致。

Smooth the bottom of the well, fill the sand and tamp it. If necessary, lay a pebble or gravel, compacted with a compactor, 90% of compaction test results, if it is sensitive to the foundation, in the implementation of compaction operation, must be particularly careful. Check and confirm that the surface is flat and uniform.

注:混凝土底板可预制,也可以在基坑内直接浇筑。

Note: the concrete floor can be prefabricated, and it can also be directly poured in the foundation pit.

底板尺寸 Plate Size



D 泵站直径 Pump station Diameter(mm)	A, B长 length(mm)	底板厚度 Thickness of bottom plate (mm)
1200	≥2000	≥300
2000	≥3500	≥350
3000	≥5000	≥350
3800	≥6000	≥400



C30基础垫层 C30 Basic Cushion

模板加工及安装 Template processing and installation

模板采用外加工模板。模板的厚度、长度、横竖肋根据护栏尺寸、长度和模板周转次数确定。根据设计图纸和测量放线位置支设模板。相邻的模板用螺栓联接,模板搭接处夹海绵双面胶条密封。模板与混凝土接触面必须打磨光洁呈亮色,然后均匀涂刷脱模剂。模板尺寸要先经质检员进行自检,然后向监理进行报验,报验合格后方可进行下道工序。

The template adopts external processing template. The thickness, length, horizontal rib template is determined according to the size, length and guardrail touch board turnover.

Form the template according to the design drawing and the measuring position. The adjacent formwork is connected by bolts, and the sealing rubber is sealed on the double side of the sponge at the joint of the template.

The contact surface between the formwork and the concrete must be polished, bright and bright, and then be evenly coated with the release agent.

The template size must first be self inspection by the inspector, and then apply to the supervision, it can carry out the procedure inspection qualified rear.

浇注混凝土 Cast concrete

混凝土不得在一个地方集中下料,防止形成起伏不定的界面。浇注时间不得大于混凝土初凝时间。振动棒与模板的距离应保持5-10cm的距离,严禁振动棒直接接触模板。每一次振动必须振动至混凝土停止下沉,不再冒出气泡,表面呈现平坦、泛浆时方可提出振动棒。

Concrete shall not be concentrated in one place to prevent the formation of a fluctuating interface. Pouring time shall not be greater than the initial setting time of concrete.

The distance between the vibrating bar and the template should be kept 5-10cm distance, and it is strictly prohibited to contact the template directly with the vibrator. Each vibration must vibrate to the concrete to stop sinking and no more bubbles emerge. When the surface is flat and the slurry is thick, the vibrating bar can be put forward.

底板施工 Plate Construction

钢筋加工 Reinforcement Processing

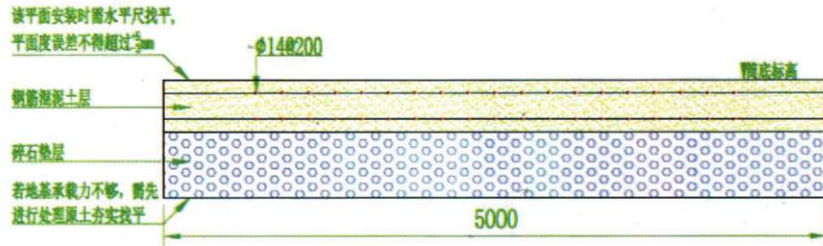
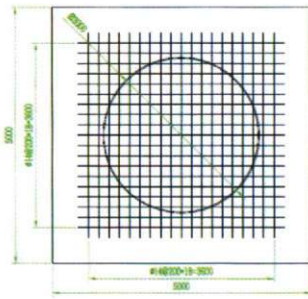
- 钢筋加工前,依据图纸进行钢筋翻样并编制钢筋配料单,以使钢筋接头最少和节约钢筋。
- 钢筋应平直、无局部弯折,对弯曲的钢筋应调直后使用。
- 钢筋加工前要清除钢筋表面油漆、油污、锈蚀等污物,有损伤和锈蚀严重的应剔除不用。
- 钢筋要集中加工,运至现场绑扎成型。

Before reinforcing steel bar, the reinforcement is turned on the drawing and the reinforcing material list is made, so that the steel joint is the least and the steel bar is saved.

Steel bar should be straight, no local bending, the bending of the steel bar should be adjusted straight after use.

The steel surface, paint, oil, rust and other dirt should be removed before the steel bar is processed, and serious damage and rust should be eliminated.

The steel bar should be centrally processed and transported to the site for banding and forming.



