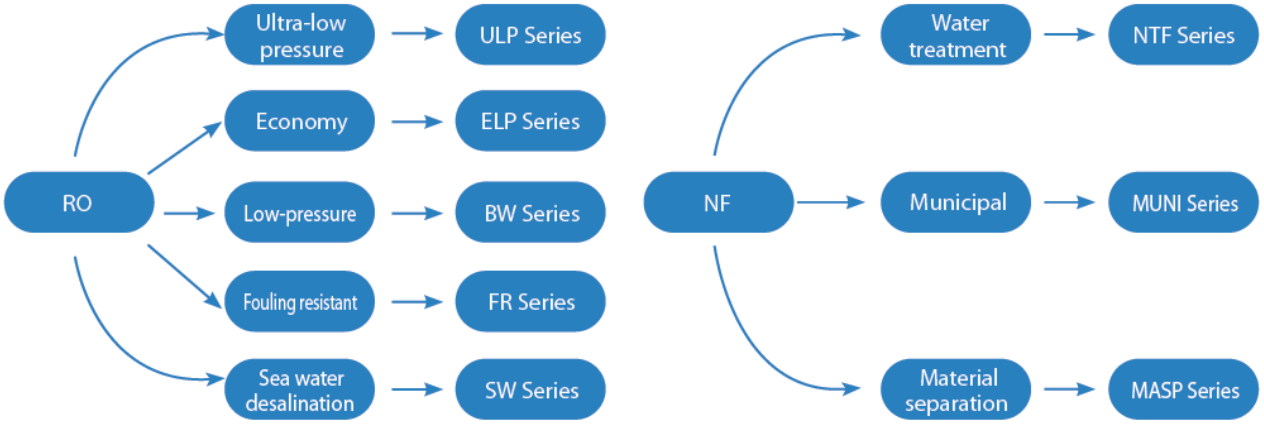
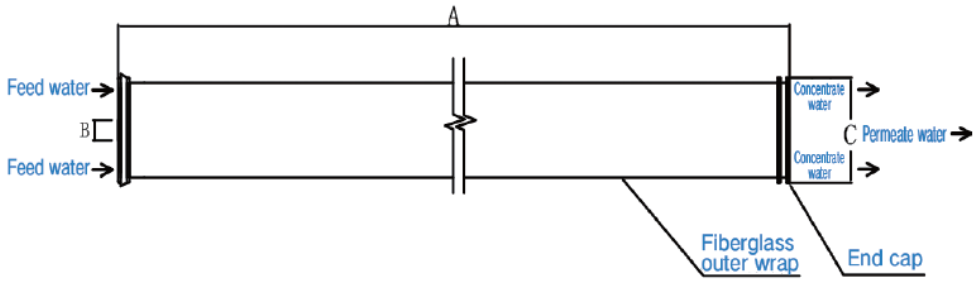
Product Classfication



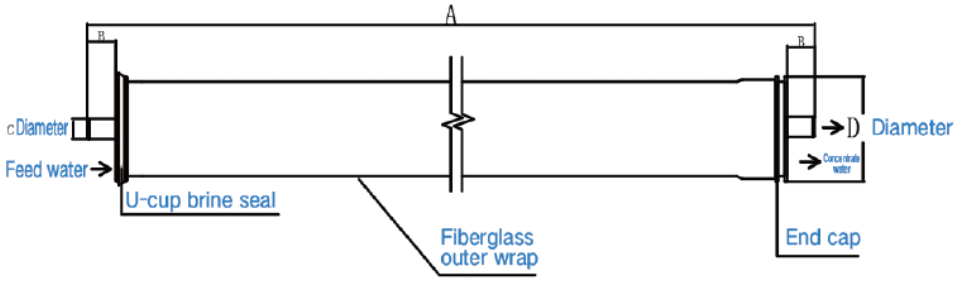
Membrane Element

8040 Membrane Element



Model	A/inch (mm)	B/inch (mm)	C/inch (mm)
8040	40 (1016)	1.125 (29)	7.9 (201)

4040 Membrane Element



Model	A/inch (mm)	B/inch (mm)	C/inch (mm)	D/inch (mm)
4040	40 (1016)	1.05 (26.7)	0.75 (19)	3.9 (99)

Product Introduction

RO Membrane Product

1. Ultra-low pressure (ULP) RO flatsheet membranes

(1) Product features

(a) High permeate flow, high salt rejection, long lifetime.

(b) It has good fouling-resistant performance and wide range of applications.

(c) Using advanced membrane technology and fully automated production lines, the reliability and stability of the product are well guaranteed.

(2) Model and performance specifications

Flatsheet	Average Permeate Flow Rate (GFD)	Stable Rejection(%)
ULP	30-40	98.5
ULP-Plus	40-50	97.5
ULP-Max	50-60	97.0

Test Conditions: Feed water pressure 70 psi (0.48 MPa); Feed water temperature 25°C; Feed water concentration 251 ppm $CaCl_2$、 210.5 ppm $MgSO_4$、 79 ppm NaCl、 265.3 ppm $NaHCO_3$、 trace NaClO; Concentrated water flow 4L/min; Feed water pH 7.

