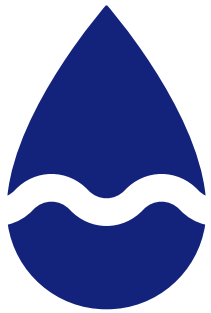
Hospital vacuum drainage plan

Hangzhou Juchuan Environmental Technology Co., LTD

Hospital drainage features



Wastewater is complex in composition

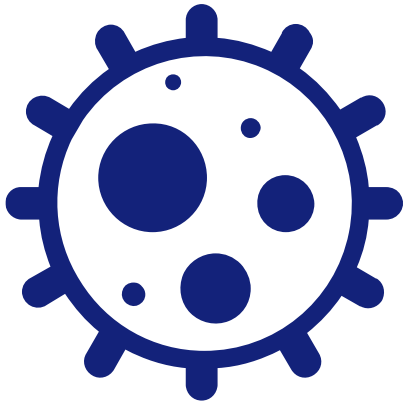
The sources and composition of hospital wastewater are complex. There is a lot of toxic, harmful, radioactive and heavy metal wastewater that must be collected separately and treated to meet standards before being discharged. If not properly treated, it can cause virus transmission and environmental pollution.

Complex building structures

The building structure of the hospital is complex, and the design must comply with various specifications and functional requirements, resulting in numerous and scattered drainage points in the hospital and a complex piping system. The design of the drainage system is particularly complex and poses significant challenges to the design and implementation of traditional drainage systems.

Large areas of drainage difficulties

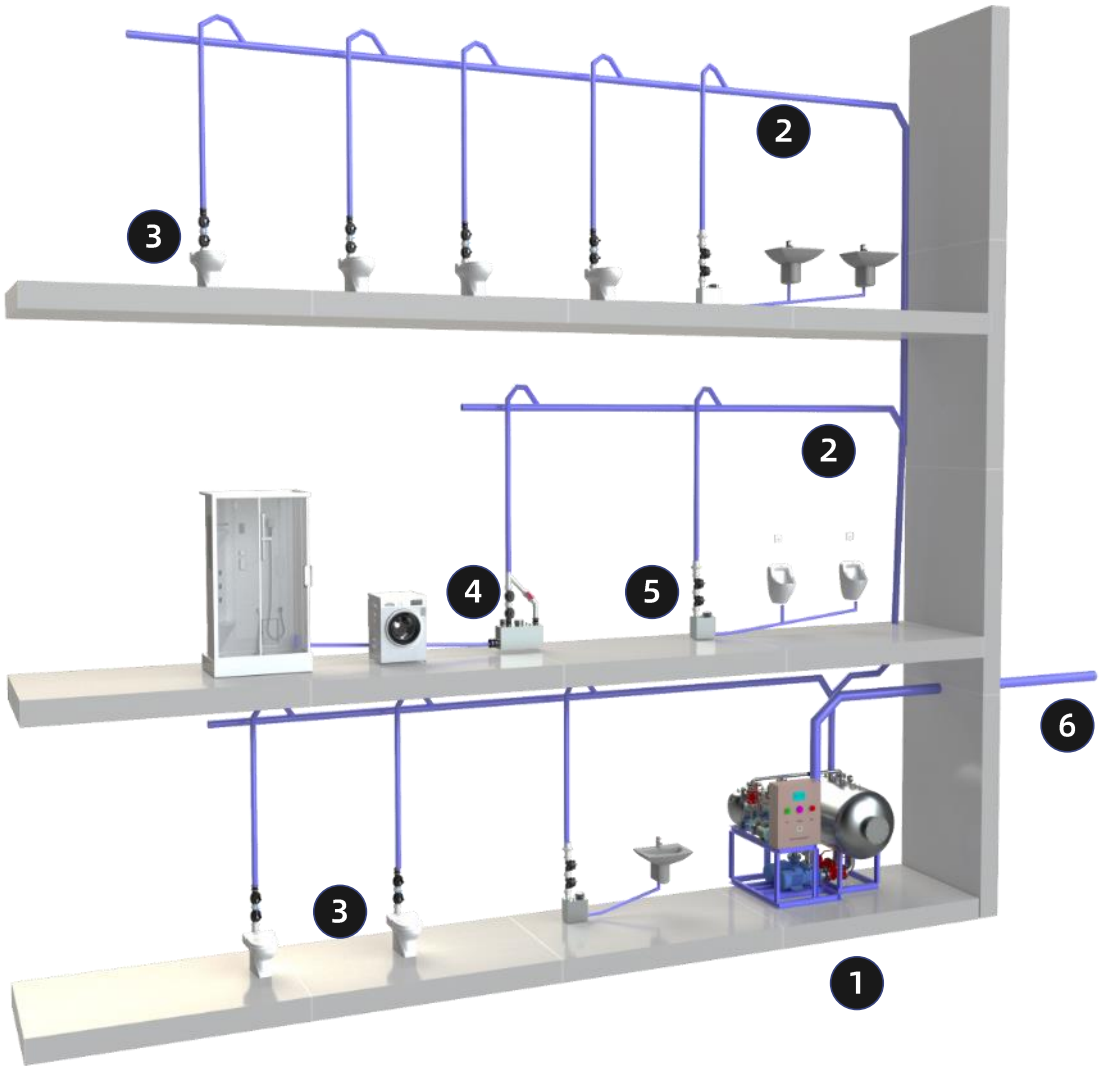
The hospital has a large amount of complex underground space, and the drainage above the civil air defense area cannot use the traditional gravity flow, which makes sewage discharge difficult. At the same time, the traditional sump and submersible sewage pump methods are prone to indoor air pollution, virus transmission, harm to maintenance personnel, and difficult maintenance.



Risk of infection

The hospital has a large number of people and patients' excrement contains many viruses. If there is a water seal failure and sewage leakage, it is easy for the virus to enter the room and increase the risk of virus transmission.

Diagram of the indoor vacuum drainage system



An indoor vacuum drainage system is a drainage system that uses negative pressure drainage, which is different from traditional gravity drainage systems and pressure (positive pressure) drainage systems. Compared with traditional drainage systems, it has unique advantages such as being environmentally friendly, water-saving, having good system airtightness, flexible drainage pipe laying methods, and convenient and quick construction.

The vacuum drainage system is mainly composed of vacuum units, vacuum pipelines, vacuum toilets, vacuum lifters, etc.

1. Vacuum pumping station

2. Vacuum pipe network

3. Vacuum toilet

4. Sewage lift

5. Wastewater lift

6. Pressure drain pipe

The main advantages over traditional drainage systems

- The system's water consumption is significantly reduced
- Without the need for continuous slopes, wastewater can be transported horizontally from above around obstacles, providing excellent flexibility in system layout

- Vacuum collection systems can significantly save space because the pipe diameters are much smaller
- Vacuum toilets are more comfortable and hygienic because they can effectively remove odors and droplets.
- There is no risk of wastewater leaking out of the system, as a burst pipe would cause air to leak into the pipe instead of sewage

- Building renovations, underground installations, shop renovations, or historic building refurbishments have all become easier and more cost-effective. Vacuum collection systems offer excellent design flexibility and do not require lift stations with multiple collection points underground.
- On ships and offshore facilities, vacuum collection systems can save space, water and weight.

Advantages of vacuum drainage systems

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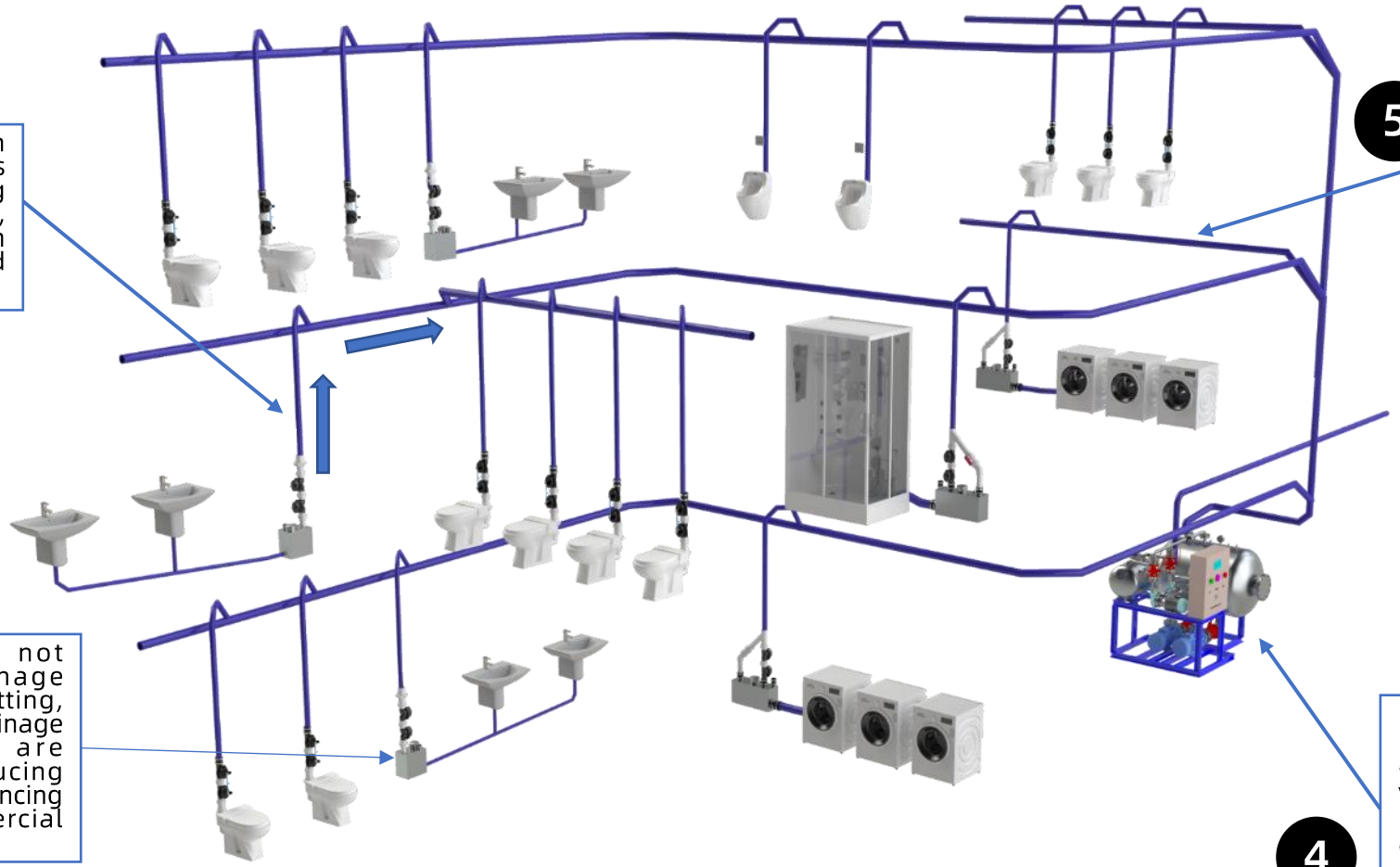

1. Vacuum pipes can drain water vertically upwards and horizontally over long distances. Flexible layout, shortened construction period and reduced construction cost.

2. Non-gravity pipes do not require reserved drainage conditions, and the splitting, merging, and building drainage renovation of shops are extremely flexible, reducing renovation costs and enhancing the flexibility of commercial recruitment.

3. Flexible vacuum drainage networks can easily achieve same-floor drainage without digging down, solving the problem of drainage networks not being able to pass under.

4. No need for multiple equipment rooms and sump pits, reducing civil construction costs, only one vacuum pump room equipment room, fewer equipment, less equipment floor space, reducing costs and improving commercial development benefits.

5. It can be transported over long distances without strict sloping, does not affect the ceiling height of the decoration, reduces costs and improves space utilization.

Advantages of vacuum drainage

Flexible collection of all kinds of wastewater

When it comes to our vacuum drainage technology, what we always mention first is the extraordinary ability to meet all the requirements. With two key features, we can adapt to every design task: • We can lift sewage to 4-7 meters • Transporting sewage has the ability to climb slopes and can transport sewage over long horizontal distances without the need for additional lift pumps. This flexibility is ideal for every designer: bathrooms can be set up where they need them, floors can be designed for completely different uses, and reconstructions will not affect other areas of the building. Simply put: A vacuum drainage system provides the best sewage collection solution for your building!

Effectively enhance the hygiene level of your interior

Although vacuum drainage systems are very flexible in design and construction, whether they can improve the sanitary environment within a building is also an important factor to consider for the drainage system. All traditional gravity flush toilets generate virus-containing aerosols in the air during flushing, causing foul odors, environmental pollution, and the risk of virus transmission.
It is well known that the backflush of traditional toilets can cause the spread of bacteria and viruses in the indoor air. But in fact, this also happens in washbasins and showers, where when a large amount of sewage enters the drain, it causes polluted air from the sewer to break through the trap and backflush into the room, spreading all kinds of bacteria and viruses.
This is not the case with our vacuum toilet, which relies on the mechanical seal of the diaphragm valve.
The vacuum pipe is a closed negative pressure pipe. When the vacuum toilet flushes, it only sucks away the sewage and takes away 60 liters of contaminated air. No splashing, no aerosol transmission - a common way for viruses to spread.
Washbasins and shower enclosures are separated from sewers by mechanical diaphragm valves without backflushing, effectively reducing the spread of bacteria.

Lower construction and operati

The vacuum drainage system can be transported over long distances without the need for sloping and additional lifting devices, with fewer equipment, and can effectively save on construction, ceiling decoration and equipment costs while maximizing the use of space. While saving costs, it also enhances the efficiency of construction projects.
Vacuum drainage pipes are flexible in installation, which can shorten the design and construction period and save labor and management costs.
Vacuum toilets can effectively save 90% of water. For commercial centers, high-speed railway stations and airports where restrooms are frequently used, they can significantly save water bills and the cost of building and treating sewage facilities at the back end, saving and being environmentally friendly.
The entire drainage system has only one vent pipe and one drain pipe for the vacuum unit part, reducing municipal connection costs. The system also has an online monitoring system that can detect equipment failures in time, effectively reducing the difficulty and cost of operation and maintenance.
In short: The vacuum drainage system effectively saves construction and operation and maintenance costs for your project!

Vacuum drainage versus gravity flow

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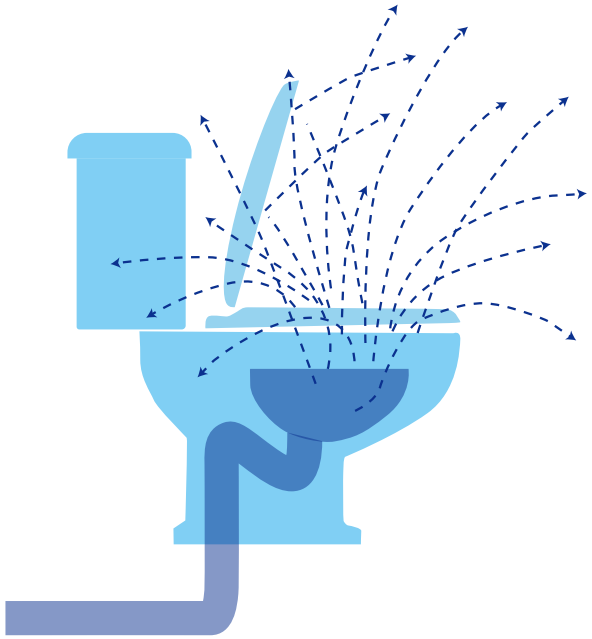
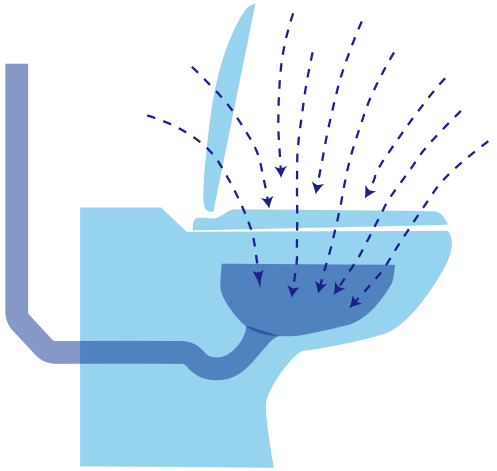
Vacuum toilets are cleaner, more hygienic and odorless than traditional water-flush toilets.

Flush toilet



Gravity toilets create turbulence in the toilet when flushed. As a result, water mists carrying millions of bacteria are produced and float out of the toilet, polluting the indoor air and causing odors and the spread of viruses.

Vacuum toilet



Vacuum toilets expel sewage by drawing air into the toilet under vacuum negative pressure, eliminating all splashes, fog and bacterial spread. Cleaner, more hygienic and odorless.

