

VONTRON

VONTRON Technology
CO.,LTD.

沃顿科技股份有限公司

纯净从芯开始

Pure Water Originates from VONTRON

Feb 13, 2023

CRRC  中国中车

PART 1

About US





新技术 | 新能源 | 新材料
New technology | New energy | New materials

CONNECTING THE WORLD THROUGH BETTER MOBILITY

连接世界 造福人类



2277.6亿
billion
2020年营收
Revenue in 2019

Over90
海外子公司
overseas
subsidiaries

180,000
员工
employees

Top500
世界五百强
in Global 500

9个
新产业板块
new industry
sectors



20个
国家级企业技术中心
national enterprise
technology centers

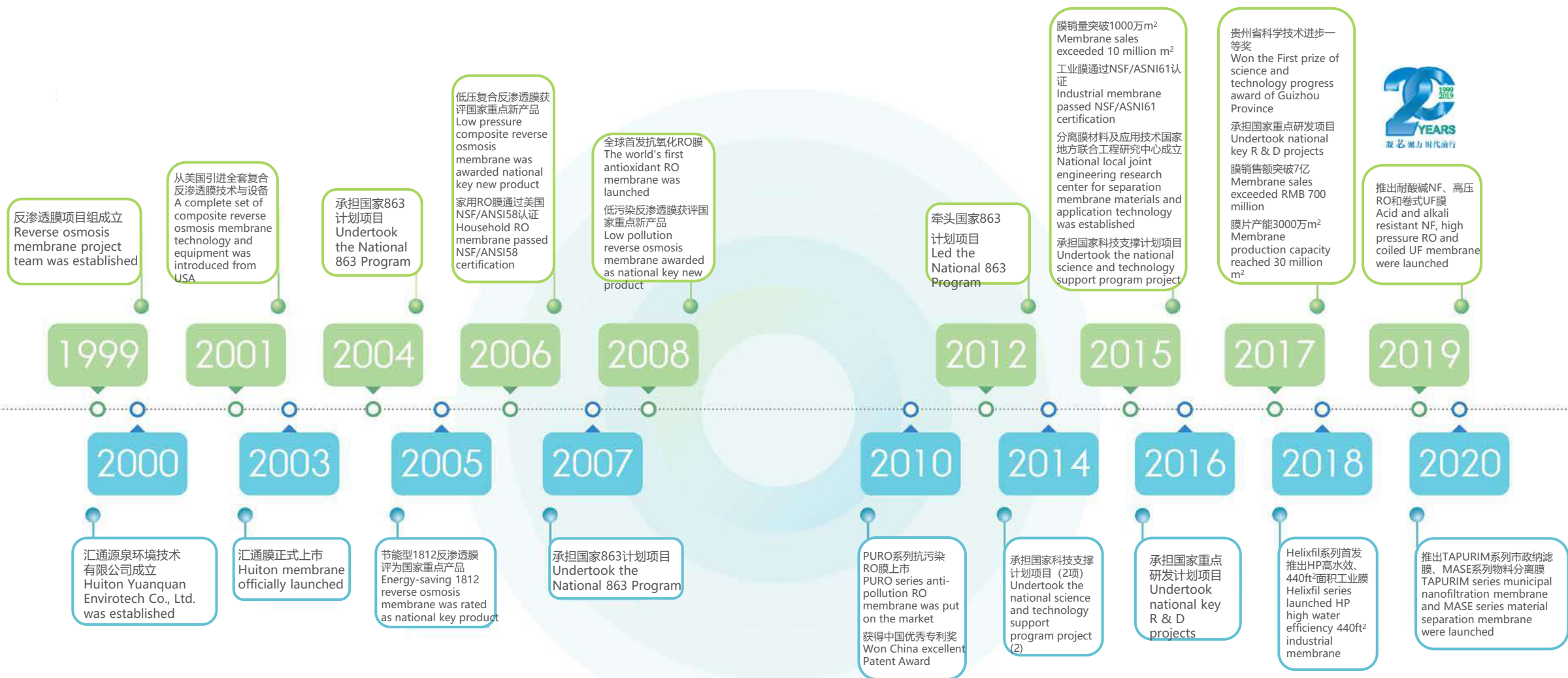
11个
海外研发中心
overseas R & D
centers

11家
国家级研发机构
national R & D
institutions

关于我们 ABOUT US

- 中国中车控股国有企业
State owned enterprise controlled by CRRC
- 分离膜材料与应用技术国家与地方联合工程中心
National and local joint engineering center for separation membrane materials and application technology
- 全球知名卷式分离膜制造商，6000万客户的选择
World famous membrane manufacturer for 60 million customers
- 年销售额8.1亿元，销往130+个国家和地区
Annual sales volume of RMB 810 million, and sold to 130+ countries and regions
- 生产基地300+亩，建筑面积6.8+ 万平米，4500万平米膜片产能
A production base of 300+ mu, a construction area of 68,000+ m² and a membrane production capacity of 45 million m²







NSF/ANSI 58、NSF/ANSI 61认证
NSF/ANSI 58 and NSF/ANSI 61 Certification
质量管理体系
Quality management system
环境管理体系
Environmental management system
职业健康安全管理体系
Occupational health and safety management system
欧盟有害成分指令标准
EU hazardous ingredients directive standard
美国WQA (U.S.)
中国涉水卫生批件
China's water related health approval
美国FDA (U.S.)



2007
高新技术企业
High-tech Enterprises

2010
中国专利优秀奖
China Patent
Excellence Award

2012
国家火炬计划
产业化项目
Industrialization
project of National
Torch Program

2013
创新型企业
Innovative
Enterprise

2017
省级专利优秀奖
Provincial Patent
Excellence Award

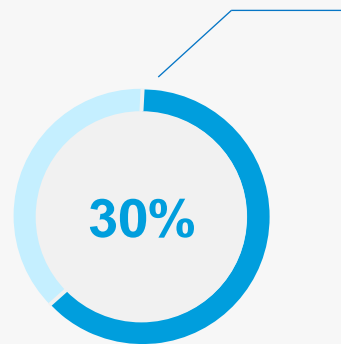
2017
省级科学技术进步奖
Provincial Science
and Technology
Progress Award

2019
省级节水型企业
Provincial Water Saving
Enterprise

服务网络 Service Network DISTRIBUTION DISTRIBUTION

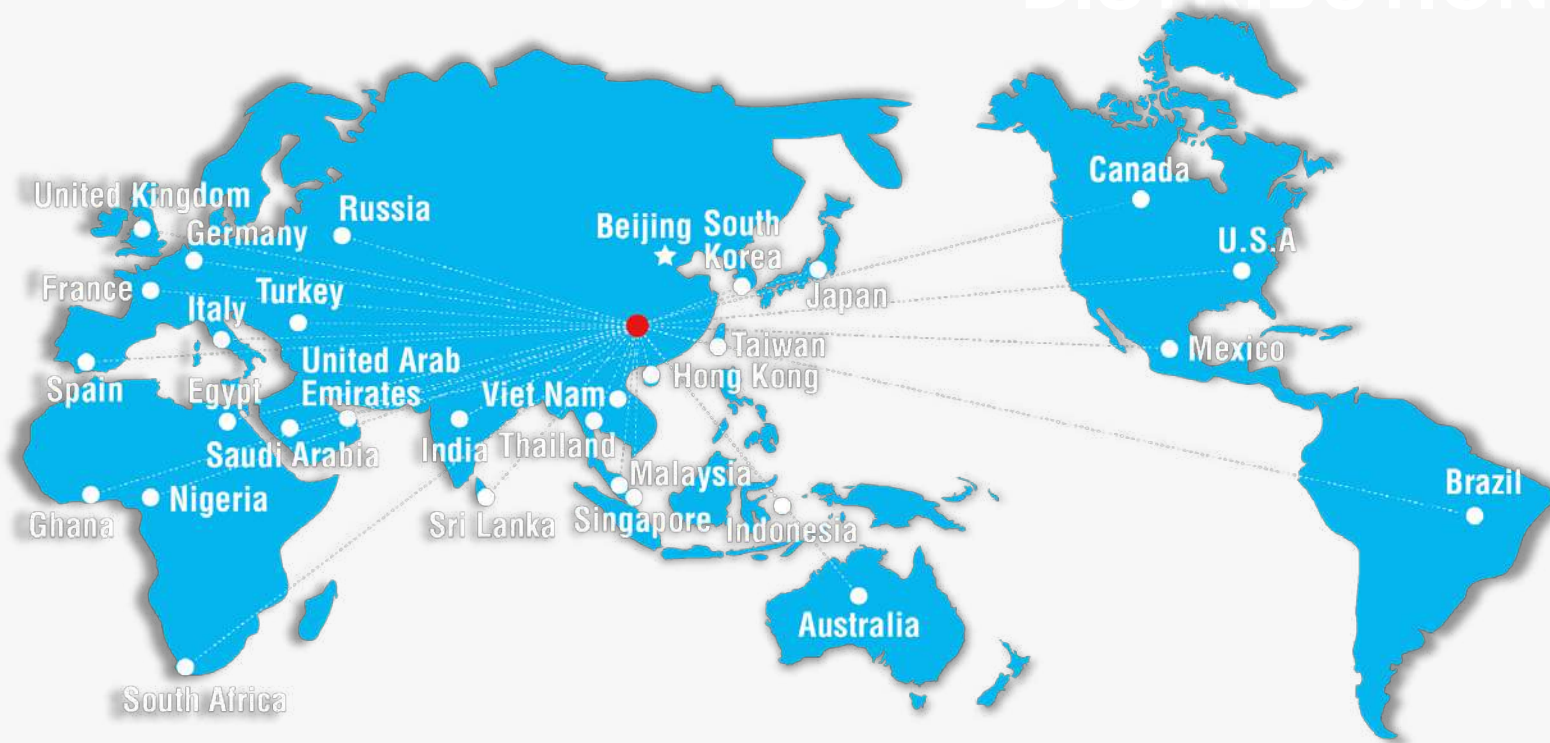
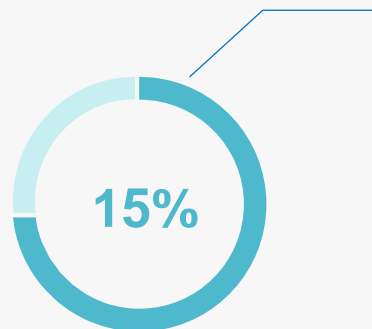
家用膜
Household
membrane