● 钢筋绑扎及安装 Banding And Installation Of Reinforcing Steel Bars:

按照设计图纸和测量放线位置进行钢筋绑扎。绑扎时要先绑扎立筋，立筋的位置调好后，再绑扎横向钢筋。先由质检员进行自检，然后向监理进行报验。检验合格后才能浇注混凝土。底板钢筋应与井壁、后浇隔墙的预留钢筋进行焊接。焊接长度不小于35d。

Binding the steel bars according to the design drawings and the measuring position. To tie Zhalil lashing bars, position adjustable vertical rib after securing transverse reinforcement. The inspector for self inspection and supervision to. The concrete can be poured after passing the test. The bottom steel bar should be welded with the reserved steel bar of the shaft wall and the back pouring wall. Welding length is not less than 35d.

● 浇注混凝土 Cast Concrete

- 混凝土应分层浇注，不得在一个地方集中下料，防止形成起伏不定的界面。浇注时间不得大于混凝土初凝时间。
- 底板浇注时保持地下水位在底板下0.5m。
- 底板浇注时应注意地脚螺栓预埋。

The concrete shall be layered and poured, and shall not be concentrated in one place to prevent the formation of a fluctuating interface. Pouring time shall not be greater than the initial setting time of concrete.

When floor is cast, keep the groundwater level below the floor 0.5m.

Pay attention to the embedment of anchor bolts when pouring the floor slab.

● 拆模养生 The Removal Of Health

混凝土浇筑完成后应根据混凝土强度能保证其表面及棱角不致因拆模而受损坏时方可拆模，对表面进行清理后洒水养生。

After the completion of concrete pouring should be based on concrete strength to ensure the surface and the edges will not be damaged because Chaimo can tear open mode, to clean up the surface after watering.

2 水泥底板安装 Cement Floor Installation

水泥底板安装必须是水平位置，安装在水泥底板上的地脚螺栓要先于泵体的放置。底板上平面必须打磨光滑。

地脚螺丝在一圈内均匀分角度安装。地脚螺丝要均匀安装。水泥底板尺寸应满足泵站抗浮的需要。必须保证混凝土基础干燥程度超过70%时才能安装。

混凝土基础的上平面必须打磨平整，安装泵站前需要清理泥土石块。

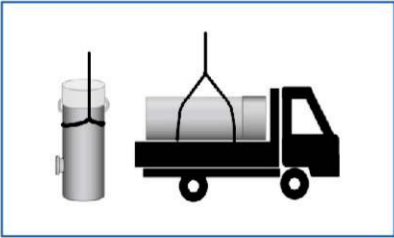
The cement floor must be installed horizontally, and the anchor bolts installed on the cement floor should be placed prior to the pump body. The upper surface of the floor must be polished and smooth.

The anchor screw is installed in a circle with a uniform angle. Anchor screws should be installed evenly. The size of cement floor should meet the need of anti floating in pump station. It is necessary to ensure that the drying degree of concrete foundation is more than 70%.

The upper surface of the concrete foundation must be polished and polished, and the soil stone should be cleaned before installing the pump.



3 吊装 Lifting



泵站运输必须水平位置放置,而且必须固定在运输底座上,用吊带和葫芦紧固。在安装和起吊至垂直位置之前,必须去掉泵站起吊装置和连接附件。在拆封区,应确保泵站不会倾翻和坠落。

Pump transport must be placed horizontally, and must be fixed on the transport base, with straps and hoist fastening. Before installation and lifting to the vertical position, the lifting device and the attachment must be removed from the pump station. In the open area, should ensure that the pump station does not tilt and fall.



应确保使用适当的起重或吊运设备从卡车上卸载泵站,吊具,吊索,卸扣的规格满足设备自重要求。并筒长度超过10m,需要用两台载荷适当的起吊设备作业。使用适当的吊索通过卸扣和吊耳起吊泵站。小心地卸载并安全放置在地面上,尽量使泵站底部整体同时着地,尽量避免底部圆弧局部承重。

用升降套索把泵站并筒从水平位置起吊到垂直位置。在这个工作阶段,壳体上的吊钩是不允许使用的。

水平移动及翻转泵站,用升降套索捆扎移动。应按照泵站实际的体积和重量选择合适的话的起吊设备规格及数量,保证起吊后平稳移动。

筒盖侧的吊耳上装好卸扣,用吊索穿过卸扣后挂在吊钩上,筒底侧将吊索捆扎在距并筒端约1.5m处后挂在吊钩上,两个吊钩同步水平吊起,先将并筒水平吊离地面10cm,确保吊点合理设备平稳。若并筒长度超过6m,需要用两台吊车作业。然后筒底侧保持一定高度悬空,筒盖侧持续升高至并筒接近垂直,然后缓慢下降至地面,整个底平面同时着地,避免并筒底部边缘单独触地。起吊前注意调整缆索位置,避免损坏上盖部件。缆索需按照图示对穿后进行作业。