Vacuum drainage versus gravity flow

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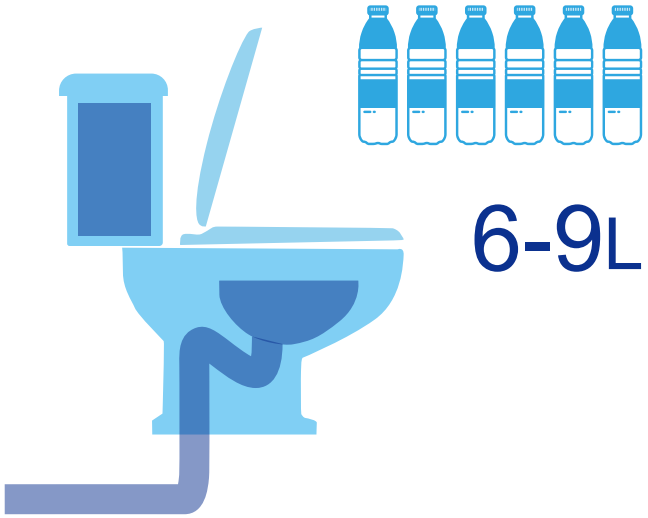
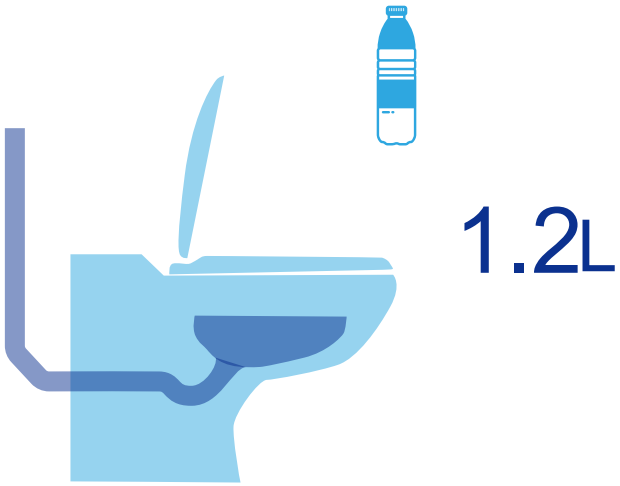
Vacuum toilets are more water-saving than traditional water-flush toilets, saving up to 80%.

Flush toilet



Vacuum toilet



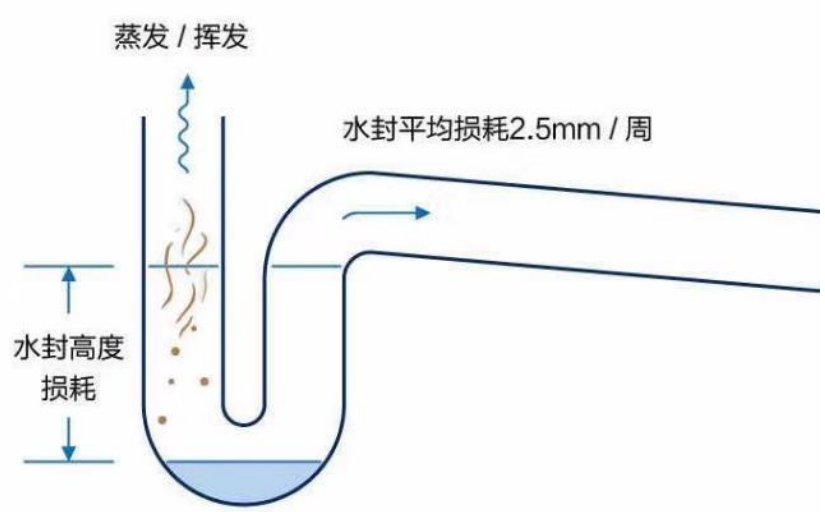
A water-flush toilet requires 6-9 liters of water for each flush. A vacuum toilet requires 1.2 liters of water for each flush.

High water consumption, high water costs, and high water treatment costs. Save 80% of water, effectively reduce water costs and water treatment c

Comparison of gravity flow and vacuum drain sealing

Vacuum drainage uses diaphragm valve mechanical seals, eliminating the risk of odor backflow and water seal failur

Gravity flow



Sealing is mainly done by the trap, but there are many risks of trap failure that can cause the water seal to fail, leading to odor backflow and causing indoor air pollution and virus transmission.

Vacuum drainage

Vacuum diaphragm valve mechanical seal

A vacuum diaphragm valve is used for sealing, and a double diaphragm valve is generally used on the pipeline. There is no risk of failure when, when the seal is not tight, air is drawn into the pipeline instead of the odor escaping.

Gravity flow versus vacuum drainage

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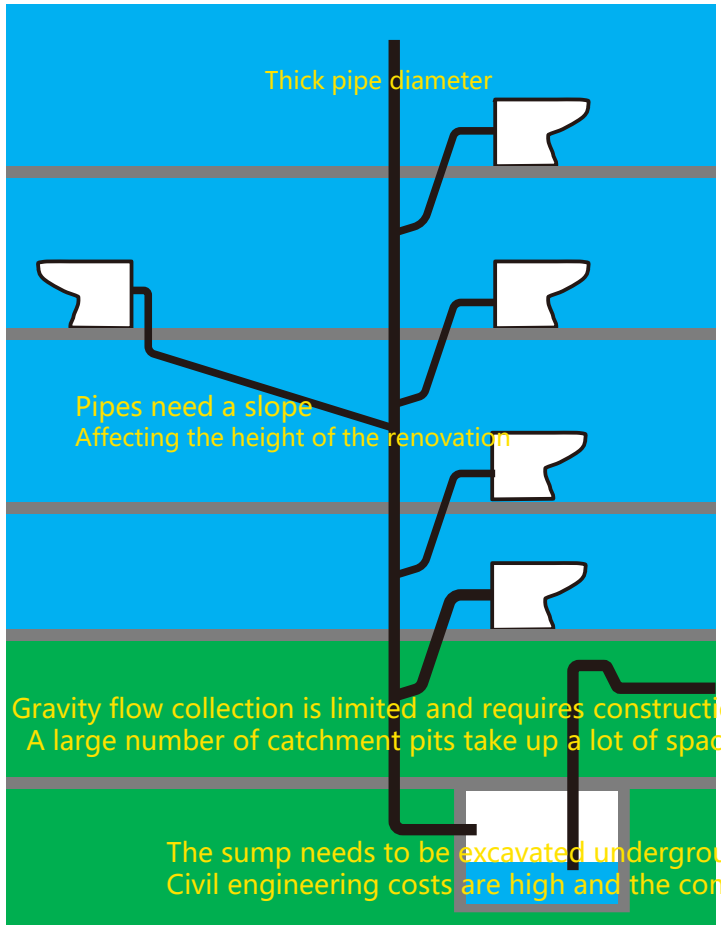
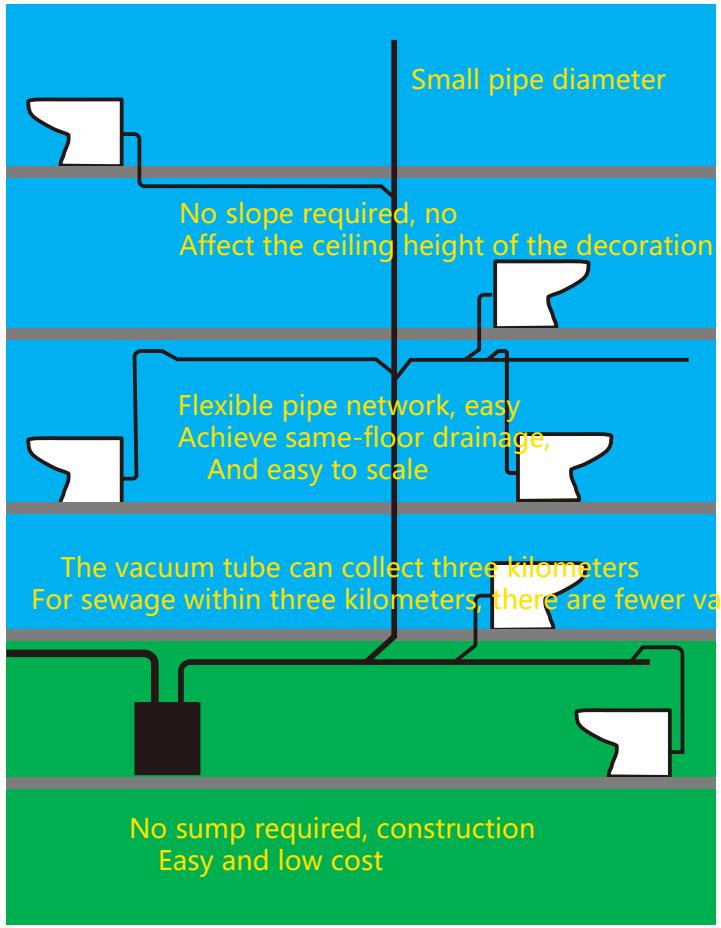
Gravity flow drainage requires the excavation and construction of catchment pits,
The pipe network requires a slope and takes up decoration space
The sump is poorly sealed and prone to unpleasant odors, requiring ventilation and deodorization

No need to build a sump, low cost
Flexible pipe network, short construction period, low cost, and effective space utilization.
Sealed collection, clean and hygienic

Gravity flow drainage



Vacuum drainage



Vacuum drainage requires no sump, flexible pipe network, short construction period and lower

Gravity flow versus vacuum drainage

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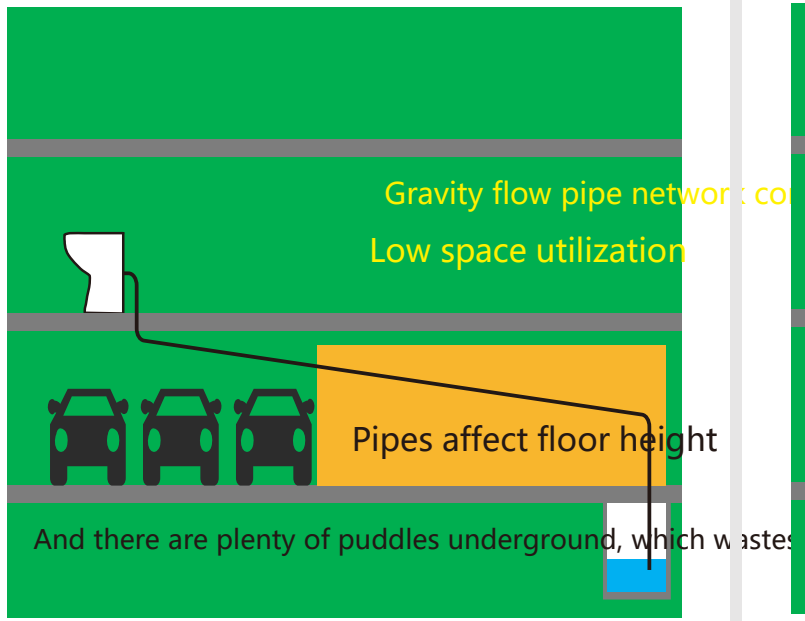
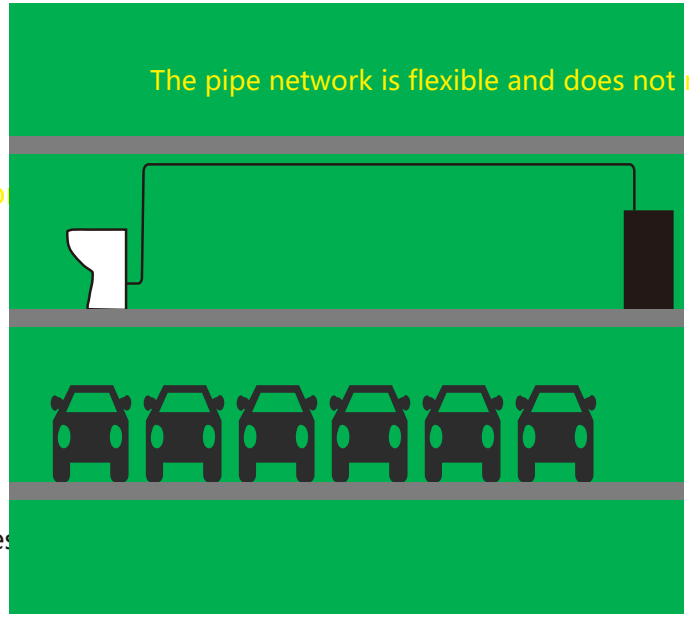
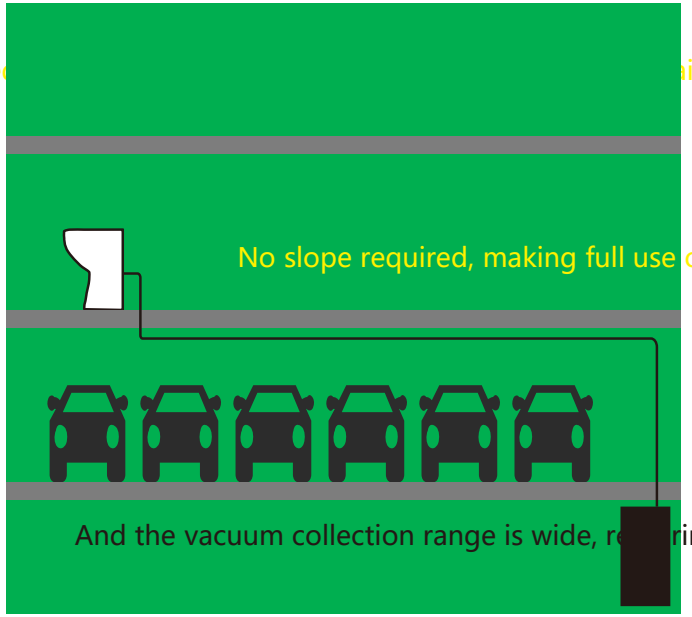
Gravity flow drainage



Gravity drainage is inflexible, only allows space to fit pipes, has low space utilization, low commercial efficiency, and is inconvenient to retrofit.

Vacuum drainage





Vacuum drainage networks are flexible, space can be effectively utilized, there are multiple options to choose from, construction is simple, and project costs can be effectively saved.

The vacuum drainage network is more flexible, bypassing obstacles and

Advantages for use in the medical building field

Significantly reduce the risk of cross-infection

Conventional gravity drainage systems in hospitals are prone to cross-infection through air-dried sewer floor leaks and drains. A vacuum drainage system is a completely sealed negative pressure system that is in a secret state under normal circumstances. When in use, air and space can only enter and the bacteria in the pipes cannot escape.

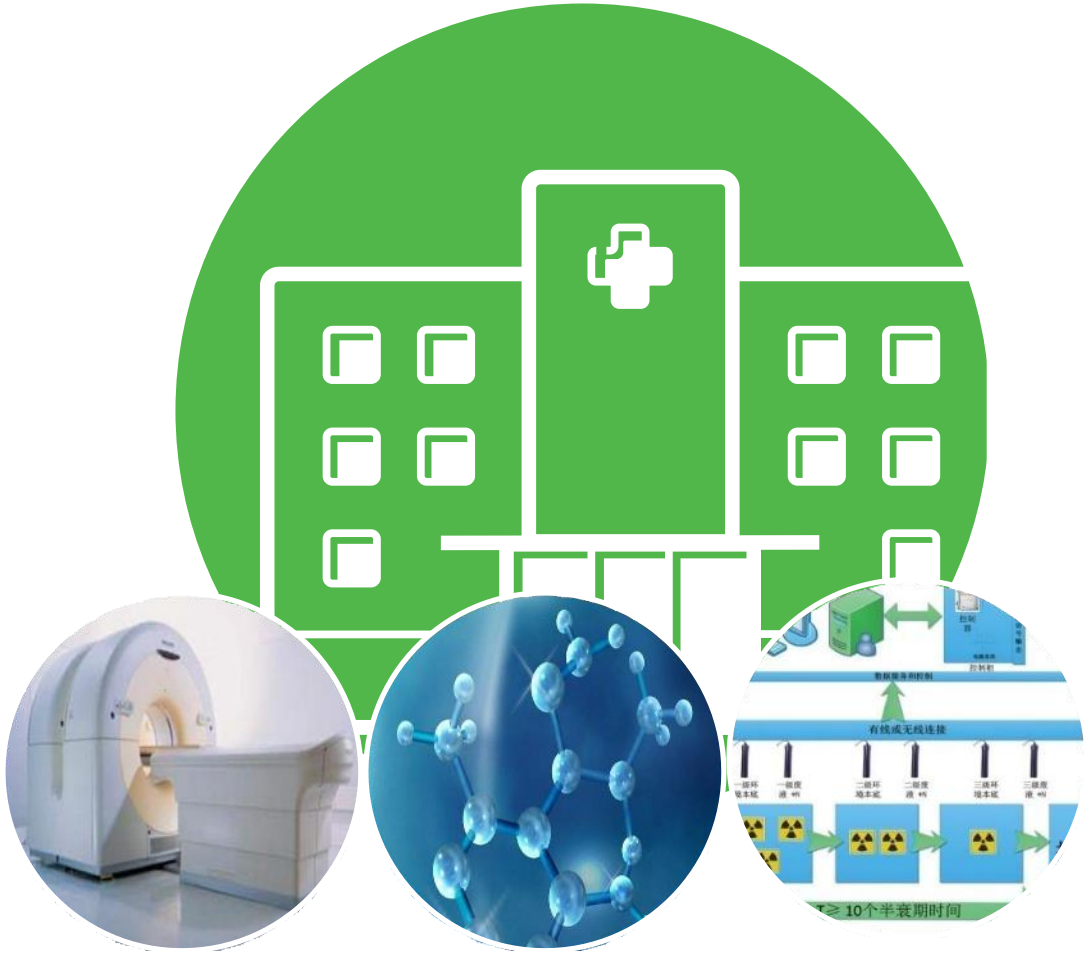
Vacuum drainage systems are particularly suitable for clean areas in hospitals (such as operating areas), negative pressure wards, infection buildings, etc.

Advantages for use in the medical building field

Clean, odorless bathroom environment

The operating principle of the vacuum system determines that during the operation of the system, a large amount of air in the usage environment enters the vacuum pipeline system under the effect of pressure difference, and at the same time, it takes away the foul smell, bacteria, secondary pollutants, solid particles, etc. present in the air, forming a clean and odorless bathroom system. Greatly improve the inpatient environment in hospital wards and the outpatient treatment environment.

Advantages for use in medical buildings



Superior water-saving capacity compared to traditional ones

Compared to the traditional 6 L per flush, the true empty toilet uses less than 1 L per flush, saving more than 80% of water.