>50,000,000支



工业膜
Industrial
membrane

>2,000,000支



合作伙伴

纯净从“芯”开始

电力行业



印染行业



钢铁冶金



市政污水



石油日化



基础化工



电子行业



合作支持
Cooperative Support

PART 2

R&D Manufacturing

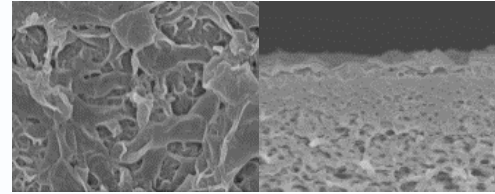


国家级研发平台 National R & D platform

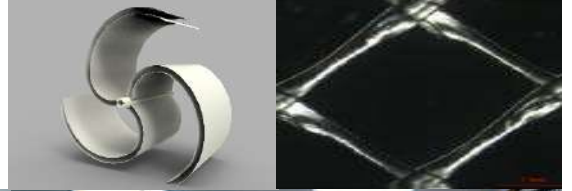
国家地方联合工程研究中心 (分离膜材料及应用技术)
National Engineering Research Center (separation
membrane materials and application technology)

产学研深度融合 Deep integration of production, study and research

先进膜材料联合研发基地
Joint R & D base of advanced membrane materials
水处理膜研发基地
R & D base of water treatment membrane



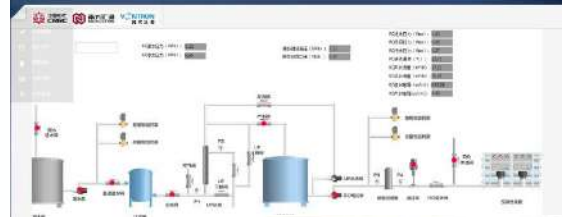
膜材料与元件设计
Design of membrane
materials and components



自主装备设计 Independent equipment design



系统设计应用技术
Application technology of
system design



全分析检测实验室 Total analysis laboratory



 **重大研发项目 8 项**
8 major R & D projects

国家重点研发计划 (2项 2016-2020)
National key R & D plans (2, 2016-2020)

国家科技支撑计划 (3项 2014-2017)
National science and technology support
plans (3, 2014-2017)

国家863项目 (3项 2004-2014)
National 863 Projects (3, 2004-2014)

 **制定国家标准 7 项**
Formulation of 7 national standards

 **授权专利130 项**
130 authorized patents

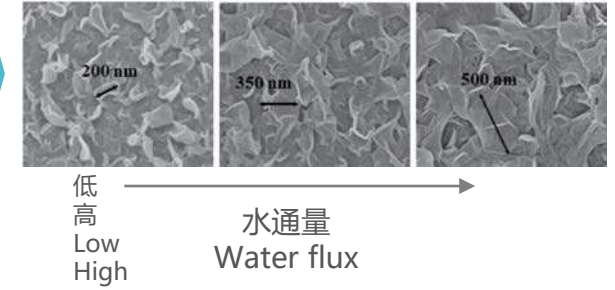
发明专利44件, 实用新型61件
44 invention patents and 61 utility models
制膜25%, 组件23%, 装备44%, 应用8%
Membrane making 25%, module 23%,
equipment 44%, and application 8%



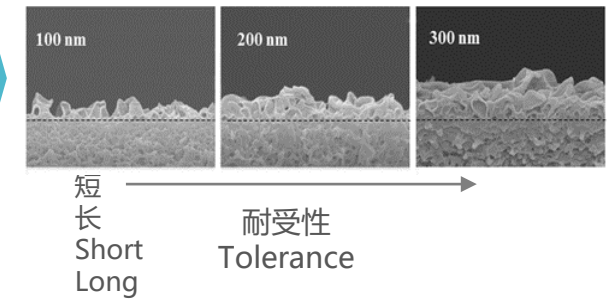


年产4500万m²膜片产能
Membrane annual production capacity of 45 million m²
全自动一体化平膜
Automatic integrated flat membrane
全球第二家干式膜片生产线
The 2nd dry membrane production line in the world

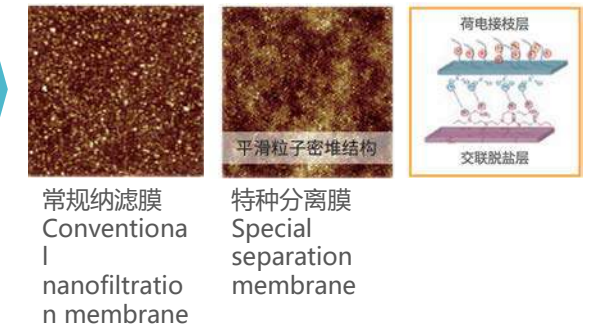
脱盐层形貌
Morphology of desalting layer
精准控制
Precisely control