(3) Membrane Selection

Flatsheet	Component elements
ULP	1812-75, 2812-200, 3012-400
ULP-Plus	3012-600, 3013-800
ULP-Max	3213-1000, 3413-1200

(a) When the membrane is used, the water produced in the first hour needs to be discharged.

(b) The size of the membrane is 300m, and the reel length may change under certain conditions.

(c) Each roll of diaphragm is individually wrapped and sealed with black plastic film.

(4) Appearance dimension of flatsheet membrane

Width(mm)	1068±1
External diameter(mm)	260±5
Internal diameter(ft)	3.0
Length(mm)	1160±2
Weight(kg)	35±2
Thickness(μm)	135±5
Colour	Yellow

(5) Storage conditions and cycle of flatsheet membranes

Storage conditions : avoid sunlight and UV rays, temperature : 10~30°C, humidity<50%.

Warranty cycle : ULP : 6 months; ULP-Plus and ULP-Max : 2 months.

2.Ultra-low pressure (ULP) RO elements

(1) Product features

ULP Series Elements work under ultra-low pressure reaching a water flux and rejection rate that can rival other low-pressure counterparts. It can operate at 2/3 pressure of LP Series. They are ideal for use in medium-sized water treatment system (TDS≤1500mg/L). Our ULP RO membranes take a leadership role in the thin-film composite membrane industry and meet the challenges of higher rejection in lower-pressure operations.

(2) Model and performance specifications

Model	Permeate Flow GPD(m^3/d)	Stable Rejection(%)	Min. Salt Rejection(%)	Active Membrane Area ft^2(m^2)	Feed spacer Thickness (mil)
ULP-8040-HF	13000 (49.3)	99	98.5	400 (37.2)	31
ULP-8040-HR	10500 (39.8)	99.3	99	400 (37.2)	31
ULP-4040	2800 (10.6)	99	98.5	78 (7.2)	31

Test Conditions: Feed water pressure 150 psi (1.03 MPa); Feed water temperature 25°C; Feed water concentration 1500 mg/L as NaCl; Recovery rate 15%; Feed water pH 7; Each membrane element may have ± 15% variation of permeate flow.

(3) Operation conditions and limits

Maximum operating pressure	300psi (2.07MPa)
Maximum water temperature	45°C
Maximum feedwater flow	17.0m^3/h (8040) , 3.6m^3/h (4040)
Maximum feedwater flow SDI_{15}	5
Maximum concentration of free chlorine	< 0.1ppm
Maximum pressure drop per element	15psi
Allowed pH range for feedwater in operation	3~10
Allowed pH range for chemical cleaning	1~12

3.Economy low-pressure RO elements (ELP) series

(1) Product features

Economy low-pressure RO elements (ELP) work at ultra-low pressure reaching a water flux and rejection rate that can compete with low-pressure counterpart. It can operate under 2/3 pressure of BW Series while reaching a rejection rate of 99.5%.

(2) Model and performance specifications

Model	Permeate Flow GPD(m^3/d)	Stable Rejection(%)	Min. Salt Rejection(%)	Active Membrane Area ft^2(m^2)	Feed spacer Thickness (mil)
ELP-4040	2400 (9.0)	99.5	99.2	82 (7.6)	31
ELP-8040	10500 (39.7)	99.5	99.2	400 (37.2)	31
ELP-8040- (440)	12000 (45.4)	99.5	99.2	440 (40.9)	28

Test Conditions: Feed water pressure 150 psi (1.03 MPa); Feed water temperature 25°C; Feed water concentration 1500 mg/L as NaCl; Recovery rate 15%; Feed water pH 7; Each membrane element may have ± 15% variation of permeate flow.

(3) Operation conditions and limits

Maximum operating pressure	600psi (4.14MPa)
Maximum water temperature	45°C
Maximum feedwater flow	17.0m^3/h (8040) , 3.6m^3/h (4040)
Maximum feedwater flow SDI_{15}	5
Maximum concentration of free chlorine	< 0.1ppm
Maximum pressure drop per element	15psi
Allowed pH range for feedwater in operation	3~10
Allowed pH range for chemical cleaning	1~12

4.Low-pressure brackish water RO elements (BW) series

(1) Product features

Low-pressure brackish water RO elements (BW) are used for separating salts from water and are produced with an automated fabrication process that ensures precision, consistency, and reliability. They are ideal for use in medium-sized water treatment system (TDS:2000mg/L-10000mg/L). Our RO membranes take a leadership role in the thin-film composite membrane industry and meet the challenges of higher rejection in lower-pressure operations.

(2) Model and performance specifications

Model	Permeate Flow GPD(m^3/d)	Stable Rejection(%)	Min. Salt Rejection(%)	Active Membrane Area ft^2(m^2)	Feed spacer Thickness (mil)
BW-8040	10500 (39.8)	99.5	99.3	400 (37.2)	28
BW-4040	2400 (9.0)	99.5	99.3	78 (7.2)	28

Test Conditions: Feed water pressure 225 psi (1.55 MPa); Feed water temperature 25°C; Feed water concentration 2000 mg/L as NaCl; Recovery rate 15%; Feed water pH 7; Each membrane element may have ± 15% variation of permeate flow.