Especially suitable for the discharge of radioactive wastewater in the nuclear medicine department of a hospital. Since radioactive wastewater needs to decay through decay tanks to meet standards before being discharged, such as iodine-131, which has a half-life of 8.3 days and typically needs to be stored for ten half-lives, approximately 90 days, to meet standards for discharge, the use of this system can reduce the volume of decay tanks by 80%, lower costs, and reduce radiation risks. (Meanwhile, the flow rate of water in the vacuum system pipe is 4-7m/s, compared to less than 1m/s in traditional gravity flow, which greatly reduces the retention time of radioactive substances in the pipe and lowers the radiation level)

Advantages for use in the medical building field

Not restricted by the functionality of the upper and lower floors

Many functional rooms in hospitals (such as operating rooms, rooms for important medical equipment, intravenous admixture centers, kitchens, distribution rooms, etc.) cannot have drainage pipes above them, so bathrooms cannot be set up on the upper floors, and the conventional scheme restricts the functional layout of the upper buildings.

The vacuum drainage system is completely free from the influence of the upper and lower floors, making the building layout more flexible and easier to modify and adjust later.

Advantages for use in medical buildings

Convenience and speed in new construction and renovation

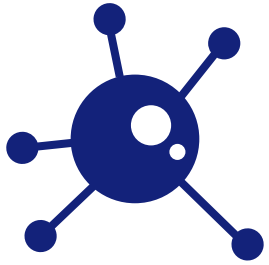
The vacuum drainage system pipes are laid within the ceiling of this floor without damaging the ceiling of the lower floor and without construction within the ceiling of the lower floor. The construction area only needs to be delineated within this floor. It is particularly suitable for the renovation and upgrading of hospital functional departments. The operation is flexible and does not affect the operation of departments on the upper and lower floors, solving a major problem of hospital renovation and upgrading.

Recommended application scenarios

Vacuum drainage systems can be widely applied in the construction and renovation of hospitals

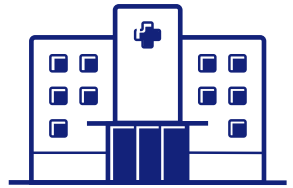
Underground public
Staff canteen

Radiology
department
Nuclear Medicine

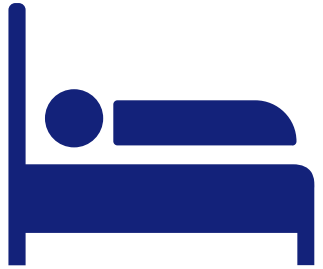


Hospital Infectious
Diseases
Biological Laboratory

Civil air defense
space
Large laboratory
area



Outpatient
Building
Public restroom



Hospital
Negative pressure
wards

Hospital underground public and staff cafeteria

Existing issues:

1.Tight hospital space: Most hospitals build their cafeterias on the basement floor, which poses challenges to the kitchen drainage system and dining environment due to the space layout.

Advantages of the vacuum drainage system:

1.Targeted solutions to underground drainage problems:

1. **Full sealed drainage: Reduce pipe blockage and odor emission, directly improve the dampness and odor problems of underground canteens, and enhance the dining environment.**
2. **High adaptability and flexibility: ✅ small pipe diameter, easy installation, flexible pipeline layout, suitable for complex underground space structures; ✅ High flow rate, less prone to clogging, ensuring efficient discharge of kitchen wastewater.**

2.Multiple benefits boost:

1. **Water conservation and emission reduction: More water-efficient than traditional drainage systems and lower sewage treatment load;**
2. **High space utilization: No need for large-diameter pipes, saving underground space and reducing construction costs.**

Radiology, nuclear medicine

Radioactive wastewater treatment requirements and challenges:

1.Special medical scenarios: Advanced radiological equipment in hospitals generates a large amount of radioactive wastewater, which requires strict treatment to avoid radiation contamination.

2.Treatment principles require:

- Full-process control (to prevent leakage), reduction (to decrease the total volume of sewage), and on-site treatment (to prevent transportation pollution).

Advantages of vacuum drainage system adaptation:

1.Meeting full control and safety requirements:

- The system operates in a closed manner, eliminating the risk of wastewater leakage, and is fully controllable from collection to treatment, avoiding the spread of radiation pollution.
- The piping layout is flexible to facilitate targeted radiation protection (such as shielding and protection design), in line with the principle of on-site treatment.

2.Achieve efficient reduction:

- The vacuum toilet requires only 0.8 liters of water for a single flush, significantly reducing the amount of radioactive wastewater produced compared to traditional drainage and lowering the treatment load from the source.

3.Flexible adaptation and cost optimization:

- The drainage units are flexibly arranged to fit the complex radiology department layout of hospitals and simplify the sewage treatment process;
- Reduce the volume of subsequent sewage treatment, lower long-term operation and maintenance costs, and balance safety and economy.

Nuclear Medicine Department - Single Vacuum toilet renovation plan

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A single vacuum toilet is designed based on the principle of vacuum adsorption and pressure discharge, featuring water conservation, cleanliness, compact equipment, and flexible installation.

Flexible

Pressure drainage, same-floor drainage

Flexible installation layout.

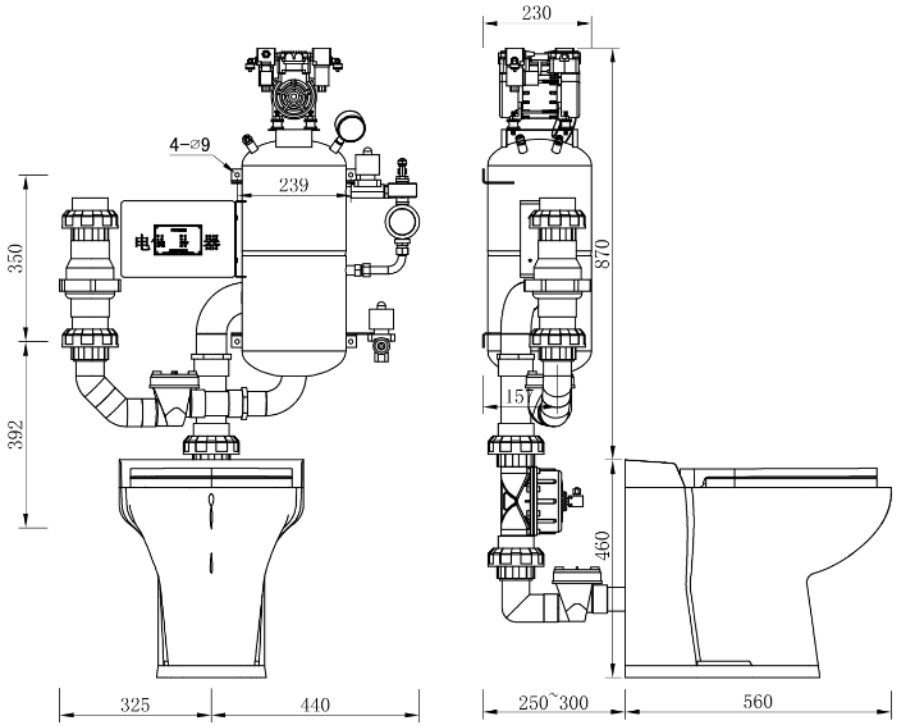
Clean

Negative pressure vacuum suction eliminates indoor air pollution and reduces virus transmission.

Water-saving

Just 0.8 liters per flush,

Save 80% of water.



Radiology, nuclear medicine - Single vacuum toilet retrofit

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Existing drainage problems in the nuclear medicine department:

1.Traditional toilets consume a lot of water: The nuclear medicine department now uses traditional water to flush toilets, which requires 3-6 liters of water for a single flush and generates a large amount of radioactive wastewater.

2.Increased storage pressure in the decay tank: The storage period for nuclear medicine wastewater has been extended from 90 days to 180 days, resulting in insufficient storage space in the decay tank and an urgent need to expand or optimize the drainage plan.

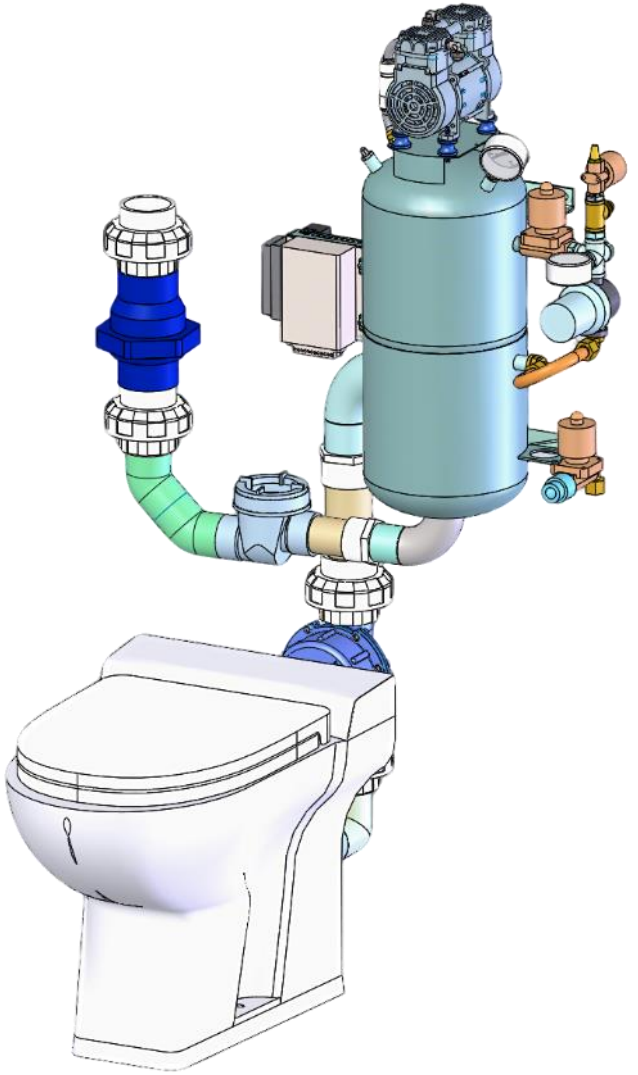
Advantages of the single-toilet solution:

1.Efficient water saving: Only 1 liter of water is needed for a single flush, saving two-thirds of water compared to traditional toilets, directly reducing water consumption.

2.Easy to install and low cost:

- No need to rely on vacuum pumping stations, can work independently, adapt to existing gravity flow sewage pipes, no need to build new sewage pipes;
- No need to expand the decay pool, significantly reducing the cost of renovation projects and sewage treatment.

3.Reliable performance and easy retrofit: With the characteristics of stability, reliability, cleanliness and hygiene, it is suitable for direct retrofit of existing nuclear medicine department restrooms with low construction difficulty.



Infectious disease departments and biological laboratories in hospitals

The sewage from the outpatient department, emergency department and wards of the infectious disease department is collected separately by vacuum drainage system. After collection, it is inactivated and then discharged into the sewage treatment station. Biological laboratories also need to be treated in a similar way. The vacuum suction of the vacuum toilet can suck up contaminated air around the toilet, effectively reducing the spread of viruses indoors. At the same time, the entire vacuum drainage system has a high level of sealing to prevent leakage of sewage and eliminate the spread of odors, viruses and bacteria. Vacuum drainage is the most ideal drainage method for infectious diseases and biological laboratories. After being collected under negative pressure vacuum, it is disinfected with chemicals and then discharged into the sewage treatment facility, which can completely eliminate the impact on the surrounding environment.

Hospital infectious disease department, biological laboratory

Drainage requirements for infectious diseases and biological laboratories:

- **High biosafety risk: The wastewater contains viruses, bacteria and other pathogens, which need to be strictly collected separately and inactivated to prevent spread.**

Core advantages of the vacuum drainage system:

1.Preventing virus transmission at the source:

- The suction function of the vacuum toilet can simultaneously adsorb polluted air around the toilet, reducing the risk of indoor aerosol virus spread;
- The system's highly sealed design prevents sewage leakage, cross-contamination and the spread of bacteria and viruses through pipes.

2.Specialized treatment process fit:

- **Separate collection + targeted treatment: Wastewater from infectious disease departments (outpatient and emergency departments, wards) and biological laboratories is collected separately, disinfected and inactivated with chemicals before being discharged into the wastewater treatment station, meeting the requirements of biosafety classification treatment;**
- The process is closed-loop and controllable, avoiding the risk of cross-contamination in traditional drainage systems.

3.Dual safeguards of biosafety and environmental friendliness:

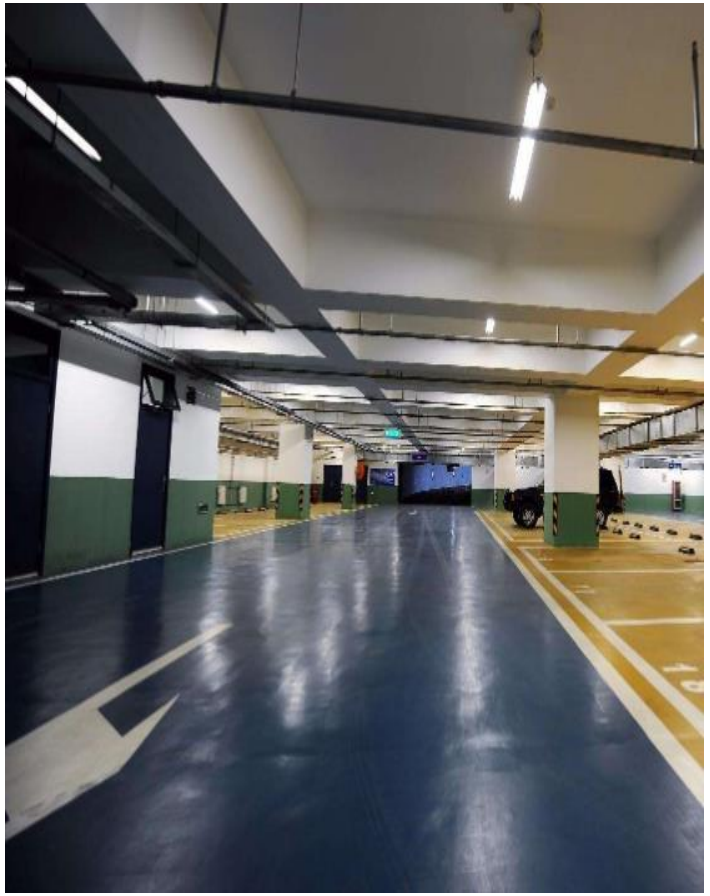
- The negative pressure vacuum collection mode cuts off the pathogen transmission path at the source and, in combination with subsequent disinfection treatment, completely eliminates biological contamination of the external environment;
- Adapted to the drainage needs of high-risk scenarios, it is an ideal choice for infectious disease departments and biological laboratories.

Large drainage points, civil air defense Spaces, large laboratories

Underground space and laboratory gravity flow drainage pain points:

1.Space constraints: Gravity flow requires sloped pipes, occupying floor height and affecting functional layout; No openings are allowed in civil air defense projects, and drainage paths are difficult to implement.

2.Environmental hazard: Insufficient pipe slope can cause sewage to accumulate, leading to the spread of odors and the breeding of mosquitoes, flies and bacteria, threatening hygiene and safety.



Core advantages of the vacuum drainage system:

1.Breaking through space limitations:

1. No slope design, small pipe diameter to release underground space height, suitable for airtight requirements of civil air defense (no need to penetrate holes);
2. Flexible cross-regional networking to solve large areas of complex layout drainage problems.

2.Fully sealed and environmentally friendly:

1. Negative pressure sealed operation eliminates odor overflow and bacterial spread, improving indoor air environment;
2. High-speed water flow (4-7m/s) reduces dirt retention and inhibits mosquito and fly breeding, meeting laboratory safety standards.

3.Efficient and reliable fit:

1. Active negative pressure drainage, not restricted by space depth or floor, reduces structural construction difficulty (no need to dig deep pipe Wells);
2. Shorten the construction period, save space renovation costs, and balance functionality and economy.

Public restroom in the outpatient building

The hospital outpatient department has a large number of patients and patients and a high flow of people. During daily use, the restrooms have problems such as easy clogging, frequent cleaning, high water consumption and strong odor. It also increases the risk of iatrogenic infections, making it difficult to improve the medical environment in hospitals.

Vacuum toilets with vacuum drainage have the advantages of low water consumption, vacuum suction of indoor space to reduce pollution, fast pipe flow, less clogging and less maintenance. It can significantly improve the medical environment.