垂直起吊时,要把重量均匀分配到4个吊钩上,起吊时,用起吊套索或吊绳来保护泵站和泵盖以免夹坏。

Be sure to use the appropriate lifting or lifting equipment from the truck unloading station, sling, sling, shackle specifications meet the equipment requirements of weight. When the shaft length is more than 10m, it is necessary to operate with two load appropriate lifting equipment. Use the appropriate sling by the shackle and lug lifting pump station. Unload carefully and put it safely on the ground, try to make the bottom of pump station at the same time, avoid the local load of the bottom arc as far as possible.

Lift the shaft of pump station from horizontal position to vertical position with lifting and lifting rope. At this stage, the hook on the shell is not permitted.

Horizontal move and turn over pump station, move with lifting noose. According to the actual volume and weight of the pump station, the specifications and quantities of the hoisting equipment should be chosen to ensure the smooth movement after lifting.

Lug cylinder cover side with shackle, using a sling through the shackle after hung on the hanger, the bottom of the tube side from the shaft end of sling strapping about 1.5m after hanging on the hook, hook two horizontal synchronous hoisting, the horizontal wellbore lifting off the ground 10cm, ensure the reasonable equipment smooth lifting point. The length of Wakawai is more than 6m and requires two cranes. Then the bottom of the





cylinder is kept at a certain height, and the side of the tube cap rises continuously until the wellbore is close to the vertical, and then slowly drops to the ground, and the whole bottom plane is simultaneously ground to avoid the sole touch of the bottom edge of the wellbore. Attention should be paid to adjusting cable position before lifting to avoid damage to upper cover parts. The cable should be operated according to the diagram. Vertical lifting, the weight evenly distributed to 4 hook, lifting, lifting sling or sling to protect the pump and pump cover to avoid bad clip.



4

安装井筒 Installing Shaft

用毛刷清洁混凝土底板表面，确保安装面和泵站安装法兰之间没有泥土等杂物。用起重吊钩吊起筒体，放在水泥底板上的地脚螺丝圈中间。操作时，不要把筒体碰到地脚螺丝，因为地脚螺丝易碰坏筒体表面。注意确认筒体的进出口方向正确性，要注意落在混凝土基础的中心位置，保证对压实层的压力均匀。检查泵站是否垂直。安装固定支架和拧紧螺母。

Clean the surface of the concrete floor with a brush to ensure that there is no dirt and other debris between the installation surface and the installation flange of the pump station. The lifting hook is used for lifting the cylinder, and is placed in the middle of the anchor screw ring on the cement bottom plate. When operating, don't touch the cylinder with the anchor screw, because the foundation screw is easy to touch the surface of the cylinder. Attention should be paid to the correct orientation of the inlet and outlet of the cylinder, and attention should be paid to the central position of the concrete foundation to ensure the uniform pressure of the compacted layer. Check whether the pump station is vertical. Install the fixing bracket and tighten the nut.



灌浆工序 Grouting procedure

用 C25 以上标号混凝土往泵站底座灌浆孔内灌浆,要求一定灌满。灌浆完成后,混凝土必须用震动棒排出空气,确保泵站底部与基础融为一体。沿着泵站底座四周均匀浇筑混凝土,高度不得低于 75cm。在混凝土灌浆过程中,在泵站内灌水至少至 1500mm 或至进水管底部,以此获得充足的平衡力。

With more than C25 mark concrete grouting into the grouting hole at the base of pump station, the requirement must be filled. After completion of grouting, the concrete must be discharged with vibrating rods to ensure that the bottom of the pump station is integrated with the foundation. Pouring concrete along the base of the pump station, the height shall not be less than 75cm. In the process of concrete grouting, pumping in the pump station at least to 1500mm or to the bottom of the inlet pipe, in order to obtain sufficient balance force.

5

管道接口连接 Pipeline Interface Connection



连接前,要在泵站井筒四周用鹅卵石或者沙子回填到连接管的最低面,并压实。进口端安装应检查:管和密封圈必须干净,进水管对准连接处,连接的地脚螺丝要紧固。法兰节要确保密封严实,对准管(无压力),对称均匀紧固。

Before the connection, it should be filled with pebbles or sand to the lowest surface of the connecting pipe around the shaft of the pump station and compacted. The installation of the inlet end should be checked: the pipe and the sealing ring must be clean, the inlet pipe is aligned at the junction, and the anchor screw to be connected shall be tightened. The flange section to ensure that the seal, alignment pipe (no pressure), symmetrical fastening.