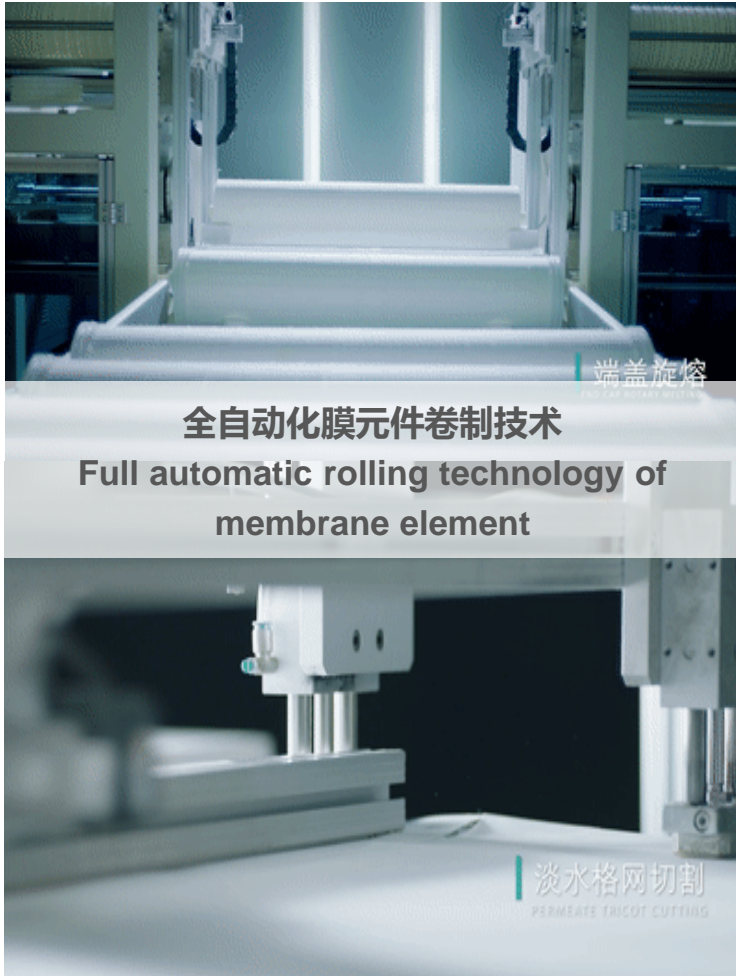


脱盐层厚度
Thickness of desalting layer
精准控制
Precisely control



多胺混合交联调控技术
Control technology of polyamine mixed crosslinking



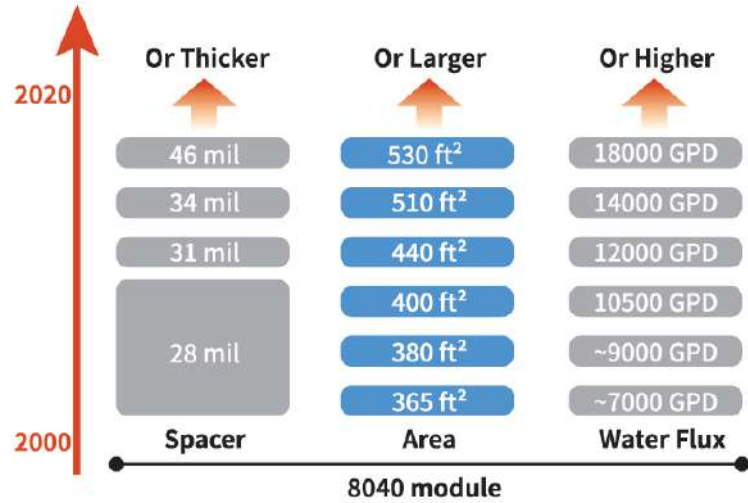


全自动化膜元件卷制技术
Full automatic rolling technology of membrane element

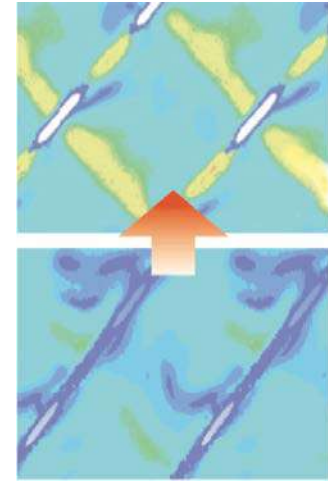
组件技术
迭代发展
Iterative development
of component
technology

浓水格网模拟
LD低压差
Simulation of LD low
pressure difference
with concentrated
water grid

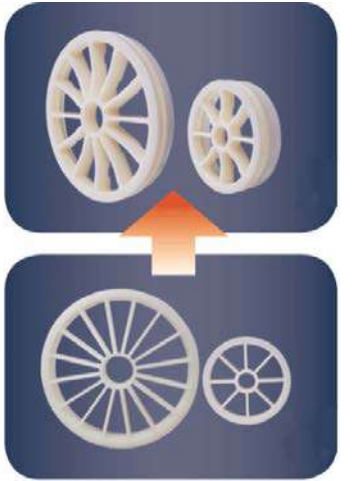
专利圆弧布水
热旋熔技术
Patented arc cloth
hydrothermal rotary
melting technology



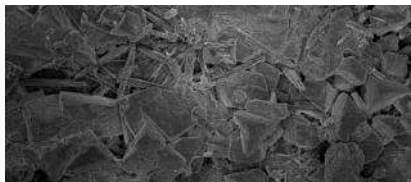
* 以上三个方向为独立体系，根据需求权衡格网厚度、通量与膜面积
* The above three directions are independent systems, and the grid thickness, flux and membrane area are weighed determined according to the demand



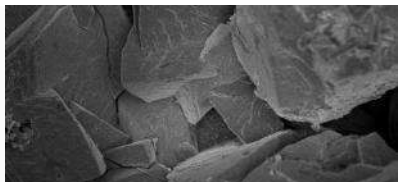
全新一代格网技术
压差下降53%
53% decrease in
pressure difference of
the new generation
grid technology



抗压提升50%
50% increase in
compression
resistance



常规膜元件
Conventional
membrane element



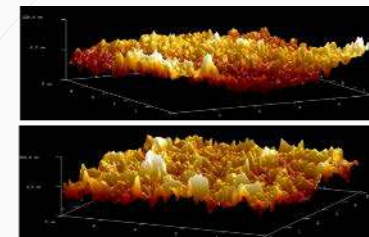
新一代膜元件
A new generation of
membrane element

表面光滑度增加，晶核形成时间增长，降低结垢倾向
Increased surface smoothness, increased nucleus formation time, and reduced scaling tendency

杂化膜表面，形成疏松晶体，降低晶体附着能力
Hybrid membrane surface, formation of loose crystals, and reduced crystal adhesion

膜片通量衰减降低，单位面积污染物重量降低20%以上
Reduced membrane flux attenuation, and reduction of the weight of pollutants per unit area by more than 20%

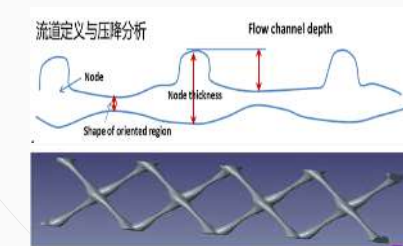
改善膜片分离层
Improvement of
membrane separation
layer



多页短流程工艺
Multi-page short
flow process



优化进水格栅结构
Optimize the water
inlet mesh structure





原材料品控
Raw material quality control

厚度检测(厚度仪)
Thickness Detection

气相色谱, GC-MS
分光光度计, UV-Vis
傅里叶红外, FTIR

缺陷检测(高速CCD)
Defect detection

膜片检测(膜片测试台)
Membrane test

密封性检测(气检台)
Sealing test

性能测试(元件测试台)
Performance test

三年产品留样
Product retention
(stored for 3 years)

PART 3

Product Display



高水效反渗透膜 Helixfil
High water efficiency reverse osmosis
membrane Helixfil

水效反渗透膜 ULP
Water efficiency reverse osmosis
membrane ULP

纳滤膜 VNF
Nanofiltration membrane VNF

家用膜
元件



家用RO&NF膜
Residential RO&NF membrane

High performance membrane

Helixfil[®]

专为高硬度、高含盐量复杂水质设计

Designed for complex water quality with high hardness and high salt content

膜元件型号 Membrane element model	产水量 Permeate Flow GPD	脱盐率 Rejection rate %
HP1812-50	50	99
HP1812-75	75	99
HP2012-100	100	99

*测试条件: 60 psi, 25°C, 250ppm NaCl测试溶液, 回收率15%

*Test conditions: 60 psi, 25°C, 250ppm NaCl test solution, recovery rate 15%



家用RO&NF膜

Residential RO&NF membrane

Residential large flux membrane element (400~1000G RO membrane)

The fourth generation high flux membrane sheet

型号 Model	脱盐率 Rejection Rate %	产水量 Permeate Flow GPD
ULP3012/3013-400	98	400
ULP3012/3013-600	98	600
ULP3012/3013-800	97	800
ULP3113-800	98	800
ULP3113-1000	99	1000

*测试条件: 100 psi, 25°C, 250ppm NaCl测试溶液, 回收率50%

*Test conditions: 100 psi, 25°C, 250ppm NaCl test solution, recovery rate 50%



家用RO&NF膜

Residential RO&NF membrane

Residential NF membrane element (100~1000G NF membrane)

截留分子量200~1000

Retention molecular weight 200~1000 Dal

中度选择性脱盐 (60~80%)

Moderately selective rejection (60~80%)

型号 Model	脱盐率 Rejection Rate %	产水量 Permeate Flow GPD
VNF1812-100 ¹	60-80	100
VNF2012-120 ¹		120
VNF2812-300 ¹		300
VNF3013-1000 ²		1000

*测试条件: ¹ 操作压力60psi, ² 操作压力100 psi, 25°C, NaCl、CaCl₂溶液, 回收率50%

*Test conditions: ¹ operating pressure 60psi, ² operating pressure 100 psi, 25°C, NaCl, CaCl₂ solution, recovery rate 50%