Negative pressure wards in hospitals

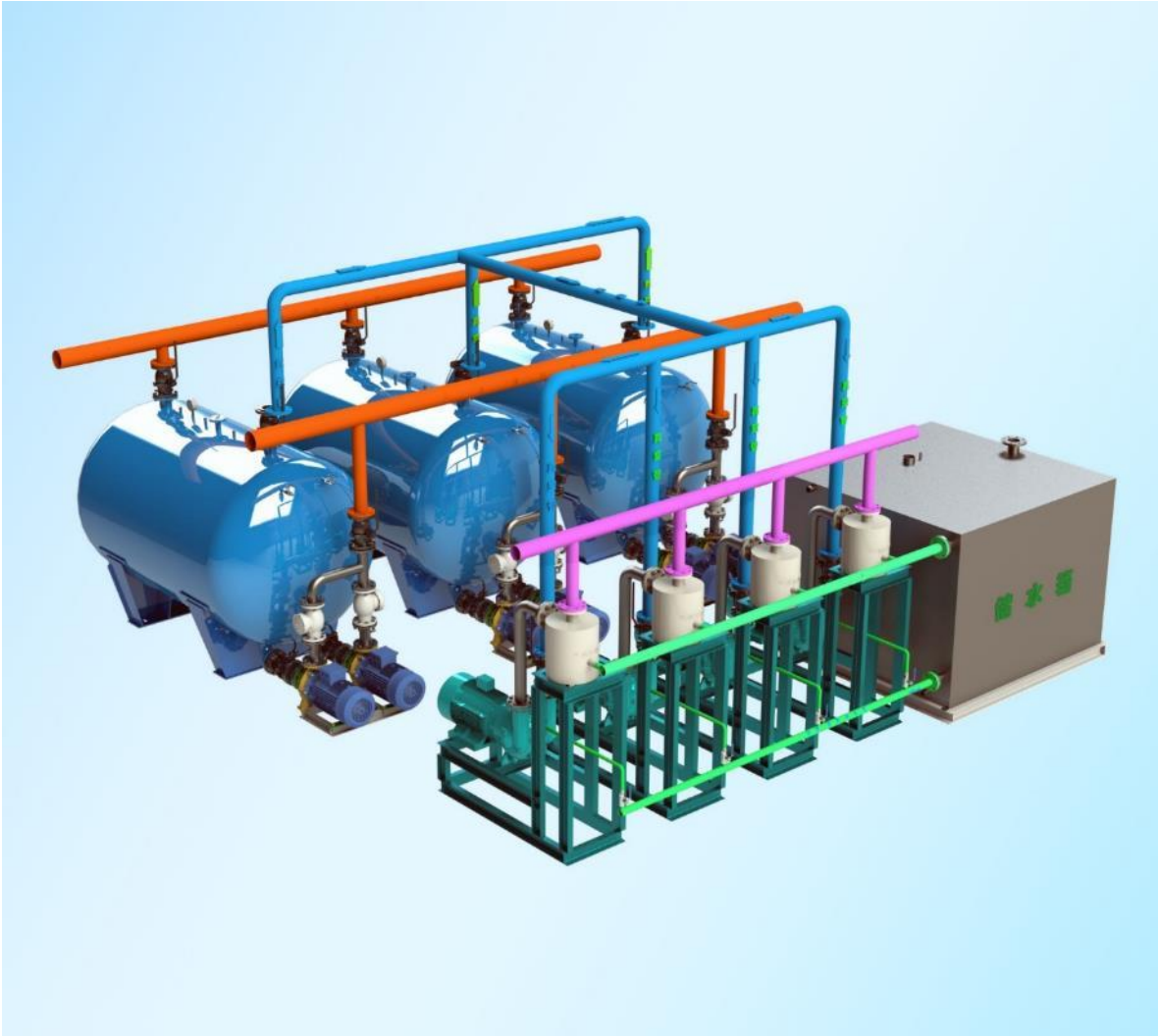
Improve the cleanliness of the wards

Effectively prevent the spread of viruses

Reduce the volume of wastewater and lower the cost of wastewater treatment

Juchuan Environmental Protection Vacuum Drainage System Features introduction

Juchuan Environmental Protection has produced more than 4,600 sets of vacuum drainage systems and has put them into extensive use. After years of experience accumulation and improvement, the products are very mature and stable. It has the characteristics of high equipment integration, compact design, small floor space and easy installation. It is also produced locally in China, which can stably control the quality and price of the products. Juchuan's vacuum units are designed with full consideration of equipment stability, featuring a redundant backup design, with vacuum pump groups backing up to each other, sewage pump groups backing up to each other, using different sensors for backup, and the pump groups working alternately, while strictly controlling the start-up frequency of the pump groups to extend the service life of the pumping station. At the same time, the system uses a highly reliable industrial-grade PLC control system, which operates reliably and has a high degree of automation.



Vacuum unit

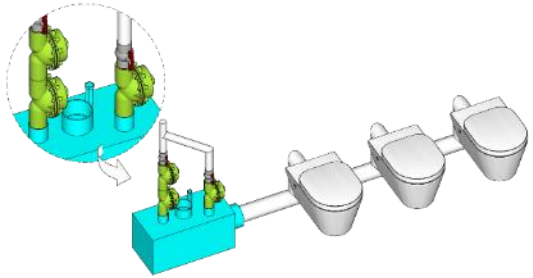
The equipment is independently developed by Hangzhou Juchuan Environmental Protection Technology Co., LTD. It has 1 invention patent, 4 utility model patents and 2 software control

Control system: Responsible for the operation and monitoring of the rectification system, all parameters are clear at a glance;

Vacuum pump set: Responsible for negative pressure supply to the vacuum tank and vacuum pipeline, two units in mutual backup and mutual use mode; Sewage collection tank: Negative pressure source, sewage collection and storage area, including liquid level sensing system;

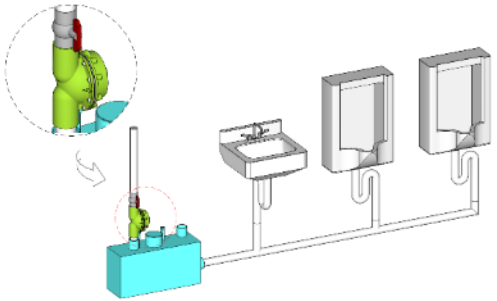
Sewage pump unit: responsible for the discharge of sewage, two units in mutual backup and mutual use mode;

Vacuum lift unit

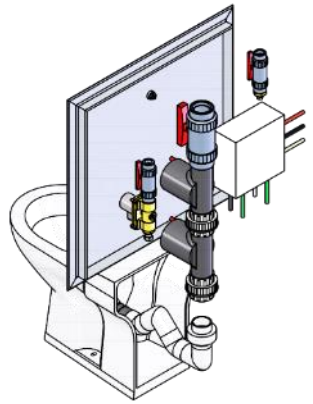


The vacuum sewage lift unit is used for domestic sewage discharge. The sewage can be collected through short-distance gravity flow and then lifted through the vacuum diaphragm valve assembly and vacuum pipeline.

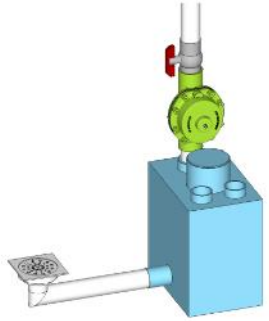
With a double-pipe, multi-diaphragm valve design, it can effectively prevent clogging.



The vacuum wastewater lift unit is used to collect domestic miscellaneous discharge wastewater and is designed with a double diaphragm valve to effectively enhance the reliability of the lift. The specific link is illustrated as shown above.



The vacuum toilet is used for sewage collection and discharge in the bathroom. It is designed with a double pipeline and double diaphragm valve, which is highly reliable.



The vacuum floor drain lift unit is used for the collection and discharge of sewage on the ground and other places, as shown in the picture above.

Vacuum drainage components

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Sensor controller

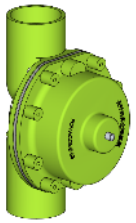
The controller is one of the key actuating elements in a vacuum drain system, driven by gas from a button source or gas from a floor drain sensor source, and controls the opening and closing of the vacuum diaphragm valve through the opening and closing of vacuum transmission.

Vacuum toilet

When using a full vacuum scheme, the vacuum diaphragm valve is directly connected to the vacuum toilet, which can achieve water-saving and effective odor absorption functions. There are multiple materials and types to choose from.

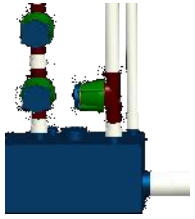
Vacuum diaphragm valve

The vacuum diaphragm valve is one of the key actuating elements in a vacuum drain system. Driven by vacuum, it controls the on-off of the vacuum pipeline by opening and closing the sealing diaphragm.



Lifter

A container for terminal sewage collection, with built-in sensors, when the sewage reaches the specified level, the vacuum diaphragm valve opens for suction. Different types of lifters are selected for different application scenarios, such as sewage lifters, wastewater lifters, floor drain lifters, and other custom lifters. It can be selected according to different application scenarios.



Vacuum tubing

Sewage is conveyed in the vacuum pipeline in the form of a gas-water mixture at a flow rate not exceeding 7m/s. Fast speed, less prone to clogging. For pipe laying, UPVC, stainless steel plated pipe, PE pipe or plastic-lined pipe (with pressure above 1.6MPa) is recommended as shown in the installation figure. PPR or hot-melt pipes are not recommended.

VACS series vacuum units

The vacuum unit is the core equipment of the vacuum drainage system, mainly used to generate vacuum and drain, and complete the management and control of each collection terminal. The equipment is designed as a whole, with high integration, easy installation and small floor space. All components related to faults of the vacuum unit adopt standby mechanism, Vacuum pumps serve as backups for each other, sewage pumps serve as backups for each other, and two sets of liquid level sensing devices, pneumatic control and electrode, complement each other. The equipment is stable and reliable.

Equipment Name: VACS Series Vacuum Unit

Equipment model: VACS series

Control mode: PLC automatic control

Power supply parameters: AC380, 20KW/H or 30KW/H

Equipment material: 304 stainless steel

Equipment volume: 0.6m³, 1m³, 2m³, 3m³, 4m³, 5m³, 10m³

Vacuum pump sets: 2 units, maximum suction volume per unit 80㎥/h, maximum vacuum degree -0.098MPa

Sewage pump set: 2 units, flow rate per unit: 25㎥/h, head 28m

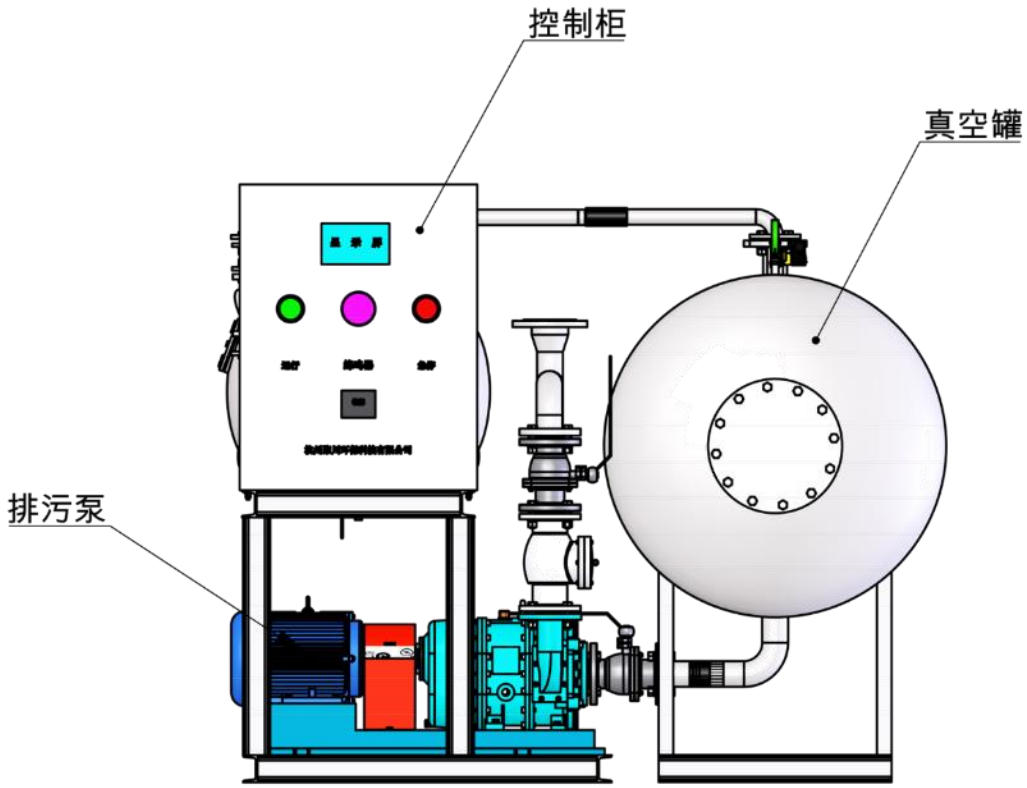
Inlet size: Φ100

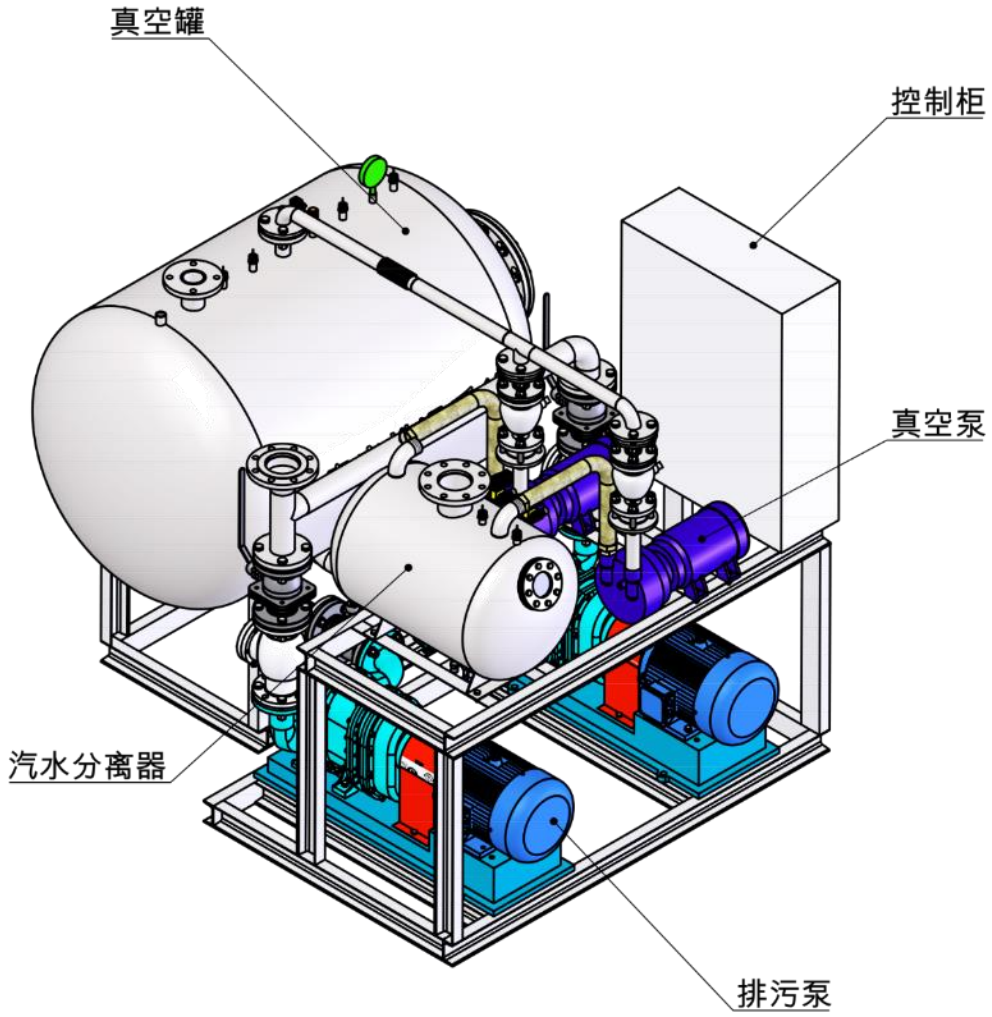
Export size: Φ100

Equipment weight: 1900KG

Note: The above parameters are for reference only and may be determined based on configuration

Diagram of the composition of VACS series vacuum units





VACS Double tank vacuum unit

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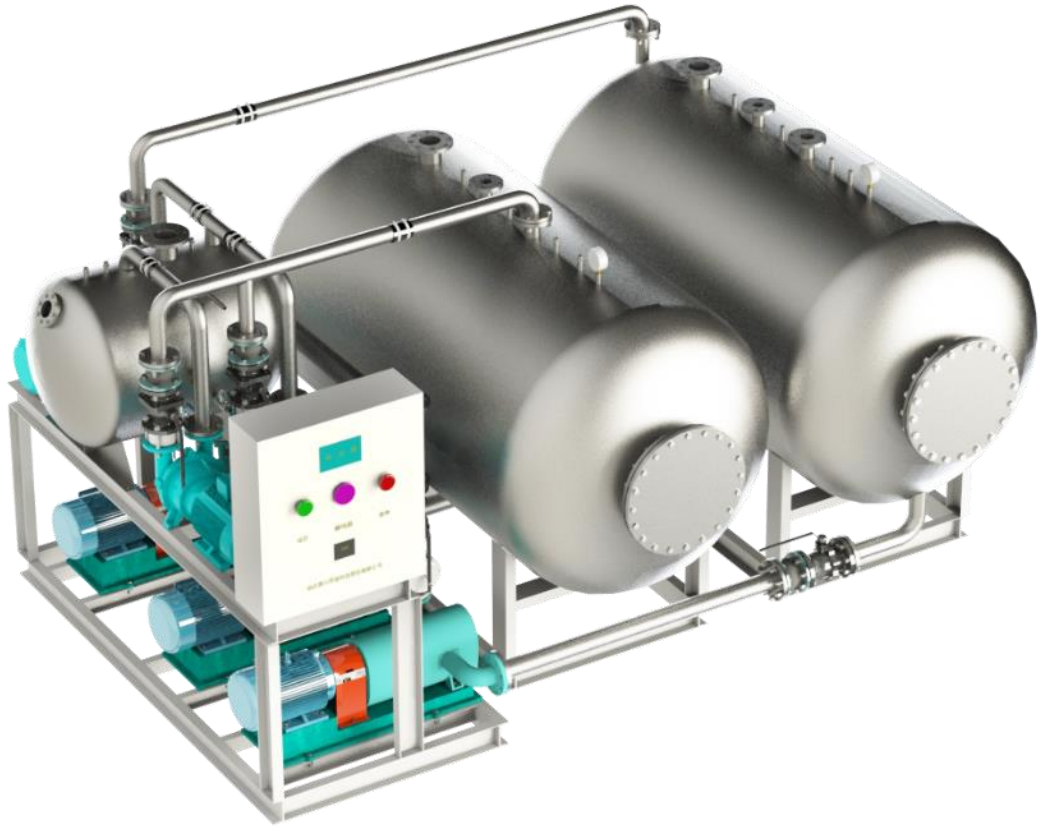
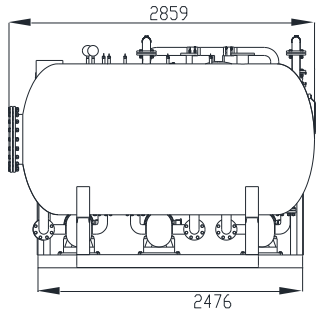
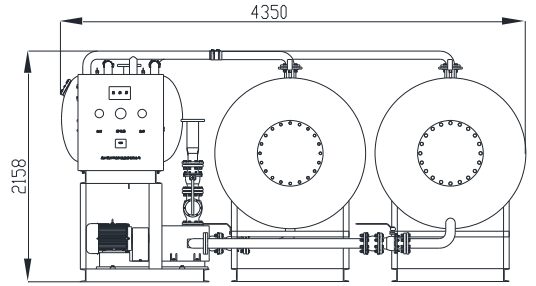
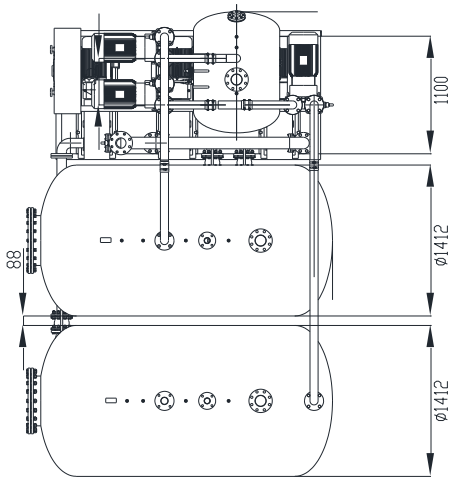
Double tank vacuum unit, separate collection of different types of water.