6

回填 Backfill

回填前,检查并确认泵站周围的管道和电气连接件在回填过程中都得到充分的保护和支撑,以此确保压实操作时不会对其施加负载。要检查泵站没有经受结构性破坏。坑内的进水管要压实。回填材料一定要是鹅卵石或者沙子,颗粒最大尺寸不能超过 32mm,避免回填材料颗粒超过规定的最大尺寸。回填材料必须彻底压实,以确保周围材料稳固支撑泵站结构。然而,不能过度压实,因为回填材料压得越实,筒壁承受的水平力就越大。

回填层到筒壁30cm附近,严禁使用夯土机等设备。顶部的部件要安装在泵站的筑堤,泵站的顶盖要保持在地面的上部。

Before backfilling, the pipelines and electrical connectors around the pump station are adequately protected and supported during backfilling, so as to ensure that the load will not be applied during compaction operation. To check the pump station did not suffer structural damage. The entrance and exit of the pit should be compacted. Backfill material must be pebbles or sand, the maximum size of the particles can not exceed 32mm, to avoid backfill material particles exceed the specified maximum size. Backfill materials must be compacted to ensure that the surrounding material is stable and support the pump station structure. However, the compaction cannot be over compacted, because the more the backfill



material is pressed, the greater the horizontal force that the cylinder wall bears.

The backfill layer near the cylinder wall of rammed earth 30cm, prohibited the use of machines and other equipment. The top of the components to be installed on the upper part of the pump station pump station embankment, cover to keep on the ground.

回填注意事项: Backfilling matters needing attention:

- 地下的回填要压紧, 否则会导致进出口的管路受力, 泵站内部管道张力将作用到外部的管路。
- 当开始回填的时候, 不能将物料砂石从一边导入罐体单边受力, 会造成筒体变形泄露和损坏。
- 如果水泥底座不平, 泵站将会倾斜, 导致罐体破裂或泄露。
- 较大的石子坠入回填坑内, 如果轧在泵站的罐壁, 会损坏罐体。
- 挖掘计划是非常重要的, 否则容易使挖掘工作带来不正确的操作, 从而导致水泥地板安装后移位, 损坏泵站, 在回填时如果计划不周到, 地下水就会滋生, 有可能导致泵站上移。

The underground backfill should be compressed, otherwise it will lead to the stress of the inlet and outlet pipelines, and the internal pipe tension of the pump station will act on the external pipeline.

When the backfill is started, the sand and gravel can not be introduced into the tank side by side, which will cause the deformation, leakage and damage of the cylinder.

If the cement base is uneven, the pump station will tilt and cause the tank to rupture or leak.

Larger stones fall into the backfill pit. If it is rolled in the tank wall of the pump station, the tank will be damaged.

The excavation plan is very important, otherwise it will make the excavation work bring incorrect operation, resulting in the cement floor installation displacement, damage to the pump station, in backfill if the plan is not considerate, groundwater will breed, may lead to pump station upward movement.

● 液位计的安装 Installation Of Liquid Level Gauge

液位计电缆要使用适当的电缆网套, 并将电缆悬挂于电缆支架。安装固定液位控制器及悬挂电缆要避免缠结或末端在录站的入口, 同时也要检查控制器被障碍物干扰从而影响液位传感器的正常操作液位计装入专门的保护套管, 根据需求调节液位计的数据高度。

The level gauge cable should use the appropriate cable net sleeve and hang the cable on the cable bracket. Fixed level controller and suspension cable to avoid entanglement or at the end of the entrance recording station, but also to check the controller by the barrier interference and influence the normal operation of the liquid level sensor meter into the protective sleeve is special, according to the demand of the height regulating liquid level meter data.

● 水泵安装 Pump Setting

检查 Check

- 当打开泵站时检查并确认顶盖和安全格栅得到适当支撑。小心挤压引起损伤。
When the pump station is opened, check and confirm that the roof and the safety grille are properly supported. Carefully crush damage.
- 设备运输和地面安装后, 检查并确认泵站内所有设备已紧固妥当并处于正确位置。
After equipment transportation and ground installation, check and confirm that all the equipment in the pump station has been tightened up and is in the right position.
- 检查所有的电气连接。
Check all electrical connections.
- 清理井底碎片。
Clean up the bottom hole.
- 用水平仪或铅垂线检查并确认导杆放置的垂直度。
level or plumb line check and confirm the guide rod placed vertical degree.
- 确保电缆无锐弯或挤压。
Ensure no sharp bending or extrusion of the cable.