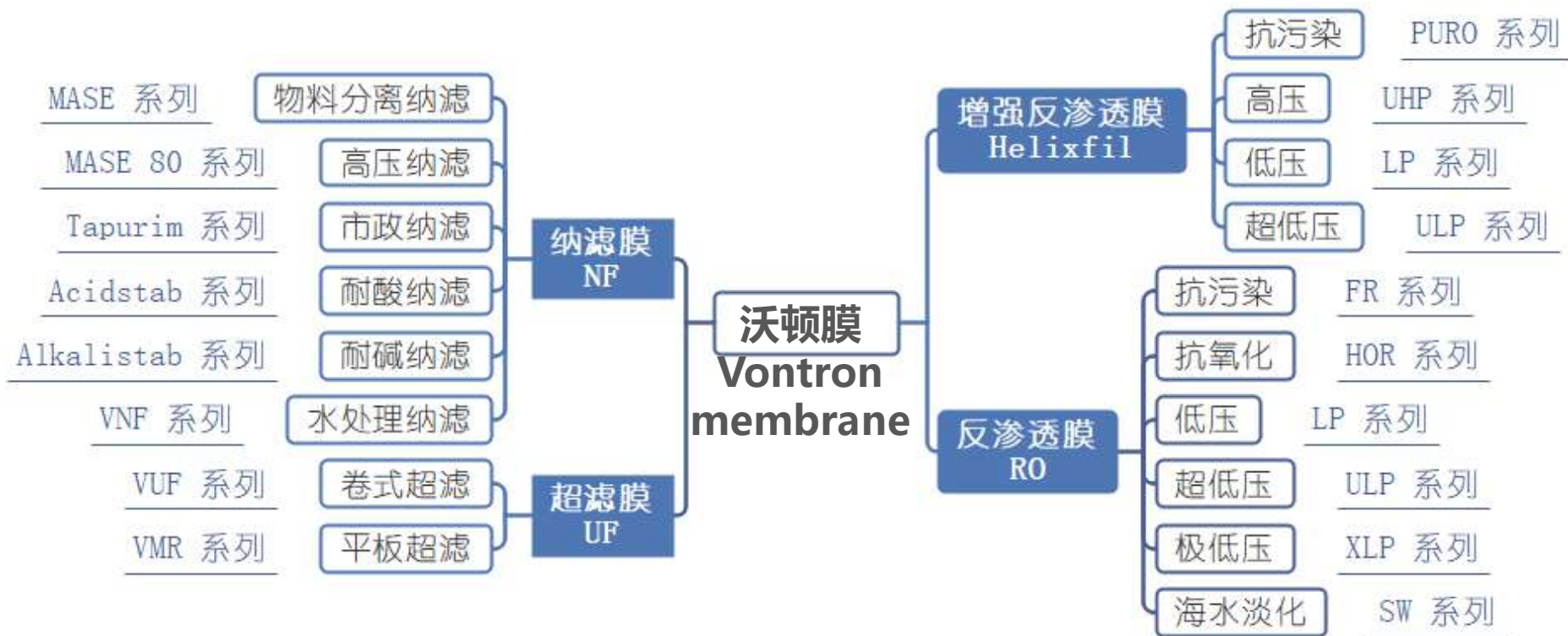
家用RO&NF膜

Residential RO&NF membrane



工业膜产品系列

Industrial membrane product series



22个系列
22series

超78个型号
More than 78 models

工业RO膜
Industrial RO membrane

Helixfil® series of industrial enhanced RO membrane

LP/ULP400-LD 34-LD低压差浓网 Low pressure difference spacer

LP/ULP440-MAX 增大膜面积 Increased membrane area

型号Model	产水量 Permeate Flow	稳定脱除率 Stable Rejection Rate	膜面积 Membrane Area	进水格网 Inlet mesh
	GPD	%	ft ²	mil
LP440-MAX	12500	99.7	440	28
LP400-LD	10500	99.7	400	34-LD
ULP440-MAX ¹	12000	99.5	440	28
ULP400-LD ¹	10500	99.5	400	34-LD

测试条件: 操作压力225 psi (1.55 MPa), 2000 mg/L NaCl, 温度25°C, pH 7.0 ± 0.5,回收率15%

¹ 操作压力150 psi (1.03 MPa), 1500 mg/L NaCl, 温度25°C, pH 7.0 ± 0.5,回收率15%

Test conditions: operating pressure 225 psi (1.55 MPa), 2000 mg/L NaCl, temperature 25°C, pH 7.0 ± 0.5, recovery rate 15%

¹ operating pressure 150 psi (1.03 MPa), 1500 mg/L NaCl, temperature 25°C, pH 7.0 ± 0.5, recovery rate 15%



工业RO膜 Industrial RO membrane

海水淡化膜

Seawater desalination membrane

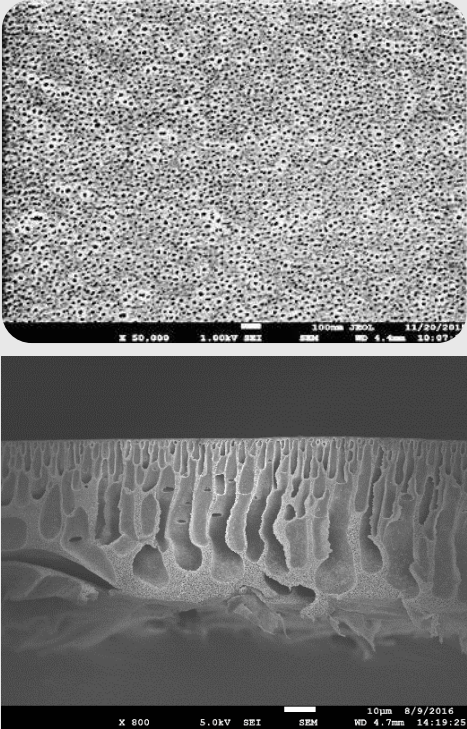
型号Model	产水量Permeate Flow		稳定脱除率 Stable Rejection Rate	膜面积 Membrane Area		进水格网 Inlet spacer
	GPD	m ³ /d	%	ft ²	m ²	mil
SW8040HR-400	7500	28.4	99.8	400	37.2	28
SW8040LE-400	9000	34.0	99.8	400	37.2	34
SW8040XHR-440	6000	22.7	99.85	440	40.9	28
SW8040XLE-440	12100	45.8	99.7	440	40.9	28

测试条件：操作压力800 psi (5.52 MPa) ， 32000 mg/L NaCl溶液， 温度25°C， pH 8， 回收率8%

Test conditions: operating pressure 800 psi (5.52 MPa), 32000 mg/L NaCl solution, temperature 25°C, pH 8, recovery rate 8%

精密截留卷式超滤膜系列 (VUF)

Precision molecular weight cutoff rolling type ultrafiltration membrane series (VUF)



- 高孔密度
■ High hole density
- 均一孔径
■ Uniform aperture
- 专利技术
■ Patented technology
- 定制化生产
■ Customized production

- 截留分子量
Molecular weight cutoff: 4 6 8 10 20 67 100 KDa
- 进水流道
Inlet flow channel: 28 34 42 46 mil
- 主要材质
Main materials: 聚丙烯腈 Polyacrylonitrile, 聚醚砜 Polyethersulfone, 聚砜 Polysulfone
- 主要用途
Main purposes: 制药、饮料、脱色、糖、细菌等领域的分离和处理
Separation and treatment in pharmaceutical, beverage, decolorization, sugar, bacteria and other fields

精密截留卷式超滤膜产品性能

Performance of precision molecular weight cutoff rolling type ultrafiltration membrane

药物分离、除杂

Drug separation and impurity removal



- ◆ 可提供34、46 mil 等多种进水流道
- ◆ Various inlet flow channels such as 34 and 46 mil are available
- ◆ 外壳形式有玻璃钢(FRP)或网格(mesh)
- ◆ Shell form of glass fiber reinforced plastics (FRP) or mesh (mesh)

8寸膜主要性能 (400 ft², 31 mil)

Main performance of 8 inch membrane (400 ft², 31 mil)

膜型号Model	截留分子量 Molecular Weight Cut-off KDa	产水量 Permeate Flow GPD
VUF8040-4K/31F	4	8700
VUF8040-6K/31F	6	6500
VUF8040-8K/31F	8	9500
VUF8040-10K/31F	10	7000
VUF8040-20K/31F	20	10500
VUF8040-67K/31F	67	25000