Custom vacuum drainage pumping stations

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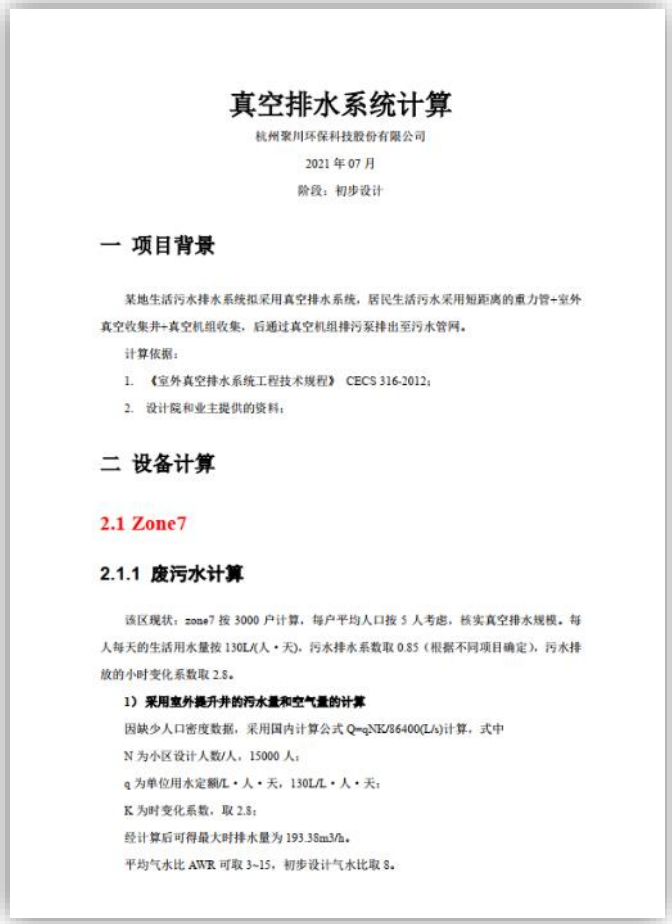
Juchuan Environmental Protection has a professional design team that can provide professional advice and



真空排水系统计算

杭州聚川环保科技股份有限公司

2021 年 07 月

阶段：初步设计

一 项目背景

某地生活污水排水系统拟采用真空排水系统，居民生活污水采用短距离的重力管+室外真空收集井+真空机组收集，后通过真空机组排污泵排出至污水管网。

计算依据：

1. 《室外真空排水系统工程技术规程》 CECS 316-2012；
2. 设计院和业主提供的资料；

二 设备计算

2.1 Zone7

2.1.1 废污水计算

该区现状：zone7 按 3000 户计算，每户平均人口按 5 人考虑，核实真空排水规模。每人每天的生活用水量按 130L/(人·天)，污水排水系数取 0.85（根据不同项目确定），污水排放的小时变化系数取 2.8。

1）采用室外提升井的污水量和空气量的计算

因缺少人口密度数据，采用国内计算公式 Q=qNK/86400(L/s)计算，式中

N 为小区设计人数/人，15000 人；

q 为单位用水定额/L·人·天，130L/L·人·天；

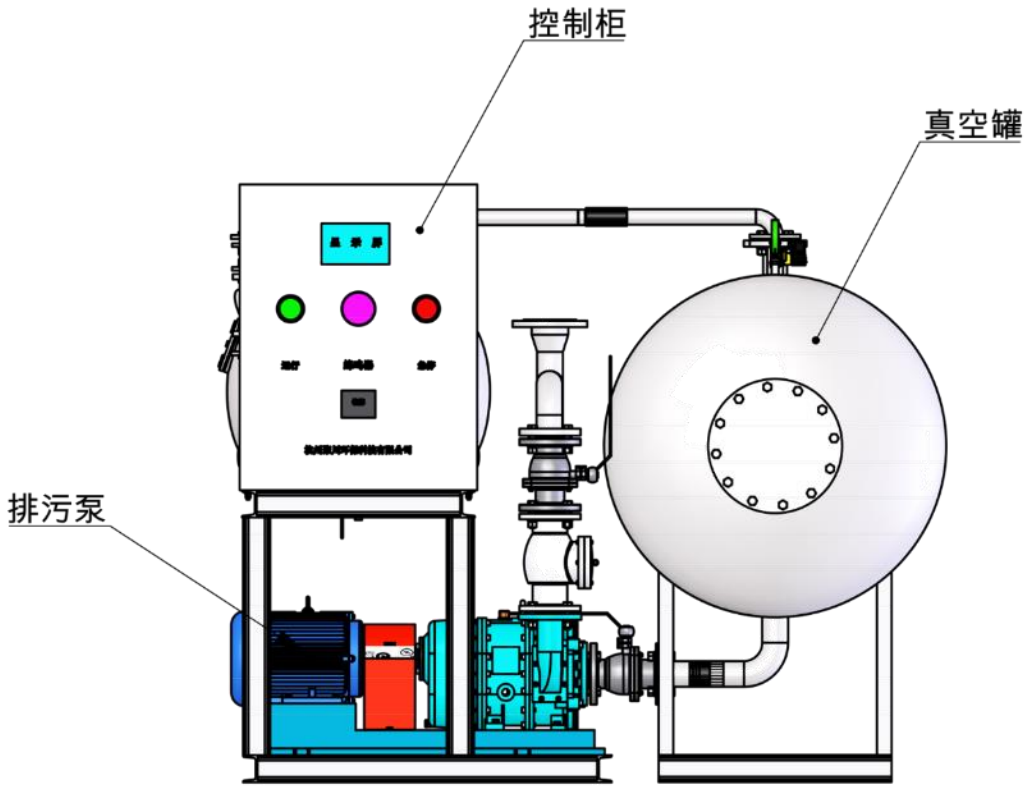
K 为时变化系数，取 2.8；

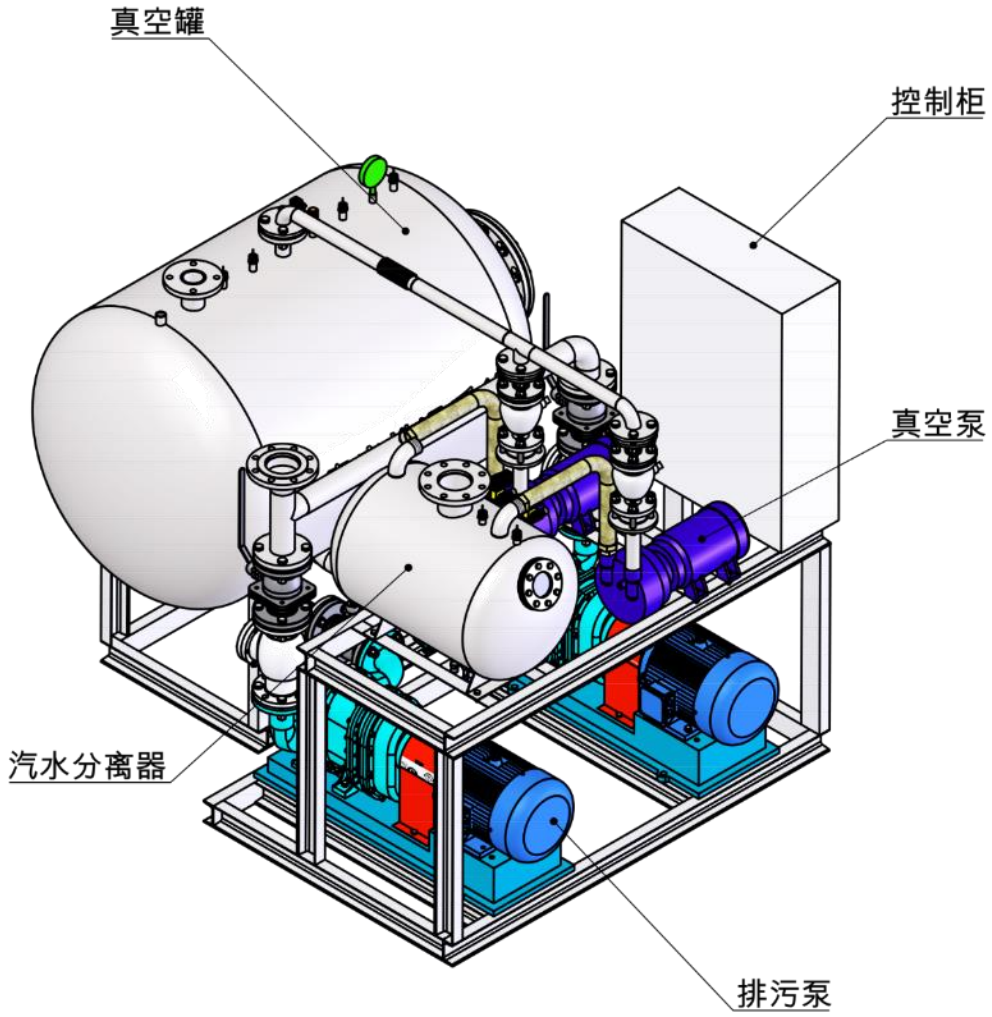
经计算后可得最大时排水量为 193.38m3/h。

平均气水比 AWR 可取 3~15，初步设计气水比取 8。

15000L custom vacuum pumping station

VACS series vacuum unit composition diagram





Vacuum unit for separating residue oil and water

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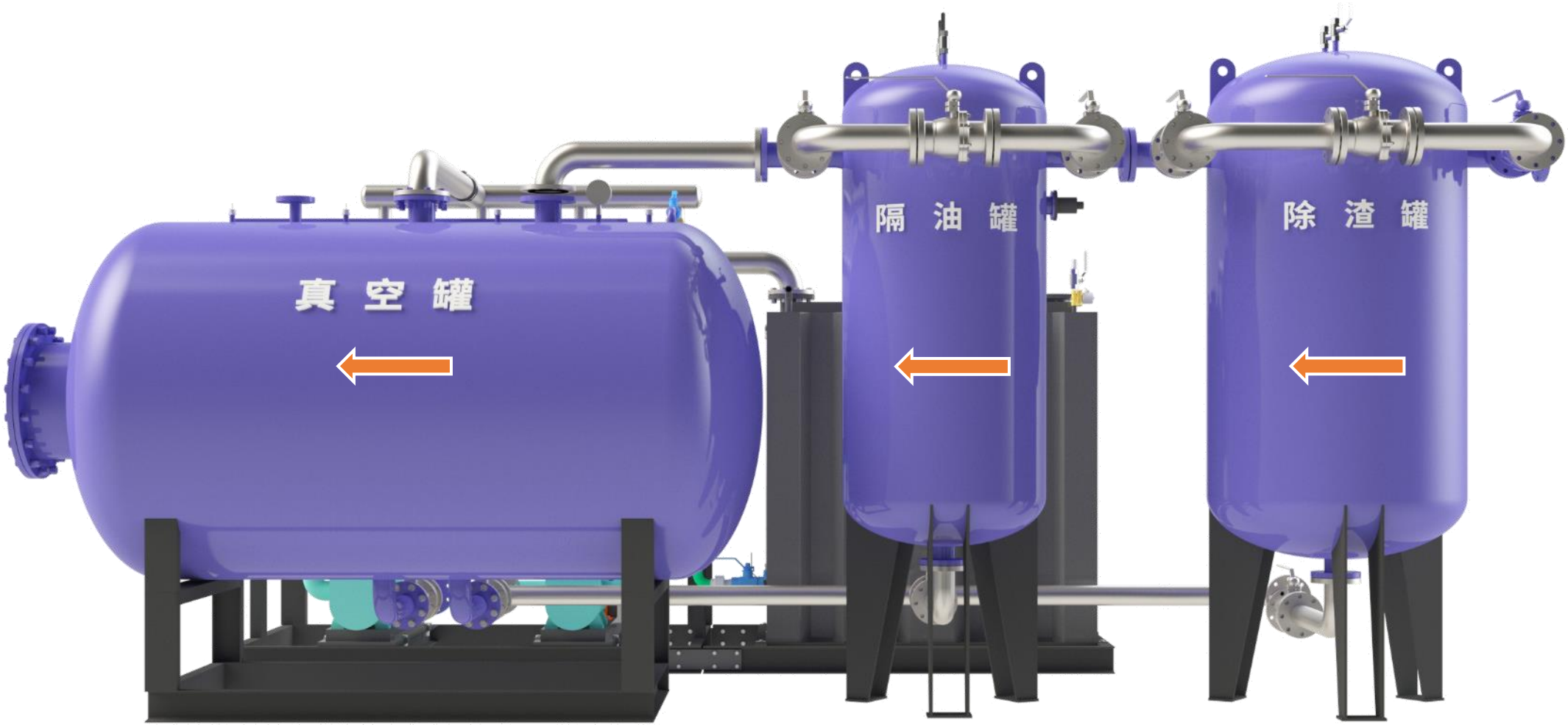
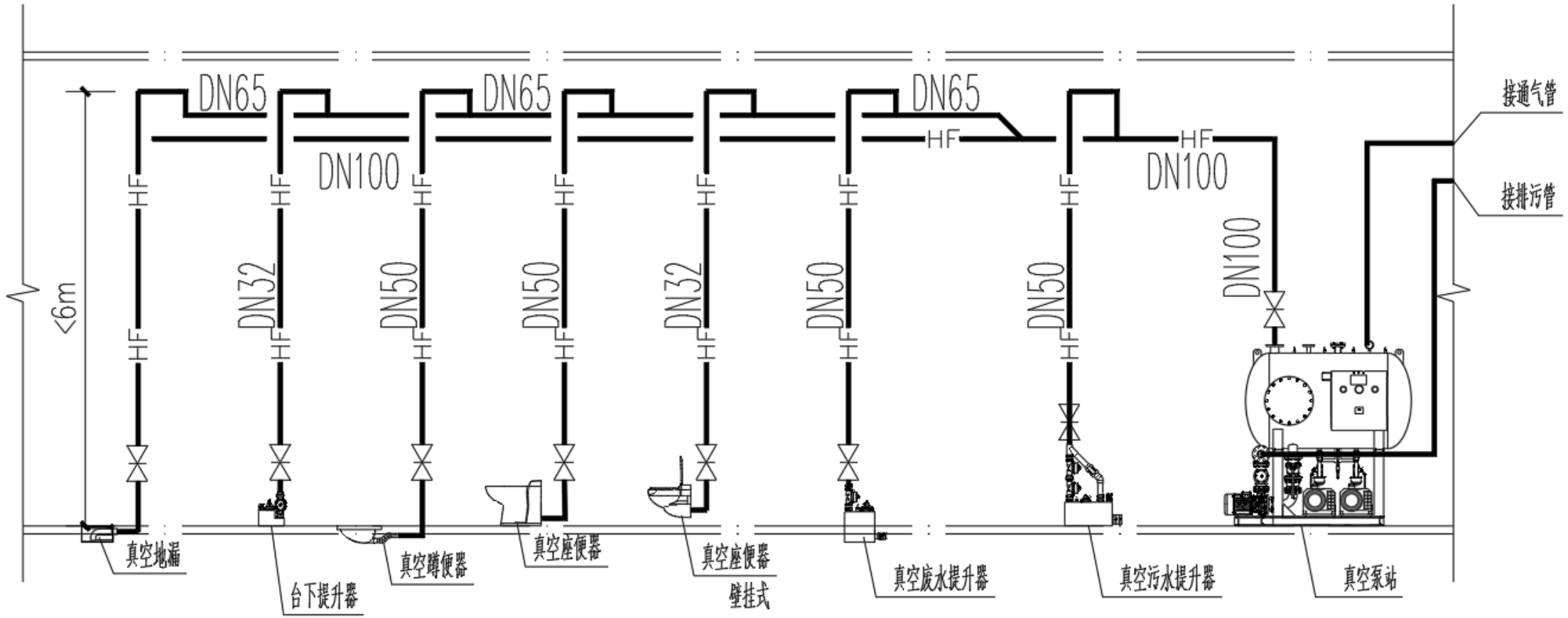
Juchuan has developed a fully automatic oil-water separation vacuum unit, which adds oil-water separation function on the basis of the company 's original vacuum unit. It is an enhanced version of the original vacuum unit. It is a new type of oil-water separation vacuum drainage equipment that integrates functions such as vacuum sewage collection, sludge and oil separation, electric heating and constant temperature, and automatic strong drainage of sewage. Completely solve problems such as ineffective oil separation, difficult oil collection, strong odor, high cost, and inability to meet standards. It is suitable for dining areas such as supermarkets, hotels, restaurants, canteens, and snack bars, and is the best choice for the catering industry.