(3) Operation conditions and limits

Maximum operating pressure	600psi (4.14MPa)
Maximum water temperature	45°C
Maximum feedwater flow	17.0m^3/h (8040) , 3.6m^3/h (4040)
Maximum feedwater flow SDI_{15}	5
Maximum concentration of free chlorine	< 0.1ppm
Maximum pressure drop per element	15psi
Allowed pH range for feedwater in operation	3~10
Allowed pH range for chemical cleaning	1~12

5.Fouling resistant RO membrane elements (FR) series

(1) Product features

Fouling-resistant RO Membrane Elements (FR) utilize specialized manufacture technique that can improve the hydrophilicity, electric charge and roughness of membrane surface, thus reducing the adhesion and adsorption of pollutants or microbes on membrane surface. FR are widely used in printing and dyeing, municipal sewage, reclaimed water reuse, coal chemical industry and many other fields.

(2) Model and performance specifications

Model	Permeate Flow GPD(m^3/d)	Stable Rejection(%)	Min. Salt Rejection(%)	Active Membrane Area ft^2(m^2)	Feed spacer Thickness (mil)
FR-8040	10500 (39.8)	99.5	99.3	400 (37.2)	34
FR-4040	2400 (9.0)	99.5	99.3	78 (7.2)	34

Test Conditions: Feed water pressure 225 psi (1.55 MPa); Feed water temperature 25°C; Feed water concentration 2000 mg/L as NaCl; Recovery rate 15%; Feed water pH 7; Each membrane element may have ± 15% variation of permeate flow.

(3) Operation conditions and limits

Maximum operating pressure	600psi (4.14MPa)
Maximum water temperature	45°C
Maximum feedwater flow	17.0m^3/h (8040), 3.6m^3/h (4040)
Maximum feedwater flow SDI_{15}	5
Maximum concentration of free chlorine	< 0.1ppm
Maximum pressure drop per element	15psi
Allowed pH range for feedwater in operation	3~10
Allowed pH range for chemical cleaning	1~12

6. Sea water desalination RO membrane elements (SW) series

(1) Product features

SW Series are used for sea water desalination process featuring high salt concentration (TDS: 25000mg/L-45000mg/L). It is widely used in seawater desalination, desalination treatment of high salinity brackish water, concentration and reuse of high salt wastewater and other fields.

(2) Model and performance specifications

Model	Permeate Flow GPD(m^3/d)	Stable Rejection(%)	Min. Salt Rejection(%)	Active Membrane Area ft^2(m^2)	Feed spacer Thickness (mil)
SW-8040-HF	9000 (34.1)	99.7	99.5	400 (37.2)	28
SW-8040-HR	6000 (22.7)	99.8	99.6	400 (37.2)	28
SW-4040	1800 (6.8)	99.7	99.5	78 (7.2)	28

Test Conditions: Feed water pressure 800 psi (5.5 MPa); Feed water temperature 25°C; Feed water concentration 32000 mg/L as NaCl; Recovery rate 8%; Feed water pH 7; Each membrane element may have ± 15% variation of permeate flow.

(3) Operation conditions and limits

Maximum operating pressure	1200psi (8.30MPa)
Maximum water temperature	45℃
Maximum feedwater flow	17.0m^3/h (8040) , 3.6m^3/h (4040)
Maximum feedwater flow SDI_{15}	5
Maximum concentration of free chlorine	< 0.1ppm
Maximum pressure drop per element	15psi
Allowed pH range for feedwater in operation	3~10
Allowed pH range for chemical cleaning	1~12

NF Membrane Product

1.Water treatment (NTF) series NF flatsheet membranes

(1) Product features

Using advanced thin-film preparation process and fully automated production lines, the reliability and stability of product performance are guaranteed. Water treatment NF membranes (NTF) integrates high flow performance, high salt rejection and long lifetime, which can be used for rolling different specifications of components from 1812 to 8040.

(2) Model and performance specifications

Flatsheet	Permeate Flow GPD	Min. Salt Rejection(%)	Advantage
NTF40	30	97	Low pressure with high flux
NTF80	24	98.0	High Rejection of Ca^{2+} and Mg^{2+}
NTF90	24	98.5	High Rejection of monovalent ion

(a) Test Conditions: Feed water pressure 70 psi (0.48 MPa); Feed water temperature 25°C; Feed water concentration 2000 mg/L as $MgSO_4$; Concentrated water flow 4L/min.

(b) The size of the membrane is 300m, and the reel length may change under certain conditions.

(c) Each roll of diaphragm is individually wrapped and sealed with black plastic film.

(3) Storage conditions and cycle of membranes

Storage conditions：Avoid sunlight and UV rays, temperature :10~30°C, humidity <50%.