产品应用Product Application

Industrial NF membrane

6 series

19 model

Municipal



Water
treatment



Material
separation



High
Pressure



Acid-resistant



Alkali-resistant



Tapurim 市政纳滤膜 Municipal NF membrane

长寿命 Long service life



组件结构
膜片&浓网
Component structure
membrane & thick mesh

低能耗 Low energy consumption



膜片 Membrane
浓网
Thick mesh

合适的脱除率 Appropriate rejection rate



膜片 Membrane

更安全 Safer



膜材料 Membrane material

性能指标 Performance Indicators

型号 Model	有效膜面积 ft ² Active Membrane Area ft ²	产水量 Permeate Flow GPD	硫酸盐脱除率 Sulfate Rejection Rate %	TOC脱除率 TOC Rejection Rate %
TAPU-XLS	400	12000	90	90
TAPU-LS	400	10500	95	90
TAPU-MS	400	9000	95	90
TAPU-HS	400	8000	95	90

测试条件: NaCl、CaCl₂、MgSO₄混合盐, 70psi (0.48Mpa), 15%回收率, pH7.5, 25°C
Test conditions: NaCl, CaCl₂, MgSO₄ salt-mixture, 70psi (0.48Mpa), 15% recovery rate, pH7.5, 25°C



**Tapurim 系列
市政纳滤膜**

- 宽适用范围** 脱盐率10%~90%
- 流体结构设计** 膜间压差降低30%
- 极低能耗** 驱动压力≤6bar
- 健康饮水** TOC去除率高于90%

全国服务热线: 4000-111-880

工业NF膜 Industrial NF membrane

- ✓ 全新34mil低压差进水格网
- ✓ New 34mil low pressure drop water inlet mesh
- ✓ 专利圆弧形布水端盖
- ✓ Patented arc-shaped water distribution end cap
- ✓ 热熔旋焊制作工艺
- ✓ Hot-melt spinning welding manufacturing process

型号Model	有效膜面积ft ² Active Membrane Area ft ²	产水量Permeate Flow GPD	脱除率Rejection Rate %
MASE-SP	400	12000	90
MASE-SL	400	12000	98
MASE-PS	400	12000	98
MASE-CR	400	12000	95

测试条件:


Test conditions:

2000mg/L MgSO₄, 100psi (0.69Mpa), 15%回收率, pH 7.5±0.5, 25°C

2000mg/L MgSO₄, 100psi (0.69Mpa), 15% recovery rate, pH 7.5±0.5, 25°C




工业NF膜


Industrial NF membrane



VONTRON
时代沃顿

Acidstab 系列 耐酸纳滤膜

-  **酸溶液高透过率**
常见酸透过率80-90%
-  **金属离子高脱除率**
常见金属离子脱除率94-95%
-  **高精度卷制技术**
降低运行阻力



沃顿科技 VHD 热消毒膜产品 VONTRON heat disinfection membrane products

型号Model	有效膜面积 ft ² Active Membrane Area ft ²	产水量 Permeate Flow GPD	脱盐率 Rejection Rate %	进水格网 Inlet Mesh mil
VHD-8040/34G	400	9000	99.0	34
VHD-4038G	90	2100	99.0	34



测试条件：操作压力 150 psi (1.03 MPa) ， 2000 mg/L NaCl 溶液， 温度 25℃，
pH 7.0 ± 0.5， 回收率 15%

Test conditions: operating pressure 150 psi (1.03 MPa), 2000 mg/L NaCl solution,
temperature 25℃, pH 7.0 ± 0.5, recovery rate 15%

工业热消毒膜 Industrial VHD membrane

沃顿科技 膜片

VONTRON membrane sheet product

	Rejection %	Flow rate GPD	Thickness mm	Effective Coating Width mm
LP	99.5	25±4	0.125-0.160	990
ULP	99.5	28±4	0.125-0.160	990
SW	99.7	18±3	0.125-0.160	990

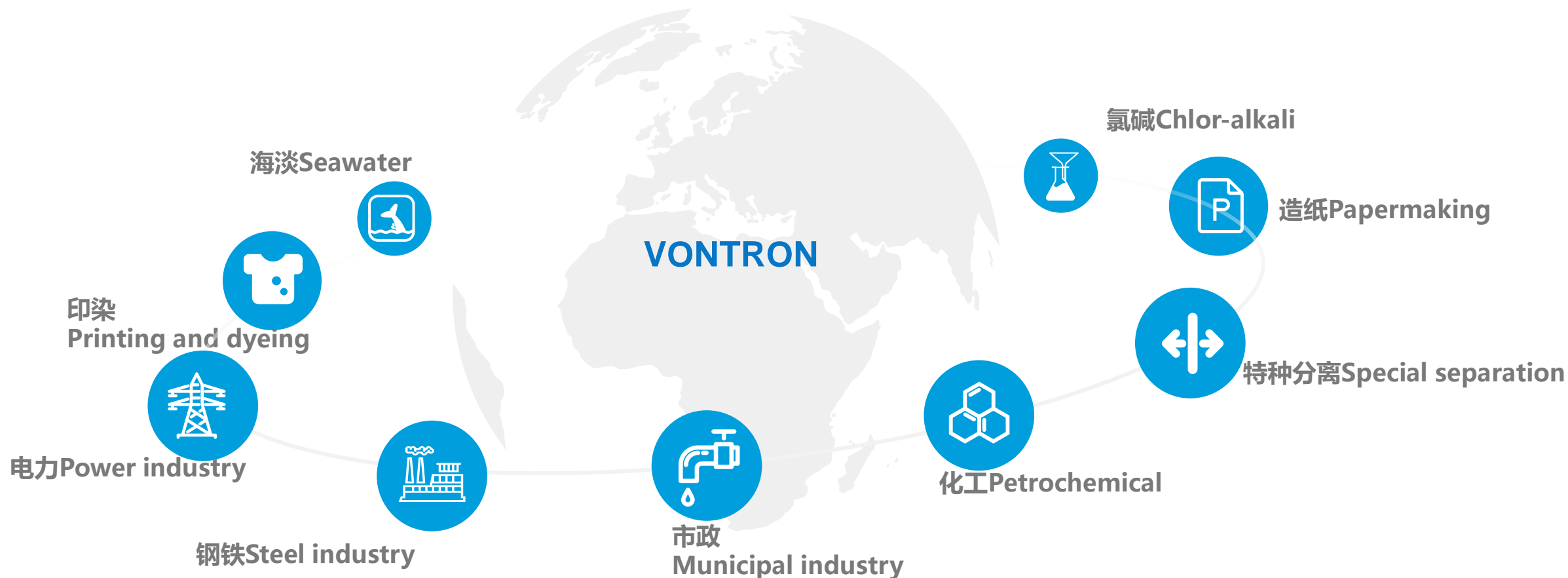
PART 4

Product Application



部分应用案例与系统解决方案

Some application cases and system solutions



产品应用

Product Application

Drinking water treatment of VONTRON commercial RO membrane

全球连锁7-Eleven便利店 RO饮用水处理设备

Global chain 7-Eleven convenience store RO drinking water treatment equipment

近且便利 提供更加有品质的产品与服务

Close and convenient Providing high-quality products and services

具备应对变化的能力 持续应对客人不断变化的需求

Have the ability to respond to changes and continue to meet the changing needs of customers

Seven & I Holdings Co., Ltd. has a variety of business forms including convenience stores, supermarkets, department stores, restaurants, specialty stores, finance, Internet, etc. It is a world-renowned circulation service group;

Fortune财富杂志500强中位列176位;

Ranking 176 in the Fortune 500;



产品应用

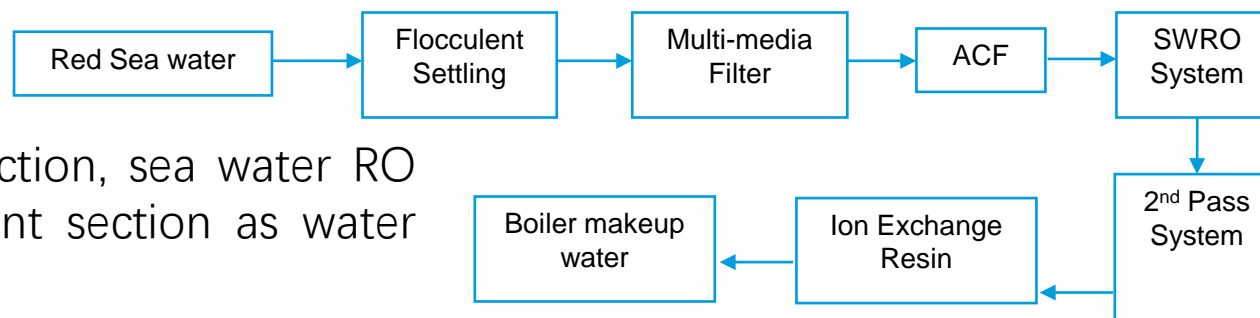
Product Application

SWRO Membranes Usage in Thermal Power Generation

RABEC Rabigh Independent Power Plant (IPP)

Rabigh IPP mainly consists of pre-treatment section, sea water RO unit, brackish water RO unit and post Treatment section as water treatment plant.