沿导杆放下泵。

Put down the pump along the guide rod.

当翻达底部,它将自动连接至预装配的出水连接。

When it is turned to the bottom, it will automatically connect to the prefabricated water outlet connection.

水泵可沿着导杆提升检查, 无需拆开任何连接件。

The pump can be checked along the guide bar without opening any connectors.

拉提升链固定在入口框架上的钩子上, 电缆固定在电缆支架上。

The lifting chain is fixed on the hook on the inlet frame, and the cable is fixed on the cable bracket.

● 粉碎格栅机安装 Crushing Grid Machine Installation

将电机与格栅连接法兰处的螺栓卸下, 然后将导杆支撑装在中间, 再将卸下的螺栓拧上;

Remove the bolts at the flange of the connecting flange between the motor and the grid, then support the support in the middle, and then unscrew the bolts;

将安装成一体的粉碎格栅的导杆支撑抓住导杆, 将格栅沿着导杆慢慢滑下到底;

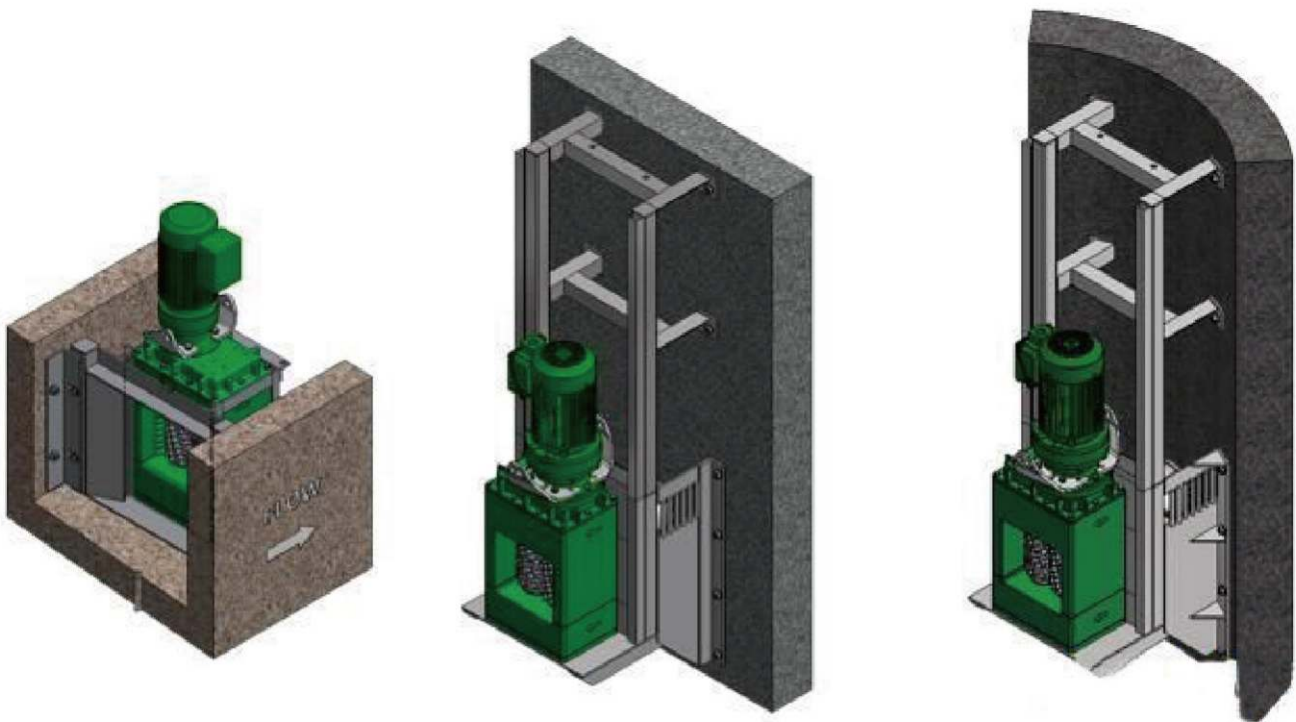
The guide bar of the grinding grid which is assembled into an integral body supports the guide bar, and slides the grille slowly down the guide rod;

将提升链固定在上部链勾上;

Fix the lifting chain on the upper chain hook;

下去检查放置是否平稳、牢固。

Go down and check whether the placement is stable and firm.





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