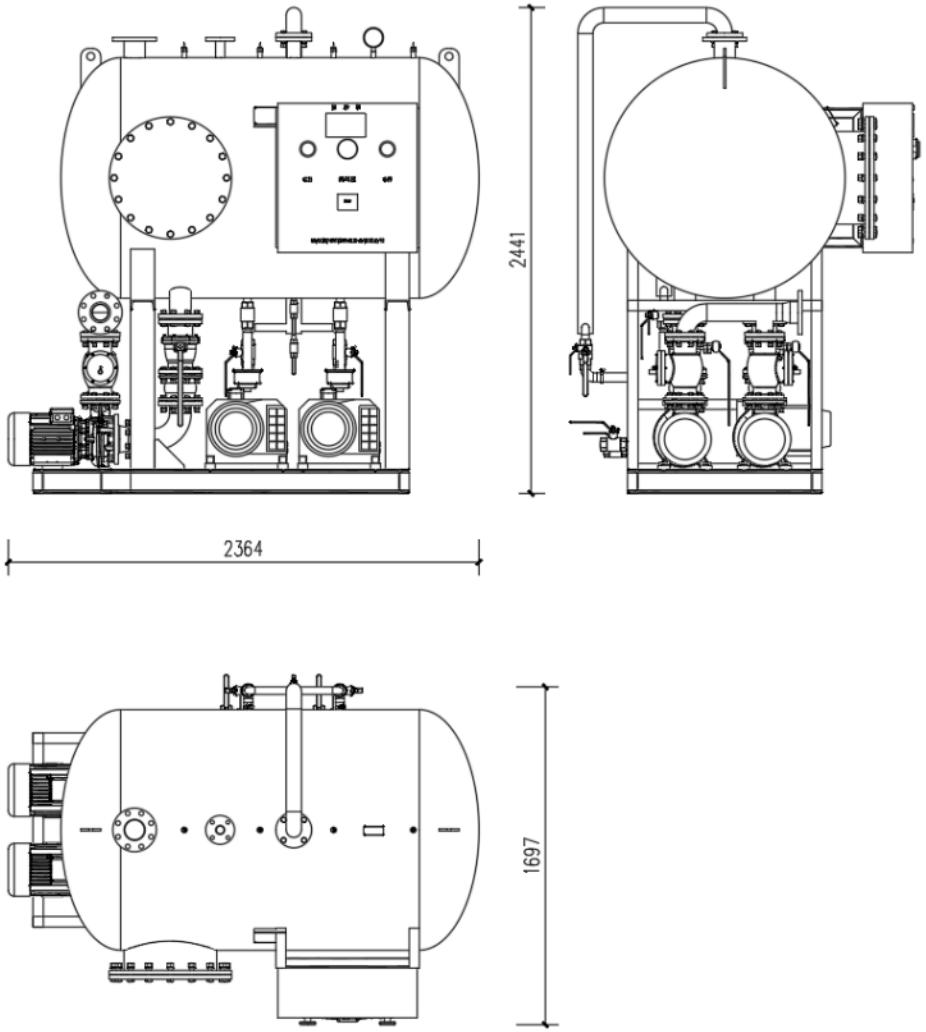
Vacuum oil separator for residue removal



System configuration · System expansion diagram



4. System Configuration



VACS series vacuum pumping stations

The vacuum pumping station is the core equipment of the vacuum drainage system, mainly used for generating vacuum and discharging sewage, and completing the management and control of each collection terminal. The equipment is designed as a whole, with high integration, easy installation and small floor space. All components related to faults of the vacuum pumping station are in standby mechanism, vacuum pumps are standby for each other, sewage pumps are standby for each other, the equipment is stable and reliable.

Equipment Name: VACS Series Vacuum Pumping Station

Equipment model: VACS series

Control mode: PLC automatic control

Power supply parameters: AC380, 20KW/H or 30KW/H

Equipment material: 304 stainless steel

Vacuum tank volume: 0.6m^3, 1m^3, 2m^3, 3m^3, 4m^3, 5m^3, 10m^3

Vacuum pump set: no less than 2 units,1 spare pump, claw vacuum pump (with sufficient budget) or water ring vacuum pump (with low budget);

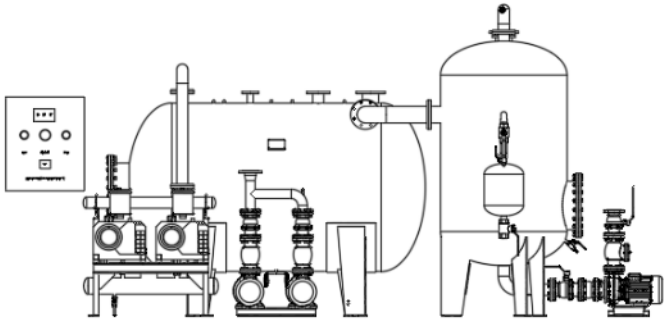
Sewage pump set: no less than 2 units,1 standby pump, cutting sewage pump or large channel CAM rotor pump;

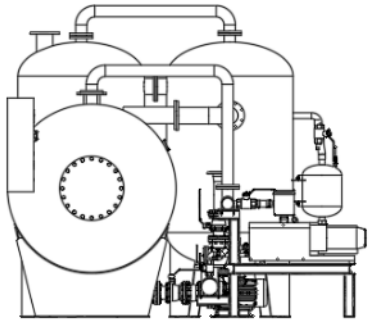
Inlet size: DN100/DN150

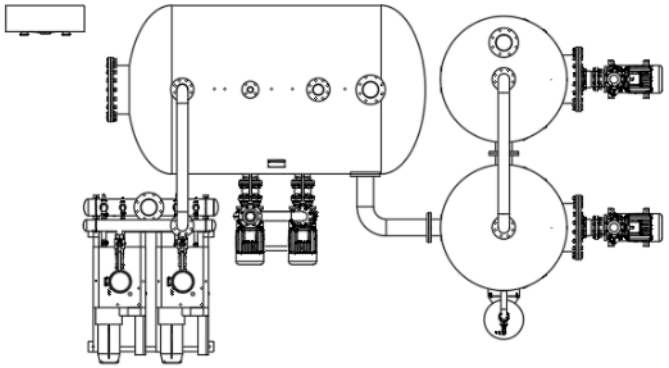
Vent and drain outlet size: DN100 /DN150

Note: The above parameters are for reference only and will be determined according to the configuration

System configuration







ZKGY series vacuum oil separator pump station

The vacuum oil separation pump station is based on the traditional vacuum pump station and is equipped with accessories such as vacuum slag removal tanks and vacuum oil separation tanks. It collects and processes in a fully sealed manner throughout the process, overcoming the drawback of the strong odor of traditional oil separation and lifting equipment.

It can be used in areas such as hospital kitchens.

Equipment Name: ZKGY Series Vacuum Oil Separator Pump Station

Equipment model: ZKGY series

Control mode: PLC automatic control

Power supply parameters: AC380, 20KW/H or 30KW/H

Equipment material: 304 stainless steel

Vacuum tank volume: 0.6m^3, 1m^3, 2m^3, 3m^3, 4m^3, 5m^3, 10m^3

Sludge and oil separation capacity: up to 40m^3 /h.

Vacuum pump set: no less than 2 units,1 standby pump, claw vacuum pump (budget sufficient) or water ring vacuum pump (budget low) is recommended;

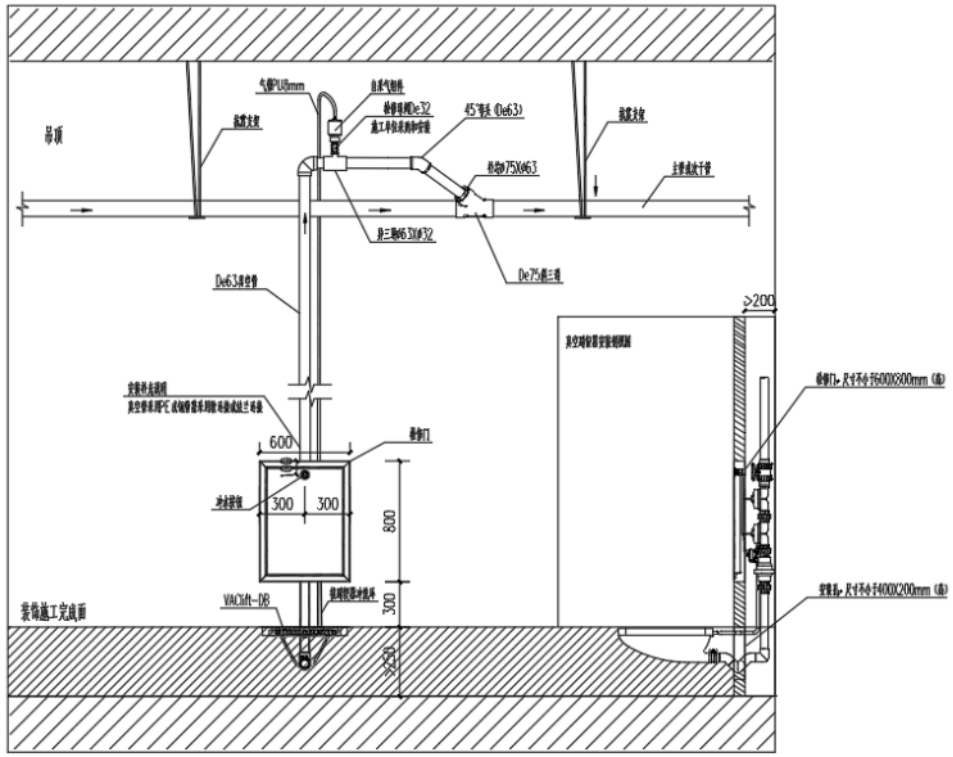
Sewage pump set: no less than 2 units,1 standby pump, cutting sewage pump or large channel CAM rotor pump;

Inlet size: DN100/DN150

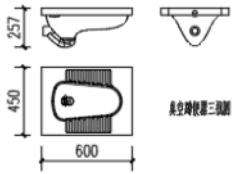
Vent and drain outlet size: DN100 /DN150

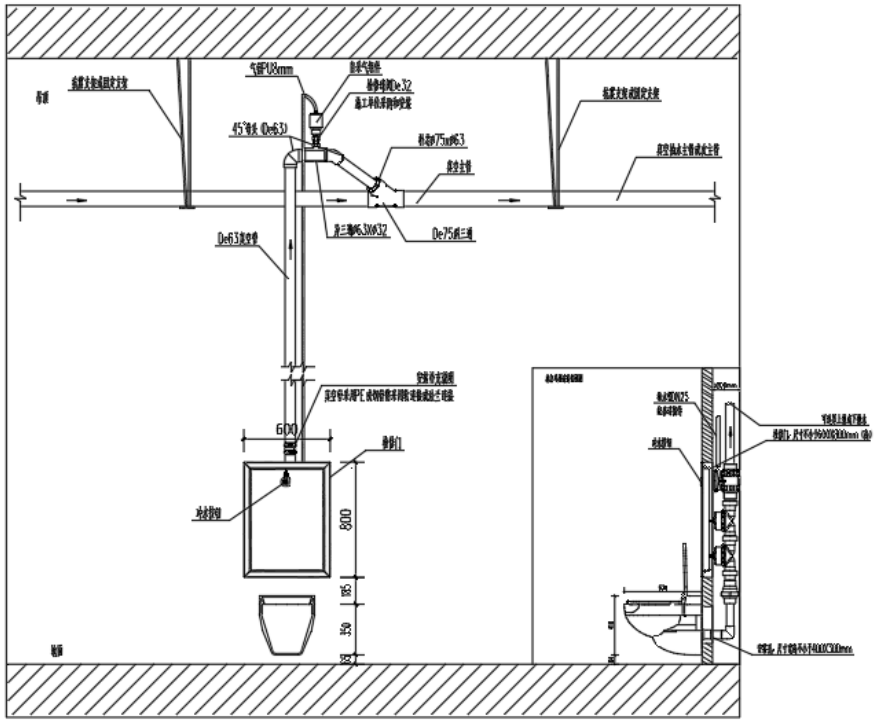
Note: The above parameters are for reference only. The specific parameters still need to be determined according to the configuration.