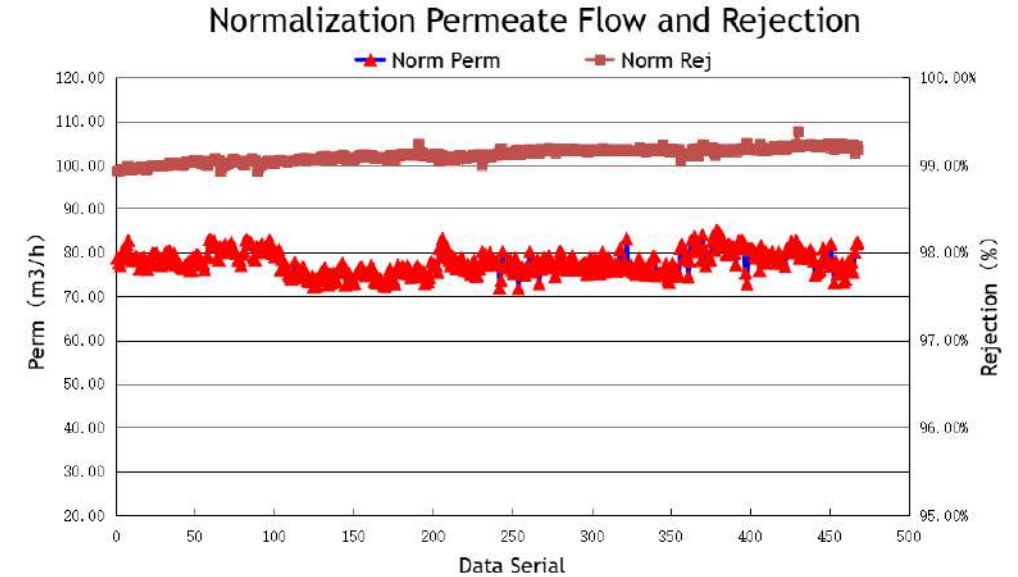
The end user is steam turbine unit boiler, which is used to produce high-quality steam. The SWRO system consist 4 trains.



SWRO Membranes Usage in Thermal Power Generation

Feed sea water quality (Red Sea)

Calcium (Ca ²⁺)	436.69 mg/l	Bicarbonate (HCO ₃ ⁻)	144.04 mg/l
Magnesium (Mg ²⁺)	1,432.36 mg/l	Carbonate (CO ₃ ²⁻)	7.53 mg/l
Sodium (Na ⁺)	12,878.02 mg/l	Sulphate (SO ₄ ²⁻)	3,311.58 mg/l
Potassium (K ⁺)	362.36 mg/l	Chloride (Cl ⁻)	22,588.58 mg/l
Barium (Ba ²⁺)	0.00 mg/l	Fluoride (F ⁻)	1.26 mg/l
Strontium (Sr ²⁺)	0.00 mg/l	Nitrate (NO ₃ ⁻)	0.00 mg/l
Boron (B)	6.80 mg/l	Silica (SiO ₂)	0.29 mg/l

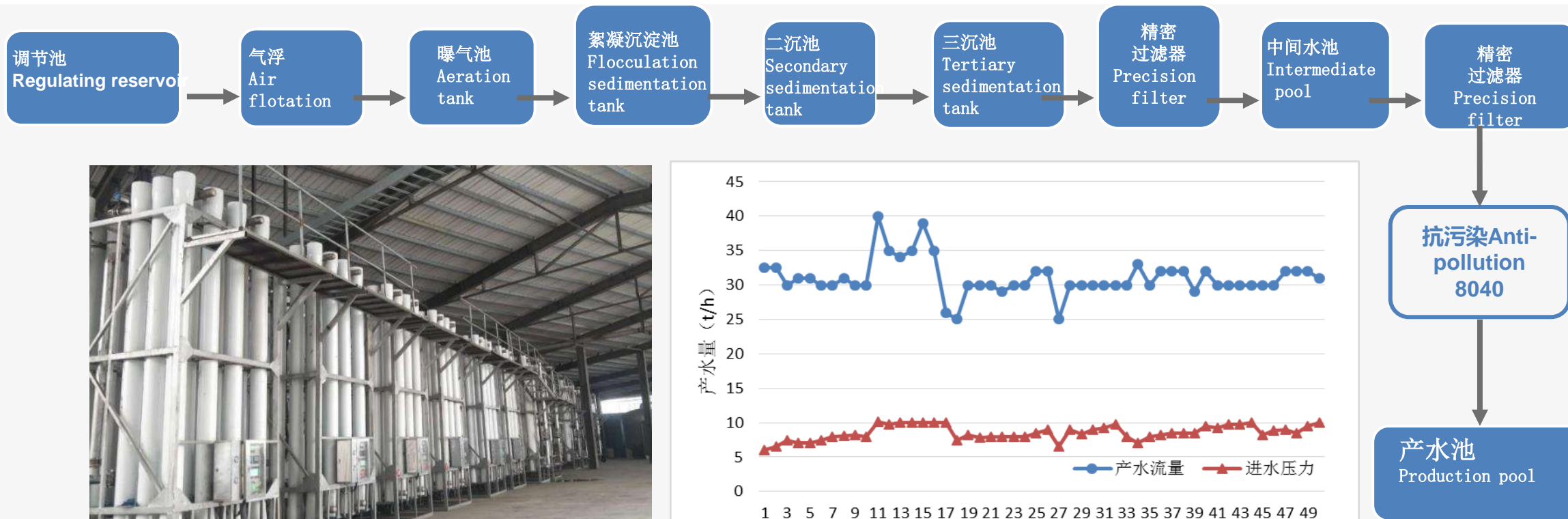


For seeking a SWRO membrane with highly productive, high rejection (Low TDS) and less price for long term stable operation. Many competitors have conducted tests in cooperation with Rabigh power plant. At last, VONTRON membranes won the competition.

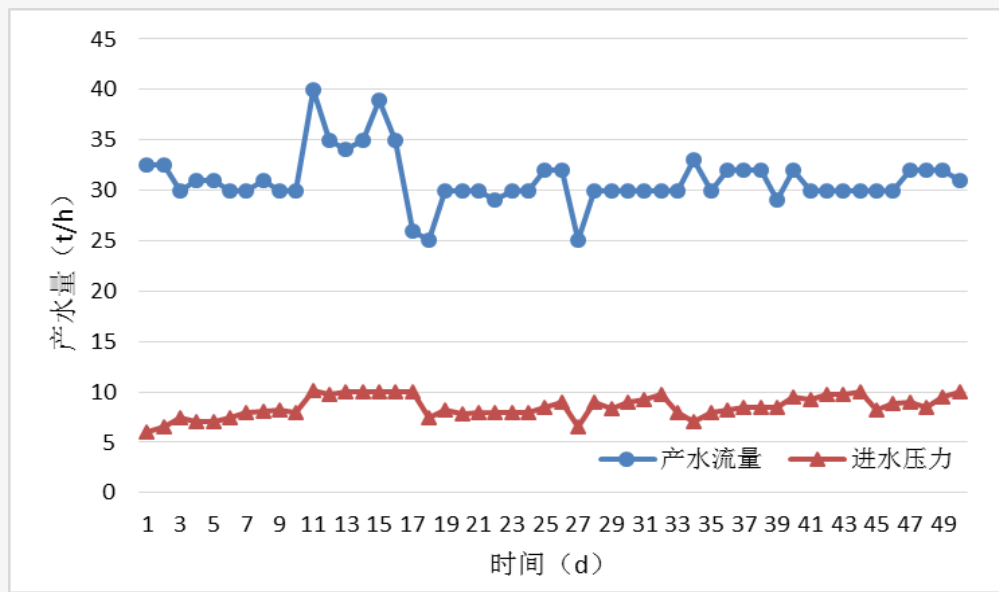
Since the first day operation in November 2019, during 450 days operation, at expected, all the parameters are still under customer's permeate water requirements, and now VONTRON newest 440ft² SW membranes are testing on the SWRO system.