Warranty cycle：The original packaging is guaranteed for 12 months before it is not split, and it is recommended to use it within 3 months after receiving the goods.

2.Water treatment (NTF) series NF elements

(1) Product features

NTF membrane elements are specially developed for industrial water treatment, specially used in landfill leachate treatment, dye decolorization, high salt water emission reduction, hard removal, denitrification and other fields.

① High flow performance, high salt rejection and long lifetime.

② High rejection for TOC, sulfate, silica and nitrate.

③ Strong acid and alkali resistance.

(2) Model and performance specifications

Model	Permeate Flow GPD(m^3/d)	Stable salt Rejection(%)		Active Membrane Area ft^2 (m^2)	Feed spacer Thickness (mil)
		$MgSO_4$	$CaCl_2$		
NTF40-4040	2500 (9.5)	97.0	40～60	82 (7.6)	31
NTF80-4040	2000 (7.6)	98.0	80～90		
NTF90-4040	2000 (7.6)	98.5	90～95		
NTF40-8040	12000 (45.4)	97.0	40～60	400 (37.2)	31
NTF80-8040	9500 (35.9)	98.0	80～90		
NTF90-8040	9500 (35.9)	98.5	90～95		

Test Conditions: Feed water pressure 70 psi (0.48 MPa); Feed water temperature 25°C; Feed water concentration 500 ppm $CaCl_2$/2000 ppm $MgSO_4$; Recovery rate 15%; Feed water pH 7; Each membrane element may have ± 15% variation of permeate flow.

(3) Operation conditions and limits

Maximum operating pressure	600psi (4.14MPa)
Maximum water temperature	45°C
Maximum feedwater flow	17.0m^3/h (8040) , 3.6m^3/h (4040)
Maximum feedwater flow SDI_{15}	5
Maximum concentration of free chlorine	< 0.1ppm
Maximum pressure drop per element	15psi
Allowed pH range for feedwater in operation	3~10
Allowed pH range for chemical cleaning	1~12

3.Municipal water application (MUNI) series NF elements

(1) Product features

MUNI membrane elements are specially developed for municipal water treatment, specially used in the advanced treatment of municipal tap water with surface water or ground water as the water source.

① High flow performance, high salt rejection and lower energy consumption.

② High rejection for organics, microbes, viruses and most of metal ions with two or higher valence.

③ A wide range of products.

(2) Model and performance specifications

Model	Permeate Flow GPD(m^3/d)	Stable salt Rejection(%)		Active Membrane Area ft^2 (m^2)	Feed spacer Thickness (mil)
		$MgSO_4$	$CaCl_2$		
MUNI-HF-8040	13200 (50.0)	97.0	40～60	440 (40.9)	28
MUNI-WS-8040	10500 (39.5)	98.0	80～90		
MUNI-HR-8040	10500 (39.5)	98.5	90～95		

Test Conditions: Feed water pressure 70 psi (0.48 MPa); Feed water temperature 25°C; Feed water concentration 500 ppm $CaCl_2$/2000 ppm $MgSO_4$; Recovery rate 15%; Feed water pH 7; Each membrane element may have ± 15% variation of permeate flow.

(3) Operation conditions and limits

Maximum operating pressure	300 psi (2.07MPa)
Maximum water temperature	45°C
Maximum feedwater flow	17.0m^3/h (8040)
Maximum feedwater flow SDI_{15}	5
Maximum concentration of free chlorine	＜0.1ppm
Maximum pressure drop per element	15 psi
Allowed pH range for feedwater in operation	3~10
Allowed pH range for chemical cleaning	1~12

4.Material Separation (MASP) series NF elements

(1) Product features

Proprietary MASP membrane elements are specially developed for material separation and resource utilization process, including the separation and concentration of liquid materials, zero discharge of wastewater, salt lake lithium extraction and other challenging fields.

① Primarily used in the separation of monovalent salt and divalent salt.

② The membrane is characterized by a molecular weight cut-off of 150~300 daltons for uncharged organic molecules.

③ The membrane separation layer has a high degree of cross-linking and excellent chemical cleaning resistance.

④ A low-dropout 34 mil feed spacer is adopted which helps to reduce energy consumption while improving resistance to pollution.

(2) Model and performance specifications

Model	Molecular weight cut off (Da)	Permeate Flow GPD(m^3/d)	Stable salt Rejection(%)		Active Membrane Area ft^2 (m^2)	Feed spacer Thickness (mil)
			$MgSO_4$	NaCl		
MASP200-4040	150~200	2800 (10.6)	98.5	85 ~ 95	76 (7.0)	34
MASP300-4040	260~300	2100 (8.0)	98.0	30 ~ 50		
MASP200-8040	150~200	13200 (50.0)	98.5	85 ~ 95	370 (34.5)	34
MASP300-8040	260~300	10000 (37.9)	98.0	30 ~ 50		

Test Conditions: Feed water pressure 110 psi (0.76 MPa); Feed water temperature 25°C; Feed water concentration 2000 ppm NaCl/$MgSO_4$; Recovery rate 15%; Feed water pH 7; Each membrane element may have ± 15% variation of permeate flow.