System configuration · terminal equipment

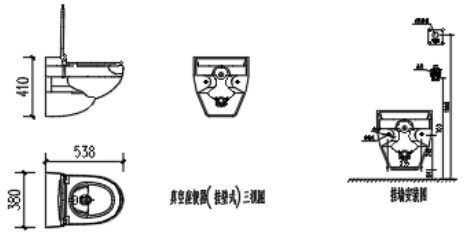


真空蹲便器安装图

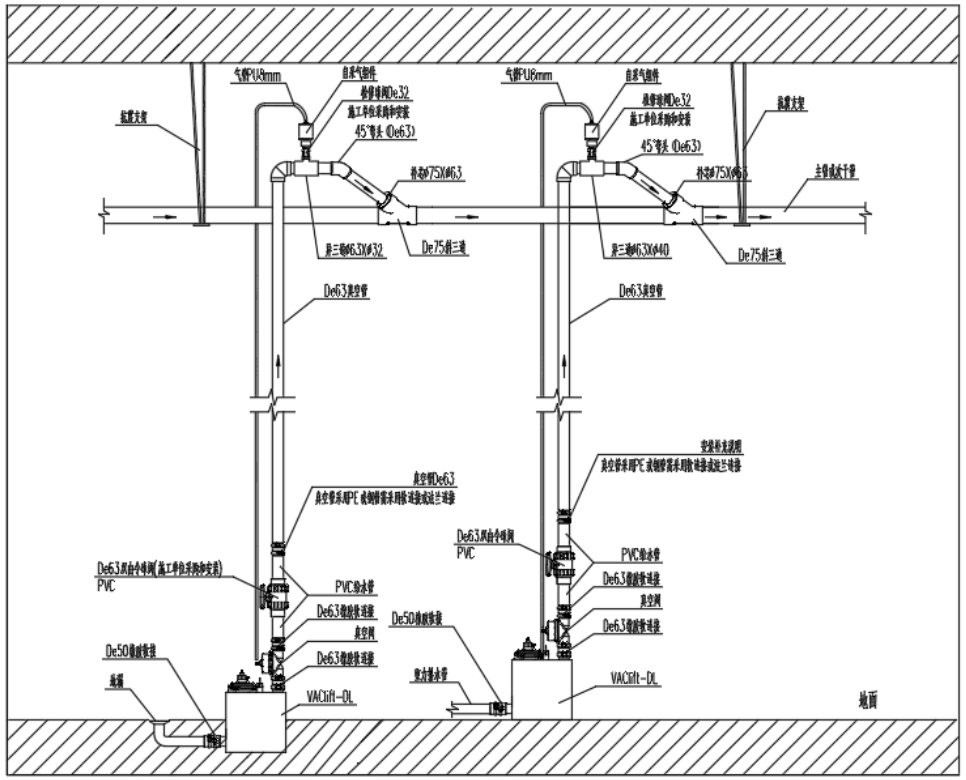




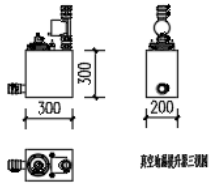
真空座便器（落地式）安装图



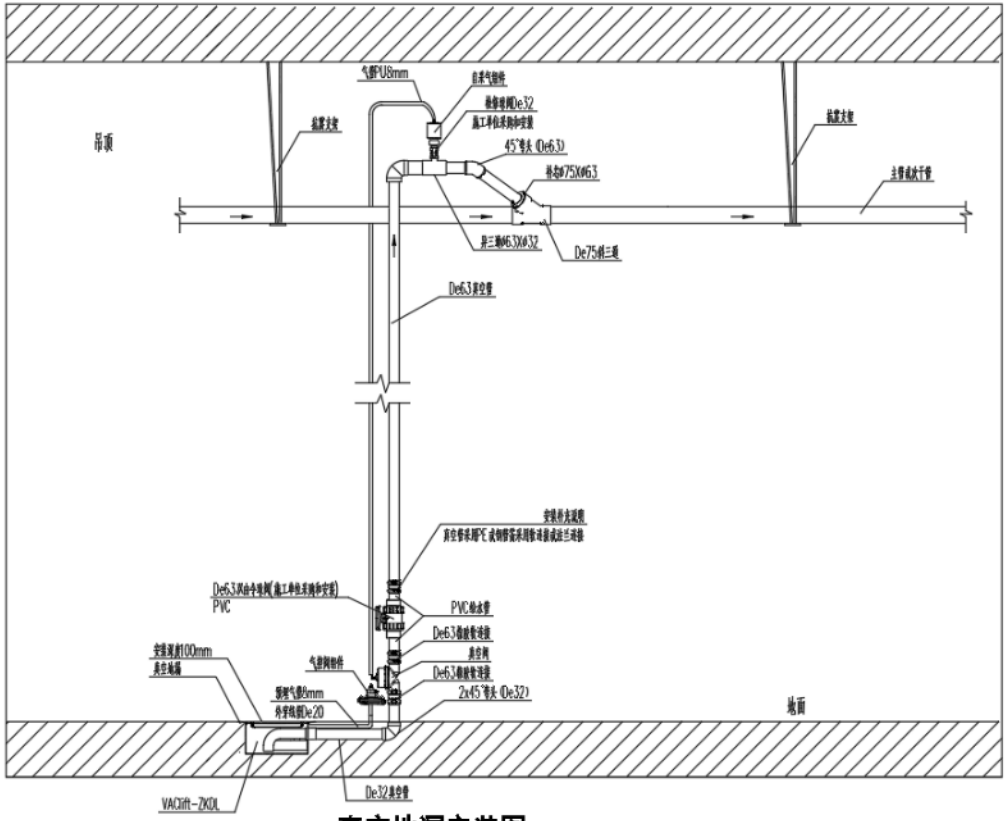
System configuration



真空地漏提升器安装图



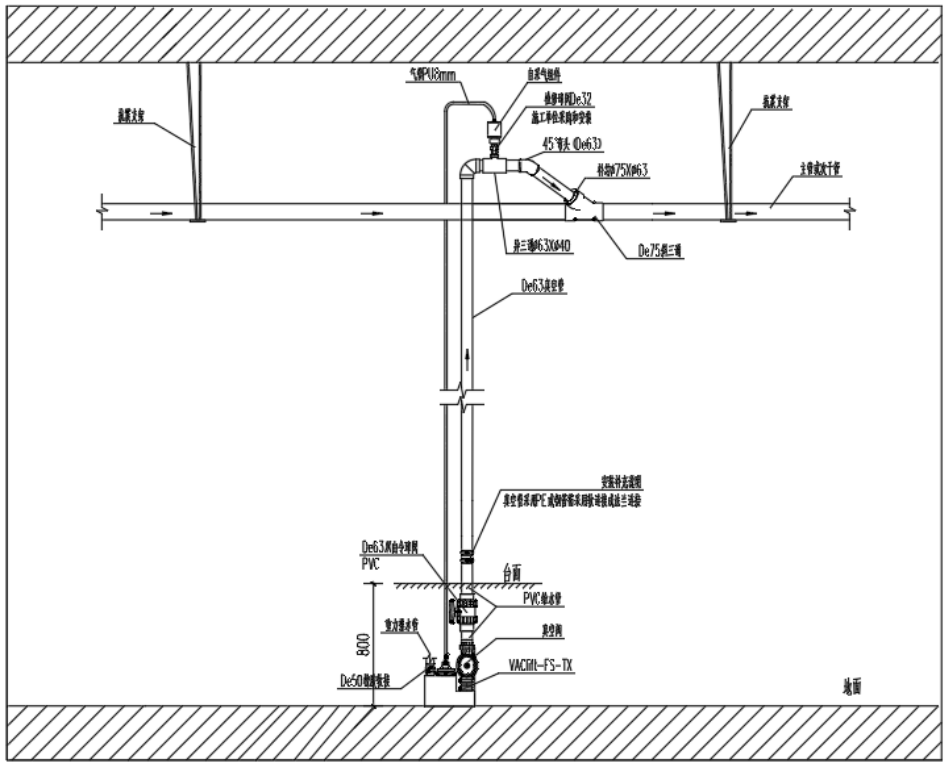
For combined discharge from multiple wastewater discharge points.



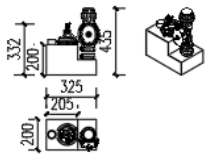
真空地漏安装图

Buried installation, with a cushion thickness of 100mm.

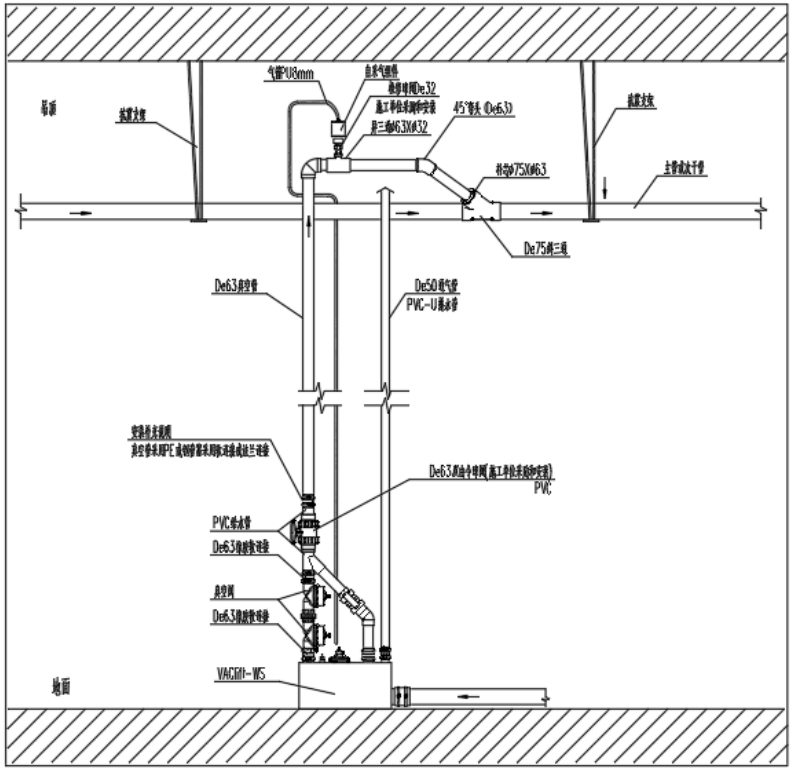
System configuration



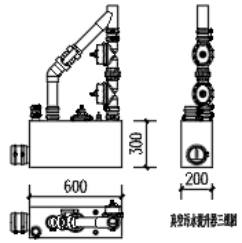
废水提升器安装图



For individual washbasin drainage.



真空污水提升器安装图



Suitable for combined discharge from multiple sewage discharge points.

Mechanical vacuum sewage lifter

Primarily used in indoor vacuum drainage systems, it features a purely mechanical structure design, does not require power supply, ADAPTS to damp and harsh environments, and is stable and reliable. At the same time, the sewage tank is designed to be formed in one piece and reinforced, with good airtightness to effectively prevent sewage leakage. It is equipped with a double diaphragm valve standby design, which ensures high reliability and few malfunctions.

Equipment Name: Mechanical Vacuum Sewage Lifter

Equipment model: VACLift-JX-WS

Control mode: Purely mechanical control

Equipment material: ABS or UPVC one-piece molding

Device volume: 30L

Device dimensions: 557.5*300*925

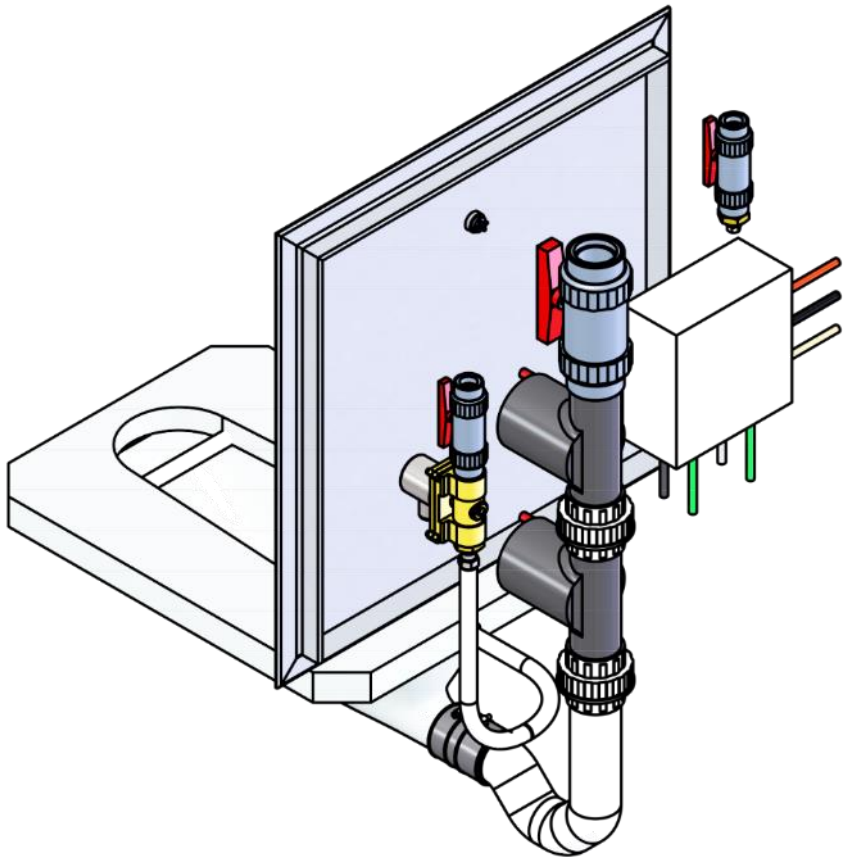
Drainage flow: 5L/S

Inlet size: Φ 110

Export size: Φ 63

Equipment weight: 3.3KG

vacuum squat toilet assembly



Full vacuum squat toilet assembly

It is mainly composed of squat toilets, vacuum diaphragm valves, vacuum controllers and other components. The system is designed with double diaphragm valves that serve as backups for each other, which can effectively enhance the reliability of the system. It is mainly used in toilet squat toilets.

Device Name: Full Vacuum Squat Toilet Assembly

Device model: VACLift-DB

Control mode: Solenoid valve pneumatic control

Device material: Ceramic or stainless steel

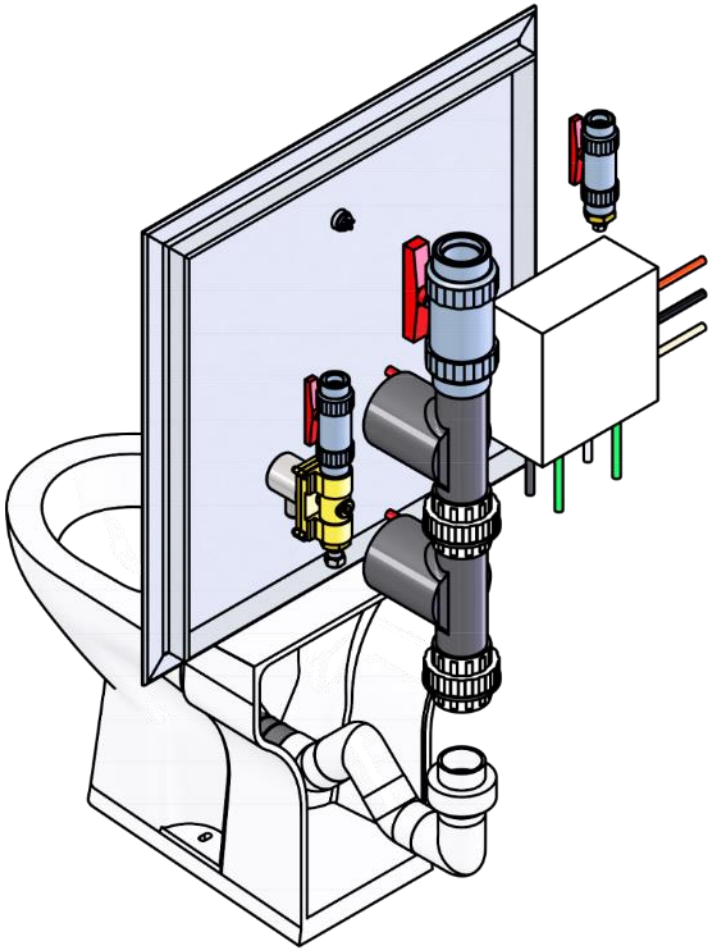
Device size: 873*680*1030

Drainage flow: 5L/S

Inlet size: Φ 63

Export size: Φ 63

Equipment weight: 15KG



vacuum toilet assembly

It is mainly composed of vacuum toilet bowl, vacuum diaphragm valve, vacuum controller and other components. The system is designed with double diaphragm valves that serve as backups for each other, which can effectively enhance the reliability of the system. It is mainly used for toilet stalls.

Device Name: Full Vacuum Toilet Assembly

Device model: VACLift-ZB

Control mode: Solenoid valve pneumatic control

Device material: Ceramic or stainless steel

Device size: 770*680*1174

Drainage flow: 5L/S

Inlet size: Φ 63

Export size: Φ 63

Equipment weight: 15KG

Medical building vacuum drainage project

Serial Number	Project Location	Project Name
1	Shenyang	Vacuum drainage Project at Shenyang Ping 'an Good Doctor Medical Imaging Diagnosis Center
2	Jingmen	Jingmen is the new PETCT nuclear medicine vacuum drainage project at the South Campus of the First People's Hospital
3	Haikou	Vacuum drainage project of Lingao County People's Hospital Project in Hainan Province
4	Wuhan	Vacuum collection project in negative pressure Ward, Tongji Hospital, Tongji Medical College, Huazhong University of Science and Technology
5	Wuhan	Vacuum drainage project for Nuclear Medicine in the Proton Building of Tongji Hospital in Optics Valley, Wuhan
6	Xianyang	Laboratory Vacuum drainage Project of Shaanxi Nuclear Industry 215 Hospital
7	Tianshui	Procurement Project of vacuum Drainage Equipment for Negative Pressure (isolation) wards of Qingshui County People's Hospital
8	Shanghai	Vacuum drainage Project of the Department of Nuclear Medicine at Fudan University Shanghai Cancer Center
9	Chengdu	A vacuum drainage project is being built at the Jinniu campus of Chengdu Sixth People's Hospital
10	Fuzhou	Vacuum toilet project at the 900th Hospital of the Joint Logistic Support Force of the People's Liberation Army of China
11	Huizhou	Huizhou First People's Hospital Vacuum Drainage Project
twelve	Ganzi	Vacuum drainage project at Daocheng Emergency Station in Ganzi Prefecture, Sichuan Province
13	Taiyuan	Vacuum drainage project for hematopoietic stem cell transplantation ward renovation project at Shanxi Bethune Hospital Hematology Department
fourteen	Lishui	Lishui First People's Hospital Vacuum Drainage Project

Introduction to Vacuum drainage/Examples of Hospital Renovation projects

Hospital renovation solutions 1

Background: The third floor of a hospital was originally designed as a physical examination center (with no sewer and a floor area of 1,500 m ²). Due to business adjustments, the entire third floor needs to be converted into internal medicine wards, adding 25 internal medicine departments, with one washbasin in each department.

Traditional gravity scheme: Holes need to be drilled in the floor slabs of each department, affecting business operations on the second floor. Some middle drainage points do not have drainage risers. Wastewater risers need to pass through the floor slabs into the basement, adding a closed lifting device and one equipment room, occupying 2 to 3 parking Spaces. The cost of the drainage project renovation is estimated at 2 million yuan and the construction period is 3 months.

Vacuum scheme: One set of vacuum unit (the equipment room occupies approximately 12m ²) on the third or lower floor, 25 sets of vacuum terminal equipment, and vacuum pipes are laid above the ceiling during the renovation. The estimated cost for the drainage project renovation is 1 million yuan, and the construction period is 1 month.

Hospital renovation Solution 2

Background: A part of the underground parking lot on the first floor of a hospital needs to be converted into a cafeteria + office + restroom (no sewer, occupying 800m ² of building area).

Traditional gravity scheme: Consider raising the cafeteria by 300mm (to meet the requirements of trench laying), and build one new oil separation and lifting equipment room and one sewage lifting equipment room on the second basement floor. It takes up 6 to 8 parking Spaces on the second basement level. The cost of the drainage project renovation is estimated at 2.5 million yuan and the construction period is 4 months.

Vacuum scheme: Set up one vacuum oil separator unit on the first basement floor, raise the cafeteria 300mm (to meet the requirements for trench and vacuum equipment installation), oily wastewater enters the vacuum tank through the sludge removal tank and oil separator tank, bathroom wastewater directly enters the vacuum tank through vacuum tubes, set up several sets of vacuum terminal equipment, vacuum pipes are laid under the beam, The cost of the drainage project renovation is estimated to be 1.5 million yuan and the construction period is 2 months.

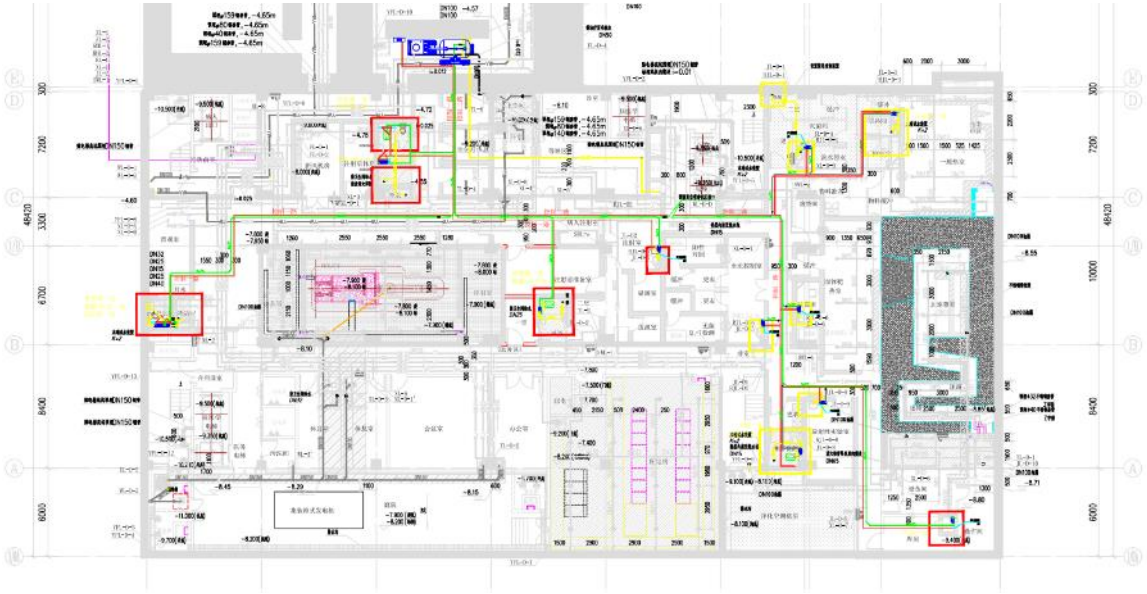
Vacuum drainage project of Chengdu Sixth People's Hospital

The Jinniu Campus of Chengdu Sixth People's Hospital is located at the intersection of Chuanjian Road and Quanshui Road outside the North Third Ring Road. This modern "high-end green smart hospital" will play an important role in emergency rescue, medical treatment, health care and rehabilitation when put into use, greatly meeting the diverse and multi-level medical service demands of the local people. To improve sanitation conditions and reduce construction costs, the hospital has adopted vacuum drainage systems in the underground B1/B2, restrooms and canteens.