Reuse of printing and dyeing wastewater of VONTRON anti-pollution RO membrane

80,000 m³/d reverse osmosis system of a top-500 enterprise in the region of Jiangsu and Zhejiang



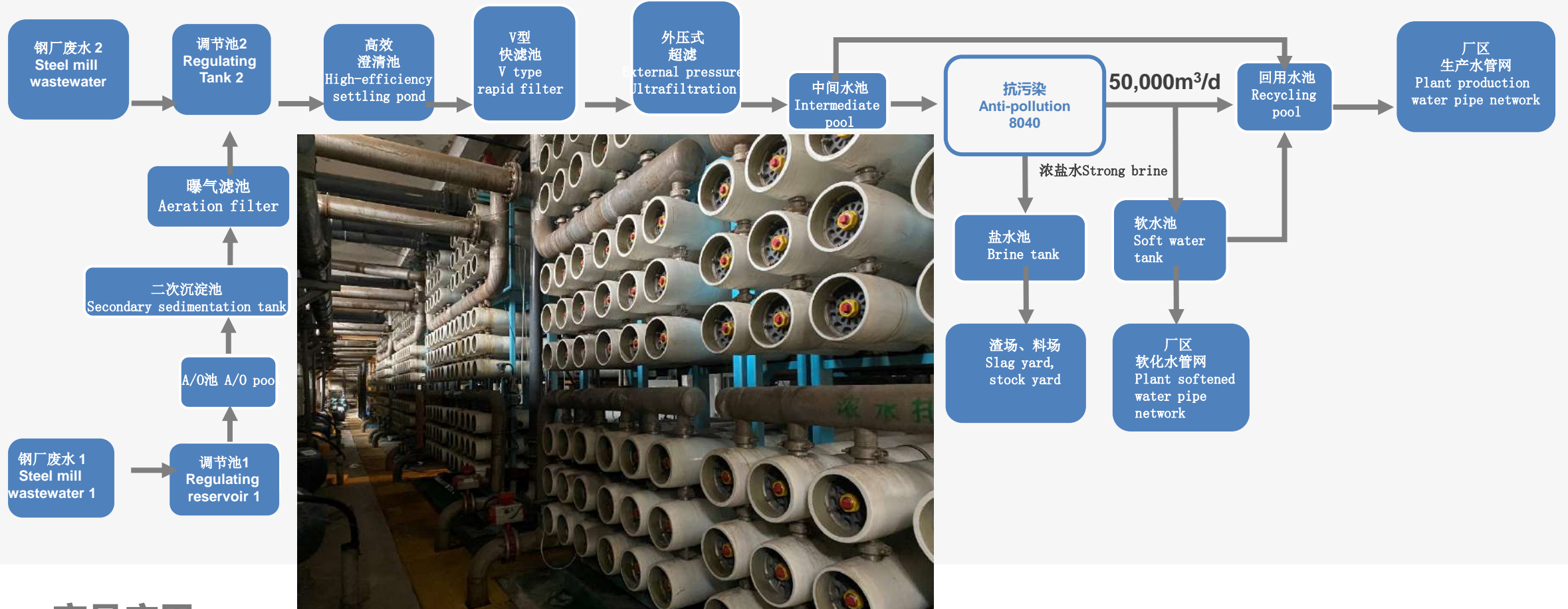
Vertical Operation Mode



Cleaning cycle is extended from 7 days to 10 to 14 days

Reuse of steel wastewater of anti-pollution reverse osmosis membrane

50,000 m³/d reverse osmosis system in a steel plant



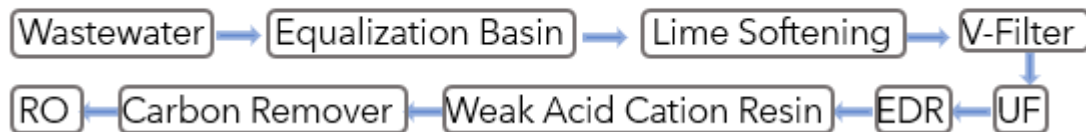
产品应用

Product Application

Coal chemical wastewater zero liquid discharge project

The wastewater undergoes several pretreatment steps (Figure 1) to reduce organic contaminants, hardness and suspended solids before ZLD membrane system.

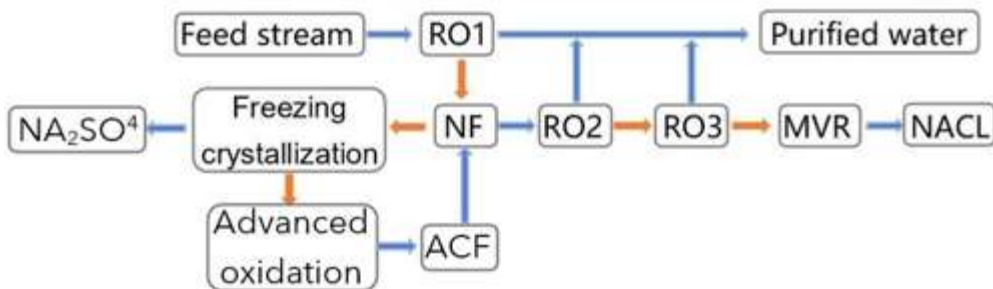
Figure 1: Pretreatments before ZLD RO/NF membrane system



After the pretreatment system, 720m³/h treated water entering the ZLD RO/NF membrane system(Figure 2) with about 25,000-30,000 mg/L TDS and 30-80ppm COD



Figure 2: Zero liquid discharge system



NF System Feed Water Quality

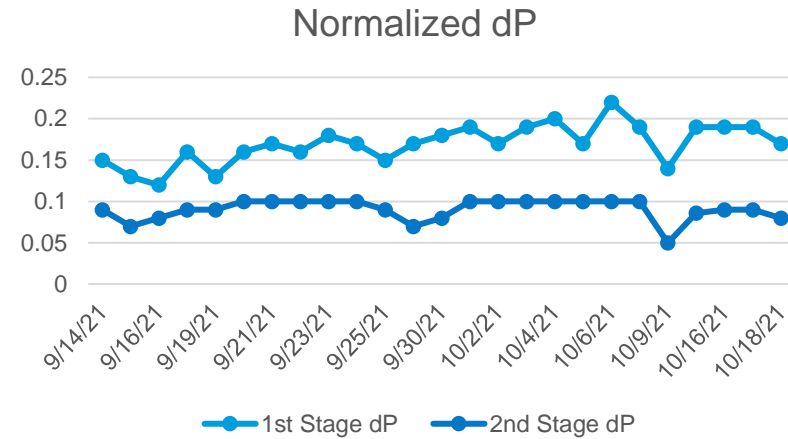
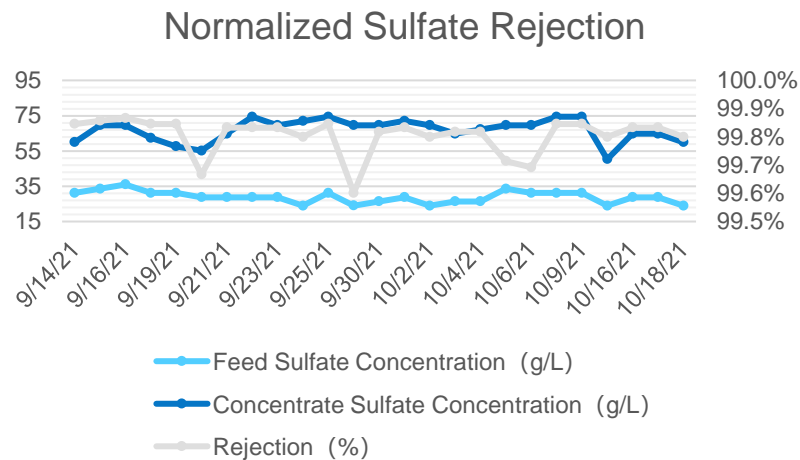
Na ⁺	24545	Cl ⁻	18053	Si	23.12
K ⁺	1394	SO ₄ ²⁻	34886	F ⁻	26.5
Ca ²⁺	3.54	NO ₃ ⁻	810	Fe	0.72
Mg ²⁺	1.7	Alkalinity	514	COD	3495.4

Coal chemical wastewater zero liquid discharge project

Because of the constantly circulating and concentrated by the mother liquid from freezing crystallization, the feed water of the NF train contains over 80,350 ppm TDS, 20,000~40,000 ppm SO₄²⁻ and 3000-5000 ppm COD

Recent Operational performance of VNF-8040HP:

a. normalized sulfate rejection, b. normalized 1st stage and 2nd stage differential pressure



Although the terrible operational condition leads to frequent organic fouling and chemical cleaning, the sulfate rejection rate still very stable and greater than 99.5% after 15 months operation.