(3) Operation conditions and limits

Maximum operating pressure	600 psi (4.14MPa)
Maximum water temperature	45°C
Maximum feedwater flow	17.0m^3/h (8040)
Maximum feedwater flow SDI_{15}	5
Maximum concentration of free chlorine	< 0.1ppm
Maximum pressure drop per element	10psi (0.07MPa)
Allowed pH range for feedwater in operation	3~10
Allowed pH range for chemical cleaning	1~12

Application Cases of RO Membrane Element

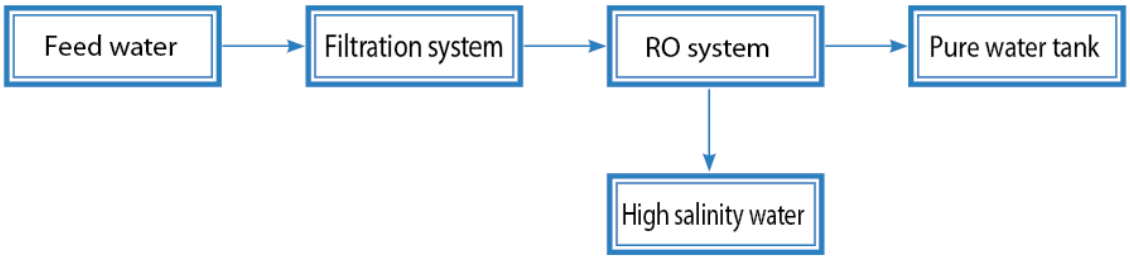
Ultrapure water production

Ultra-Low Pressure Reverse Osmosis (ULP RO) membrane element is often used in the production of ultrapure water for use in the semiconductor industry, power industry (boiler feedwater), and medical/laboratory applications.

1.Application of NT ULP element in ultrapure water production

(1) The application case

(2) The typical process route



(3) Description

Filter system: multi-medium filters, activated carbon filter, resin softening filter combination.

Reverse osmosis system: two stage membrane system filtration.

Table 1 lists the parameters related to system operation.

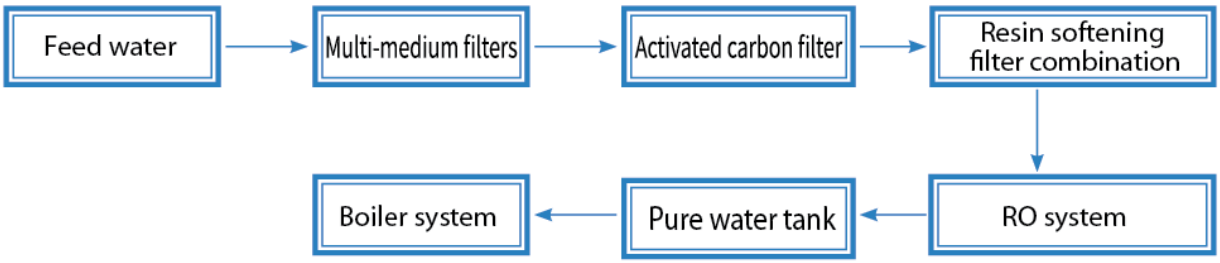
Table 1 Related technical parameters of the application case

	Water Flow Rate (m^3/h)	System recovery (%)	RO permeate (μs/cm)	Operating pressure (MPa)	System stabilized Salt Rejection (%)
Parameter	30	85	<5	0.6	>99.4

2.Application of NT ULP element in boiler feedwater

(1) The application case

(2) The typical process route



(3) Description

Reverse osmosis system: one stage membrane system filtration.

Table 2 lists the parameters related to boiler makeup waters system operation.

Table 2 Related technical parameters of the application case

	Water Flow Rate (m^3/h)	System recovery (%)	RO permeate (μs/cm)	Operating pressure (MPa)	System stabilized Salt Rejection (%)
Parameter	5	75	<15	0.6	>98