Chengdu Sixth People's Hospital Vacuum Drainage Project

Vacuum drainage project for Proton Building, Tongji Hospital in Optics Valley, Wuhan

The Proton Building, an important medical facility construction project for the Guanggu campus of Tongji Hospital of Huazhong University of Science and Technology, will rapidly drive and enhance the level of tumor diagnosis and treatment in the central China region and fill the gap in proton therapy in the region. The nuclear medicine restrooms of this project adopt the Juchuan vacuum drainage scheme, and the application of vacuum drainage in the nuclear medicine department restrooms has significant advantages. It operates in a closed manner to prevent radioactive contamination. The piping layout is flexible and convenient for radiation protection treatment, reducing the total amount of radioactive wastewater and construction and maintenance costs. The design and installation are flexible, such as water-saving toilets and no need for continuous ramps in the piping, providing a better solution for drainage in the department. A set of vacuum pumping station VACS-1000 was adopted, and the project has been in operation since June 2023.



Laboratory Vacuum drainage Project of Shaanxi Nuclear Industry 215 Hospital

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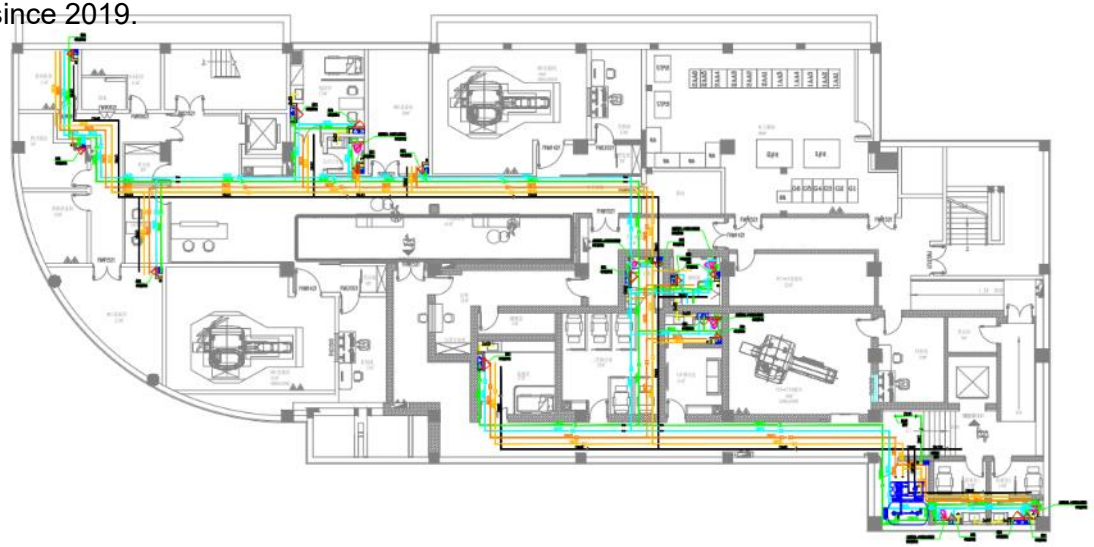
Shaanxi Nuclear Industry 215 Hospital was founded in 1974 and is a modern tertiary general hospital. The project is a laboratory drainage project. The hospital laboratory uses vacuum drainage, which has obvious advantages. It is sealed to prevent cross-contamination. The layout is flexible to adapt to complex environments. It saves water, reduces emissions and lowers costs. It drains quickly without water accumulation or odor, and the pipes are easy to maintain. In highly infectious sample testing rooms, safety is guaranteed and limited space does not interfere with operations. The laboratory has been in operation since mid-2023, using the Juchuan environmental protection vacuum drainage system, the VACS-3000 vacuum drainage pump station and 14 sets of vacuum lifters.

Shenyang Ping An Good Doctor Medical Imaging Diagnosis Center

Shenyang Ping An Good Doctor Medical Imaging Diagnosis Center is a professional imaging diagnosis institution. The center is equipped with advanced medical imaging equipment such as high-end CT, magnetic resonance, etc. It has a team of professional imaging diagnostic physicians who have rich clinical experience and professional knowledge and can provide patients with accurate and efficient imaging diagnostic services. The application of vacuum drainage in the nuclear medicine department's restrooms has significant advantages. It operates in a closed manner to prevent radioactive contamination, has flexible piping layout for radiation protection treatment, reduces the total amount of radioactive wastewater and construction and maintenance costs, and has flexible design and installation, such as water-saving toilets and no need for continuous ramps in the piping. The restrooms of the nuclear medicine department of this project are equipped with Juchuan vacuum drainage system, one set of vacuum pump station VACS-1000, six sets of vacuum toilets, six sets of vacuum wastewater lifters and twelve sets of vacuum floor drain lifters. The project has been in use since 2019.



Juchuan performance

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Juchuan Environmental Protection currently has over 2,600 sets of vacuum drainage in use across th

- Xi 'an Happy Forest Belt Project (the world 's largest underground forest belt project, 900 toilet stalls in vacuum sewage service restrooms) - Many and scattered basement restrooms and air conditioning machine rooms, vacuum unit one-to-many collection
- Changsha Helong Gymnasium - The first and second basement floors of restaurants and shops are scattered, and gravity flow discharge is costly
- Commercial development of Qingdao Railway Station - Scattered underground restaurants and shops, high cost of gravity flow discharge
- Wenzhou South Railway Station - Drainage of restaurants and shops, gravity flow cannot be discharged
- Shanghai Hongqiao Railway Station - Underground restrooms do not allow gravity flow drainage
- Xi 'an Baozi Village Commercial - There is no gravity flow discharge in the underground restrooms
- Taizhou Phoenix Mountain State Guesthouse - Construction error, no gravity flow discharge
- At environmental industry waste transfer stations such as Zoomlion in Changsha, Naide in Chongqing, and Jinwei in Yangzhou - there are many impurities in the leachate and gravity flow pipes are prone to clogging
- Nanjing Yijiu Kitchen Waste Treatment Equipment - wet waste crushing + vacuum collection

Juchuan performance

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- The first phase of the comprehensive utility tunnel for the large residential community at Songjiang South Station - the underground restrooms cannot be discharged by gravity flow
- Lingyin Temple Buddhist Garden in Hangzhou - There are many scattered drainage points and gravity flow drainage is not possible
- Shenyang Ping An Good Doctor Medical Imaging Diagnosis Center Vacuum Drainage - The hospital has many departments and cannot perform gravity flow drainage
- Vacuum drainage for catering - drainage of commercial properties in Hangzhou Metro Lines 1, 2, 3, 4, 5, 6, 7 - cannot be discharged by gravity flow
- Chengdu Metro Line 6, Suzhou Metro Line 5 section Drainage Project - The section sump pit is shallow and traditional submersible pumps cannot be installed
- Shenzhen Zhongfu Circuit Company - Factory layout adjustment, circuit board acid and alkali washing wastewater, neutralized in vacuum tanks and discharged into the sewage treatment system
- Zhengzhou Qiaoju Commercial Street - Underground commercial gravity flow renovation, oily, sump + submersible pump maintenance inconvenient
- Hangzhou Guomao Building - New staff canteen on the top floor, gravity flow affects the decoration of the lower floor, vacuum oil separator unit is used
- Wenzhou Longwan Wanda Plaza Vacuum Drainage project
- Zhengzhou Erqi Square Underground Commercial and Catering Drainage (the largest underground square in Central China)
- Vacuum drainage project for Xianghe Da 'ai Hospital in Langfang, Hebei
- Chengdu Metro Line 18 Xibo City Station Vacuum Drainage Project - Elevator and Escalator Foundation Pit drainage

A list of vacuum drainage achievements

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Serial Numbers	City	Metro project name		
1	Wuhan	Wuhan Metro Line 2	January 4, 2016	
2		Wuhan Metro Line 3	January 9, 2015	
3		Wuhan Metro Line 3 Property	2017	
4		Phase I of Wuhan Metro Line 4	April 25, 2013	
5		Phase II of Wuhan Metro Line 4	February 2014	
6		Commercial development of Wuhan Metro Line 4	27 March 2014	
7		Wuhan Metro Line 6	May 10, 2016	
8		Wuhan Metro Line 7	6 March 2017	
9		Wuhan Metro Line 8	2017	
10		Property development for Wuhan Metro Line 8	August 1, 2017	
11		Wuhan Metro Line 11	2017	
twelve		Wuhan Metro Airport Line	2017	
13		Wuhan Metro Caidian Line	February 2, 2018	
fourteen		Wuhan Metro Zhifang Line	March 31, 2018	
15	Guangzhou	Guangzhou Metro Line 4	2016	
16		Guangzhou Metro Line 6	September 2, 2015	
17		Guangzhou Metro Line 7	May 23, 2016	
18		Guangzhou Metro Line 9	February 2016	
19		Guangzhou Metro Line 13	May 2, 2017	
20		Guangzhou Metro Line 21	April 24, 2017	
21		Guangzhou Metro Zhujiang New Town Central Line	2017	

Vacuum drainage performance list

ALL RIVERS RUN INTO SEA 聚川® 环保

Serial Numbers	City	Metro project name		
22	Shanghai	Shanghai Metro Line 1	January 2019	
23		Shanghai Metro Line 9	January 2019	
24		Shanghai Metro Line 10	April 14, 2014	
25		Shanghai Metro West Station	18 March 2014	
26		Shanghai Hongqiao West Transport Plaza	7 November 2017	
27	Wuxi	Wuxi Metro Line 1	August 1, 2013	
28		Wuxi Metro Line 2	October 20, 2013	
29	Hangzhou	Hangzhou Metro Line 1	2014	
30		Hangzhou Metro Line 2	December 23, 2014	
31		Hangzhou Metro Line 4	May 19, 2014	
32		Drainage system at Qibao Station of Hangzhou Metro	2014	
33	Changsha	Changsha Metro Line 2	13 March 2015	
34		Changsha Metro Line 3	November 30, 2017	
35		Changsha Metro Line 4	December 19, 2017	
36		Changsha Metro Line 5	May 24, 2018	
37	Suzhou	Suzhou Metro Line 2	November 1, 2013	
38		Suzhou Metro Suzhou Railway Station	2013	
39	Xi 'an	Xi 'an Metro Line 1	13 September 2016	
40		Xi 'an Metro Line 3	November 2015	
41		Xi 'an Metro Line 4	13 October 2017	
42	Foshan	Foshan Metro Line 1	March 9, 2015	
43	Nanning	Nanning Metro Line 2	July 2016	
44		Nanning Metro Line 3	December 30, 2017	
45	Suzhou	Suzhou Metro Line 2	2017	

Company Introduction

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Hangzhou Juchuan Environmental Technology Co., LTD. (stock code: 870271)

We provide cleaner, more environmentally friendly and energy-efficient technical solutions for waste collection and treatment in residential areas, municipal facilities, commercial catering, ships, trains, buses and other living environments.

Vacuum collection expert, vacuum collection system practitioner.

Juchuan Environmental Protection was founded in August 2006 and is headquartered in Hangzhou, Zhejiang Province, China. It is a domestic New Third Board listed company, a national high-tech enterprise, and a Zhejiang specialized, refined, distinctive and innovative enterprise.

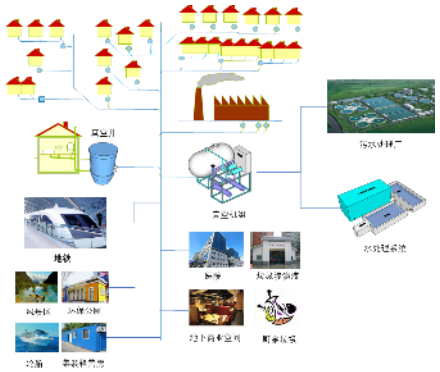
As a leader in vacuum drainage systems in China, Juchuan is dedicated to the research and development and marketing of innovative drainage equipment and systems. The company holds 11 invention and utility model patents and 13 computer software Copyrights. The company is equipped with an advanced automatic control testing center and equipment testing platform, and has established a strict quality assurance system in accordance with ISO9001, ISO14000 and ISO18000 standards; The company 's products are widely used in various fields. The company 's vacuum drainage systems are widely used in many cities such as Beijing, Guangzhou, Shanghai, Wuhan, Hangzhou, Xi 'an, Changsha, etc.

chnology to improve the environment for the benefi

Honors Qualifications

- National High-tech Enterprise
- Companies listed on the New Third Board
- Zhejiang Specialized, Refined, Distinctive and Innovative Enterprises
- Technology-based small and medium-sized enterprises
- Innovative small and medium-sized enterprises
- Zhejiang Software Enterprises
- Tax Credit Grade A enterprise
- Member of the Public Toilet Construction Management Professional Committee
- Member of the Water Supply and Drainage Equipment Branch of China Building Metal Structure Association
- A participating unit in the compilation of the national standard for General technical conditions of vacuum drainage integrated equipment
- Technical Standard for water supply and drainage systems of urban rail transit
- China Energy Conservation and Environmental Protection Enterprise Credit Rating A
- New Third Board Future Star Enterprise
- Hangzhou's "Young Eagle Program" enterprises
- Jianggan District Qianjiang Times Trust Fund Shortlisted enterprises
- Cyber Top 10 College Student Startups
- Innovation Award at China Toilet Revolution Innovation Expo
- Quality management system certification
- Environmental management system certification
- China Occupational Health and Safety Management System Certification
- Product after-sales service evaluation certification
- Safety production standardization certification
- Information Security Management System Certification
- Information Technology Service Management System Certification
- AAA Credit Enterprise
- Aaa-rated contract-abiding and creditworthy enterprise
- AAA Quality Service Integrity Enterprise
- Aaa-level model unit for honest operation
- Aaa-level honest supplier

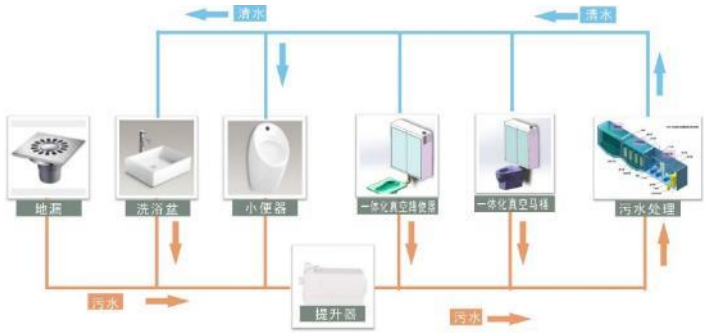
Main products



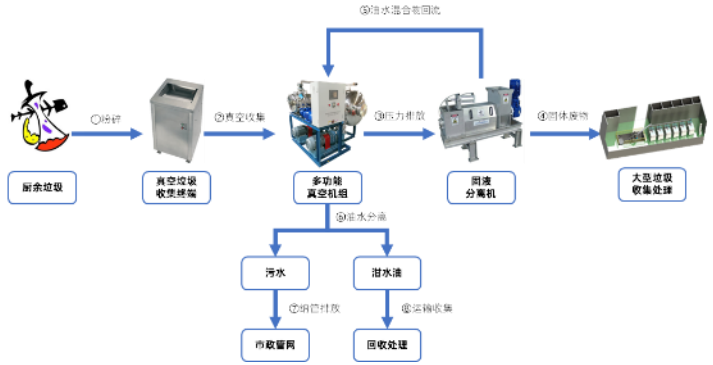
Vacuum drainage system

Closed sewage lift station

Pneumatic drainage system



Micro water circulation public toilet system



Vacuum garbage collection

Juchuan Advantage

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Listed companies

Listed companies
Stock code: 870721

Top 10 Companies

National High-tech Enterprise, Fledgling Enterprise, Technology-based Small and Medium-sized Enterprise, Cyber Startup Top 10 Enterprises

Specialized, re

Zhejiang Province Specialized and Refined Enterprise

Serving the whole countr

We are serving public toilets and commercial developments at more than a thousand subway stations across the country

State Support

Has received a National Innovation Fund grant

Multiple patent

A number of national patents have been filed, including three invention patents and seven computer Copyrights

Sichuan production base

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Some cooperative customers

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聚川环保

中国建筑

中国中铁

中国铁建


中国交建

中国中冶

上海建工集团

北京城建集团


盒马鲜生


江苏省环保集团

Some partner customers

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北京地铁 BEIJING SUBWAY

上海地铁 Shanghai Metro

广州地铁 Guangzhou Metro

中国铁建

中国电建 POWERCHINA

中国建筑

中国石化

杭州地铁 HANGZHOU METRO

长沙地铁 Changsha Metro

武汉地铁 WUHAN METRO

西安地铁 XIAN METRO

METRO 成都地铁

苏州地铁 SU ZHOU METRO

NNRT 南宁轨道交通

昆明轨道交通 Kunming Rail Transit Co.,Ltd

无锡地铁 WUXI METRO

佛山地铁 FMETRC

万达广场 WANDA PLAZA

QIAN XIA LAK 千峡湖


贺龙体育馆


常州市政


西安堡子村

中联重科环境产业

The demonstration is over.
Thank you for watching

THE PROFESSIONNAL BUSINESS TEMPALTE

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