NF membrane treat landfill leachate

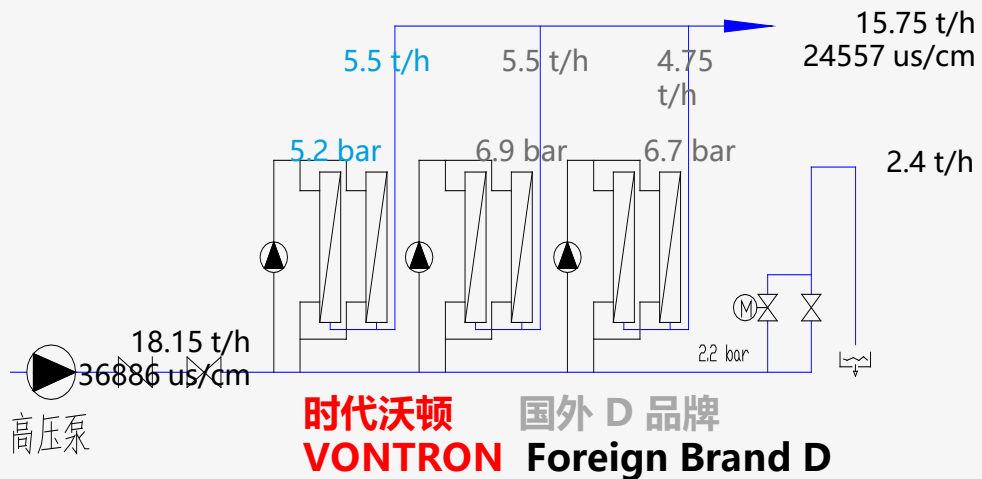
Feed water:

Chroma 10903, CODcr 1186, TOC 712, TDS 21602, total hardness 1772, pH 7.5

VONTRON NF membrane rejection rate:

Chroma 99.5%, TOC 93.8%, total hardness 75.0%, TDS 20.5%, conductivity 33.4%

Main function: removal chroma/hardness/TOC/ammonia nitrogen, partial desalination



Feed water Competitor Permeate VONTRON Permeate



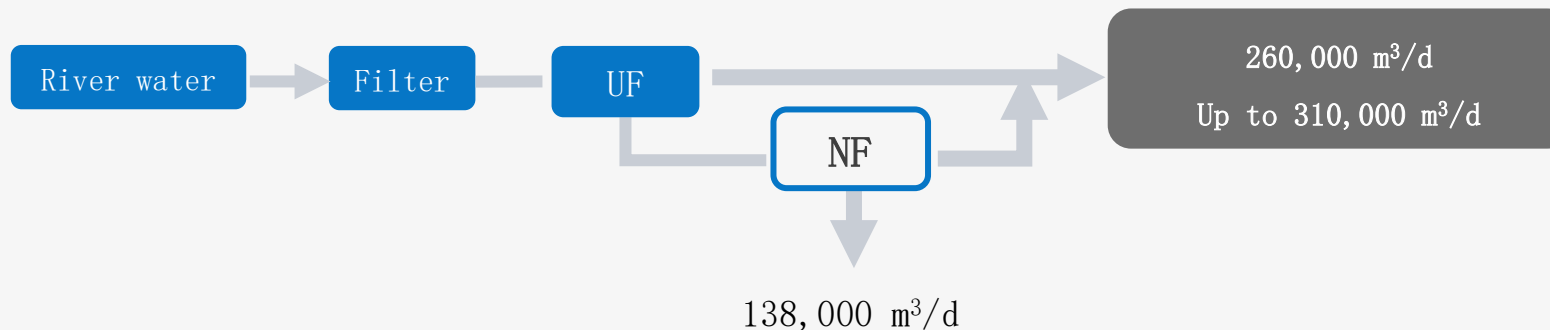
	色度Chroma	CODcr	TOC	TN	TP	总硬 Total hardness	总碱 Total alkali	TDS	电导 Conductivity
Feed concentration	10903	1186	712	1074	6.21	1772	3647	21602	26710
Rejection rate %	99.5	96.4	93.8	5.6	86.7	75.0	46.3	20.5	33.4

产品应用 Product Application

NF membrane municipal water treatment application

An advanced water purification plant in Kaotan, Taiwan

Second largest waterworks in Asia
 Tap Water supply for the whole Kaohsiung City

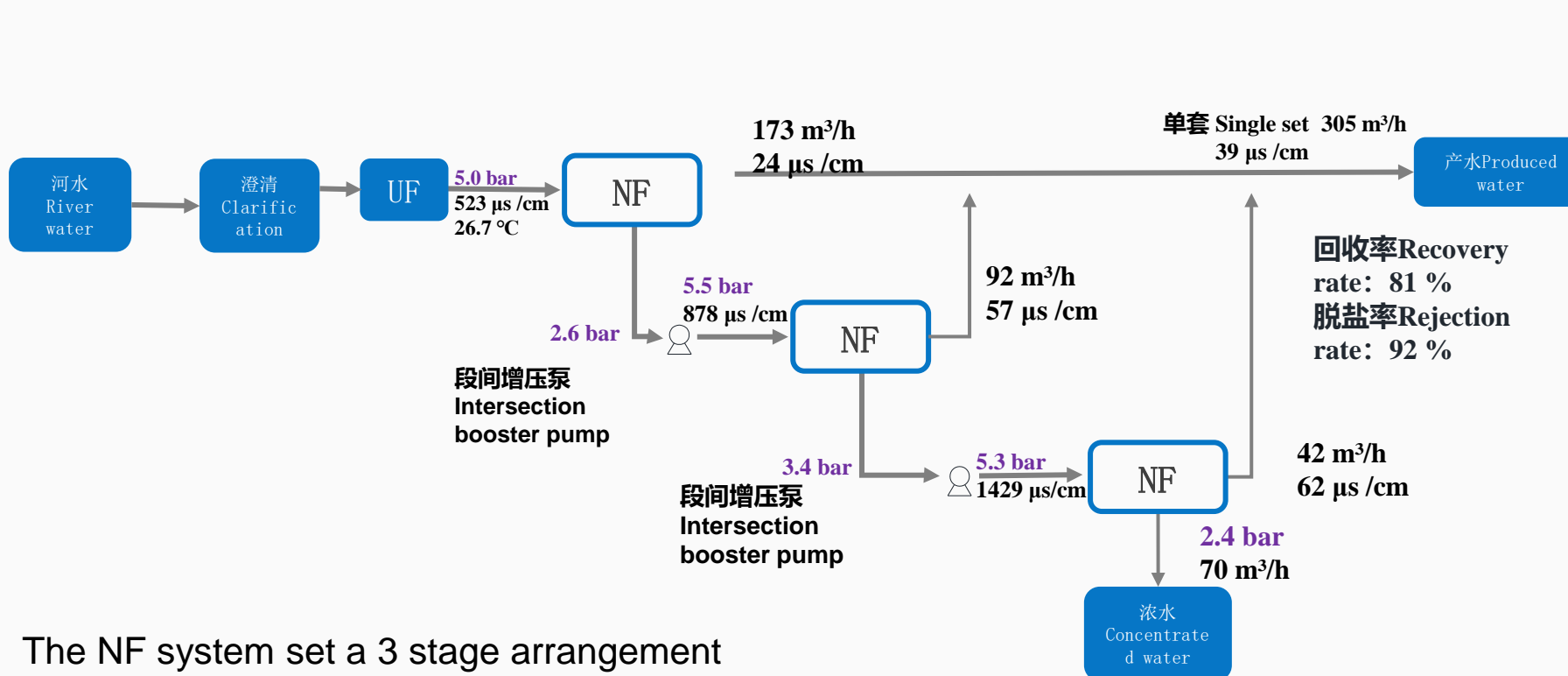


Water Quality Item	Taiwan Drinking Water Standard	Permeate Water quality
Turbidity (NTU)	< 2	< 0.2
Total dissolved solids (mg/L)	< 500	< 250
Total trihalomethane (mg/L)	< 0.08	< 0.03
Total number of bacterial colonies (CFU/mL)	< 100	< 1.0



NF membrane municipal water treatment application

An advanced water purification plant in Kaotan, Taiwan



The NF system set a 3 stage arrangement

System recovery rate is 81%, and system rejection rate is 92%.

Note: The system recovery rate is 90% for the original 4 stage system, which is cancelled due to energy saving and cost reduction

VONTRON

THANK YOU!

沃顿科技股份有限公司

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