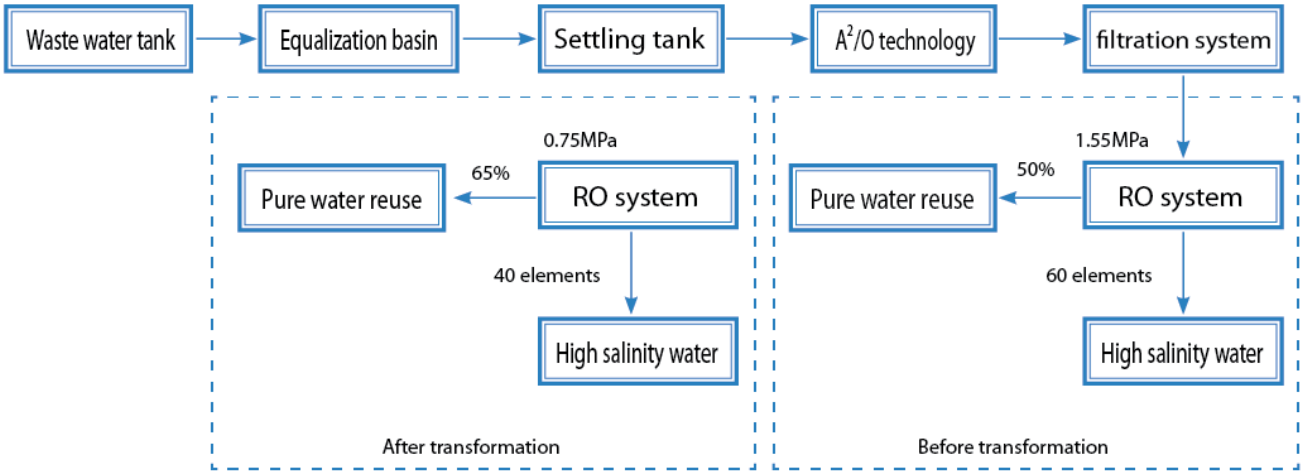
Reclaimed water reuse project

1.Application of NT ULP membrane element in reclaimed water reuse

(1) The application case

(2) System transformation

NT ULP-8040-HF membrane element was used to replace the original BW membrane element, the system water yield increased by 15%, the operating pressure reduced by about 50%, and the water quality meets the requirements of the clients.



(3) System Data

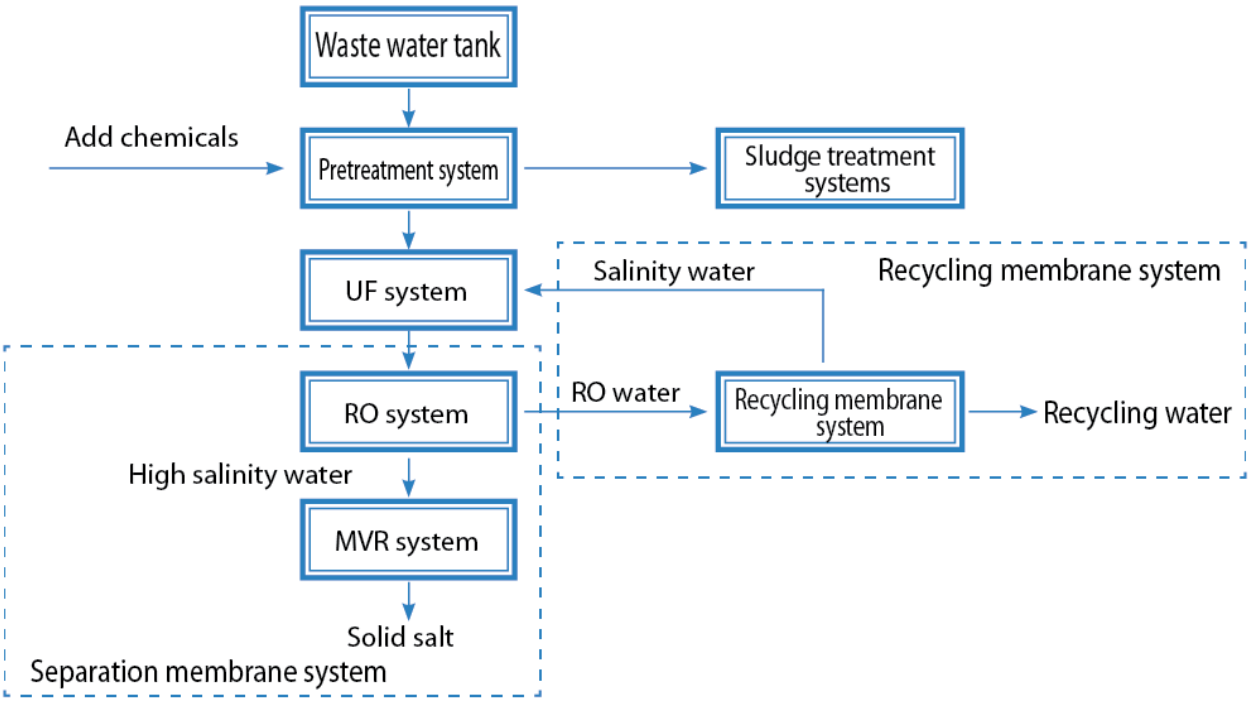
Table 3 Related technical parameters of the application case

	Water Flow Rate (m^3/h)	System recovery (%)	RO element number	Operating pressure (MPa)	System stabilized Salt Rejection (%)
Before transformation	30	50	60	1.55	96
After transformation	40	65	40	0.75	96

2.Applications in industrial water treatment

(1) The application case

(2) System transformation



(3) System Data

Table 4 Related technical parameters of the application case

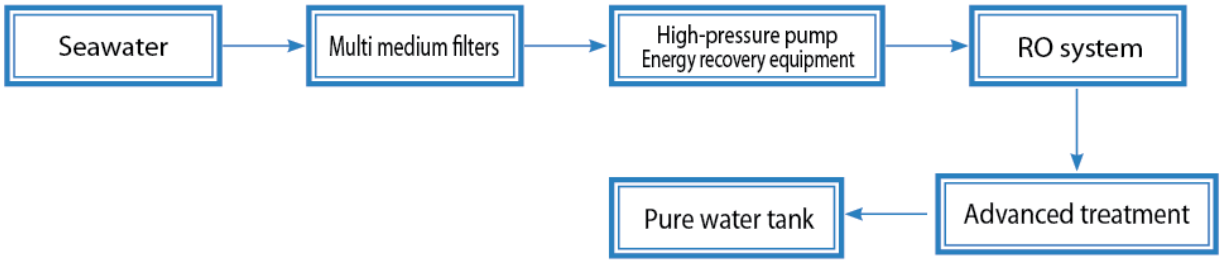
System	Model	System recovery (%)	System water system capacity(m^3/d)	Operating pressure (MPa)	System stabilized Salt Rejection (%)
Separation membrane system	FR-8040	70	1000	2.5-3.0	≥ 97.5
Recycling membrane system	ULP-8040-HF	85	700	<0.8	≥ 97.0

Seawater desalination project

Seawater desalination project in a coastal city

(1) The application case

(2) System transformation



(3) System Data

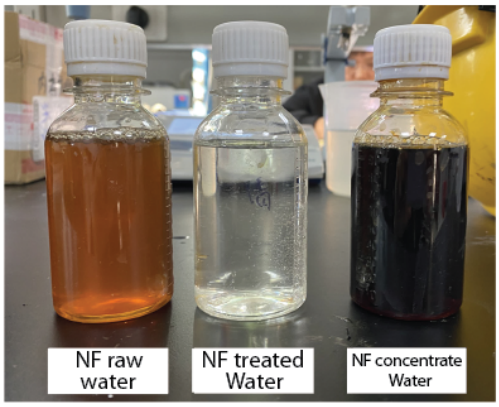
Table 5 Related technical parameters of the application case

Model	System water system capacity(m^3/d)	System recovery (%)	Operating pressure (MPa)	System stabilized Salt Rejection (%)
SW-8040-HR	2000	40	<6.0	≥ 98.5

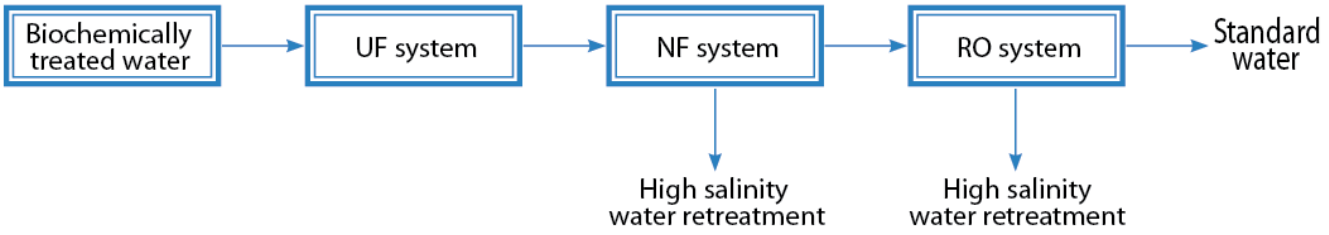
Application Cases of NF membrane element

1.Landfill leachate treatment project

(1) The application case



(2) The typical process route



(3) System Data

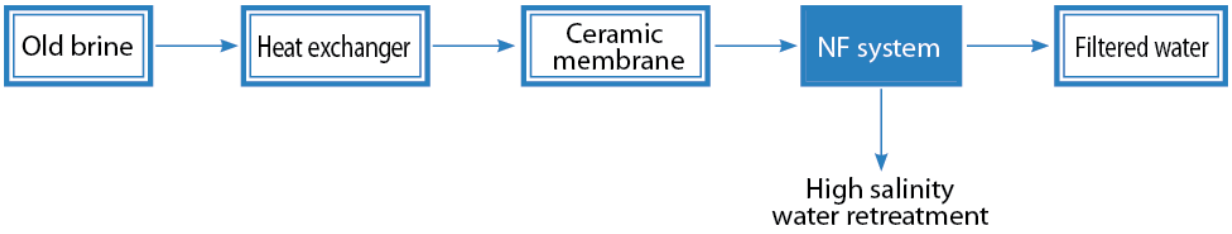
Table 1 Related technical parameters of the application case

Model	System water system capacity (m^3/d)	System recovery (%)	Operating pressure (MPa)	Rejection of chromaticity (%)	Rejection of COD (%)	Rejection of total nitrogen (%)	Rejection of total hardness (%)
NTF80-8040	510	85	1.2	> 99	95	65	75

2.Application of NF membrane in chlor alkali chemical plant

(1) The application case

(2) The typical process route



(3) System Data

Table 2 Related technical parameters of the application case

Model	System water system capacity (m^3/h)	System recovery (%)	Operating pressure (MPa)	Feed water temperature (℃)	NACl concentration of feed water (g/L)	SO_4^{2-} concentration of feed water (g/L)	SO_4^{2-} concentration of filtered water (g/L)
NTF40-8040	54	85	2.1	40	290	12-15	< 0.5

Packaging and Preservation of Membrane Elements

Preservation of NT membrane elements

All series dry membrane elements

NT Film can offer a wide range of products, including wet membrane elements and dry membrane elements.

Compared with wet membrane elements, the advantages of dry membrane elements are easy to transport and install, and dry membrane elements have longer service life than wet membrane elements. At present on the market, dry membrane elements are the main sales products.

Table 1 Comparison Between Dry and Wet Membrane Elements

Element Type/ Factors	Dry Membrane Element	Wet Membrane Element
Protective Solution	Not required	1.0%(w) of sodium bisulfite should be replaced regularly (90 days or less)
Temperature of Presevation	No higher than 45°C	0°C ~ 45°C
Breeding of microorganism	No Breeding	Easy to breed (If the protective fluid is not replaced in time)
Transportation and etc.	Light weight, easy transportation and low cost	Heavier, not easy to transport, cost high

(1) Storage of membrane elements

For the storage of NT membrane elements, the following requirements are recommended,

(a) Storage place must be cool and dry, avoid direct sunlight.

(b) Pay attention to the storage temperature of wet membrane elements to prevent freezing at low temperatures, the temperature of storage place must be kept at 0°C ~ 45°C.

(c) Do not open the original packaging of the membrane element before it is not used.

(d) Please protect the wet membrane element to prevent the breeding of microorganisms, and please check regularly.

(e) About storage of unused membrane elements, if there is no device to save, the wet membrane element can be stored for up to 12 months.

(2) Important information

(a) The data and information provided by NT Film in this information have been abtained through long-term experiments. We are confident that these data and information are accurate and effective. NT Film will not bear any consequence arising from the client's failure to use and maintain the product in accordance with the conditions provided in this book.

(b) It is forbidden to add any chemical agents that have an impact on the membrane elements during storage and operation. If such chemical agents are used in violation of this provision, NT Film will not bear any of the consequences arising therefrom.

(c) Along with technological progress and product upgrading, product specifications are subject to change at any time without prior notification. Please refer to the latest product information of NT Film.

Quality Assurance of Membrane Elements

To customers,

Thank you for using reverse osmosis membrane elements and nanofiltration membrane elements of NT Film.

Our company provides the following quality assurance for NT Film membrane elements.

1. Within 36 months after the customer received the reverse osmosis membrane (12 months for nanofiltration membrane), if there is any quality problem caused by the manufacturing process and materials, and our company finds that there is indeed a product quality defect, Recalyx Industries will replace the new membrane element free of charge. However, Recalyx Industries will not be responsible for serious fouling and damage of membrane elements caused by customers' failure to use the products correctly according to our company's regulations)
2. During the quality assurance period, the user has the following obligations,

(a) Feed water turbidity exceed 1.0NTU, SDI15 exceed 5.0, feed water temperature higher than 45°C. And feed water contains any harmful substance that may cause physical and chemical damage to the membrane elements.

(b) The feed water shall not contain such as chlorine, potassium permanganate and hypochlorous acid radical, etc.

(c) Before being installed or put into operation, the membrane elements shall be stored in original packing box and preserved at the temperature not higher than 45°C for dry membrane elements and at the temperature within 0~45°C for wet membrane elements.

(d) In any case, the backpressure exerted on the membrane element should not exceed 5 psi, and the membrane element should be avoided from the impact of water hammer when the system is in operation.

(e) The maximum operating pressure for membrane element is as follows.

Membrane Series	Max Operating Pressure
ULP Series	300 psi（2.07 MPa）
ELP Series	600 psi（4.14MPa）
BW Series	600 psi（4.14 MPa）
FR Series	600 psi（4.14 MPa）
SW Series	1200 psi（8.30 MPa）

(f) The pH value of feed water shall be within the range of 3~10 during regular running. When the system is cleaned, the pH value of feed water shall be within 2~12.

(g) If under standard operating conditions, the performance of system decreases by 10% or the contamination or scaling occurs, the membrane elements should be cleaned immediately in accordance with specified procedures.

(h) Membrane assembly arrangement, instrument configuration, recovery rate and other system components and design parameters should be consistent with the engineering design.

3. According to the test conditions specified in the product sample, the new membrane products have the initial performance specified in the brochure. Within 36 months after the customer received the membrane products. Since the user received the membrane element, our company provides a 3-year quality assurance, as follows,

(a) When used or tested under standard test conditions, and the pressure of initial average water production, the average salt passage should not exceed 2 times of the value specified in the Product Manual.

(b) When used or tested under test conditions, the average water permeate flow is no less than 70% of the minimum value specified in the Product Manual.

4. Membrane element users should understand the system conditions and have general maintenance and accident diagnosis knowledge. It is required that user should frequently and systematically record the standardized performance data of the whole system and its subsystems, ensure that these data are genuine, complete and consistent and keep these data on file for future reference.

5. Recalyx Industries reserves the right of final interpretation of this product manual.