Ultrafiltration membrane separation technology introduction

UF is a separation process using sieving as the separation principle, which uses pressure as the driving force to achieve mechanical separation. When the mixed solution containing different sizes of the molecular solute flows through the membrane surface, the solvent and small molecules such as inorganic salts pass through the membrane and teh macromolecule solute is trapped to achieve the purpose of separation and purification.

With over 20 years of separation-technology leadership and products in more than 500 ultrafiltration installations worldwide, we offer a portfolio of products designed for outstanding membrane separation, extreme productivity and efficiency, and exceptional reliability.

Ultrafiltration (UF) uses standard home water pressure to push water through a semipermeable membrane and remove any contaminants. Unlike reverse osmosis, ultrafiltration retains minerals in the water, while filtering out bacteria, viruses, and parasites.

The ultrafiltration membrane has a variety of products of different materials, different cut off molecular weight and different structures. Our company can not only provide standardized UF membrane products, but also produce special membrane products in accordance with the requirements of users, which may meet the needs of different industries include polyacrylonitrile, polyether sulfone , polyvinylidene fluoride(PVDF) etc.

Polyacrylonitrile membrane module widely used in various water treatment industry fro its low price, large water flux and good anti fouling cleaning. In particular. It has been widely used in water recycling and the pretreatment of reverse osmosis water equipment.

Polyethersulfone hollow fiber ultrafiltration membrane has the advantages of acid and alkali resistance, high temperature resistance, high mechanical strength, resistance to cleaning and etc. is widely used in food industry, and the recovery of cathodic electrophoretic paint.

PVDF hollow fiber ultrafiltration membrane has the advantages of strong oxidation resistance, pollution resistance and good cleaning performance. It is widely used in sewage treatment industry.

Our company developed the special separation membrane, such as PES/PS blend hollow fiber UF membrane, which has many advantages of stronger acid and alkali resistance, anti-pollution, high temperature resistance and so on. We use patented technology to prepare high temperature resistant hollow fiber membrane modules, which are composed of polyether sulfone and polysulfone blend hollow fiber membrane or polyvinylidene fluoride hollow fiber membrane. This

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membrane module can be used in long-time running under 90℃ and the maximum using temperature of the membrane is up to 95℃.

Hollow fiber UF membrane module is mainly composed of hollow fiber membrane and shell. According to different ways of flooding water, hollow fiber UF membrane module is divided into internal pressure membrane module and external pressure membrane module.

The liquid solution first enters the inner wall of the hollow fiber membrane, and the liquid in the raw material liquid penetrates from the inner wall of the membrane into the outer wall of the film driven by the pressure difference. This type of module is called internal pressure membrane module.

The liquid solution first enters the outer wall of the hollow fiber membrane, and the liquid in the raw material liquid penetrates from the outer wall of the film into the inner wall of the film driven by the pressure difference. This type of module is called external pressure membrane module.

Brief introduction of UF membrane

Ultrafiltration is one membrane filtration process that serves as a barrier to separate harmful bacteria, viruses, and other contaminants from clean water. An ultrafiltration water system forces water through a .02 micron membrane. Suspended particles that are too large to pass through the membrane stick to the outer membrane surface. Only fresh water and dissolved minerals pass through.

At present, the commonly used ultrafiltration membranes in industrial production are: plate and frame type, circular tube type, spiral wound type, hollow fiber type, and capillary type. Various industries must choose different types of ultrafiltration membranes according to their needs to give full play to their performance.
The development of membrane technology has brought great convenience to the treatment of production water and the concentration and separation of substances in various industries. With the continuous advancement of science and technology, ultrafiltration membrane technology has been continuously improved, occupying a leading position in the market with its unique properties.

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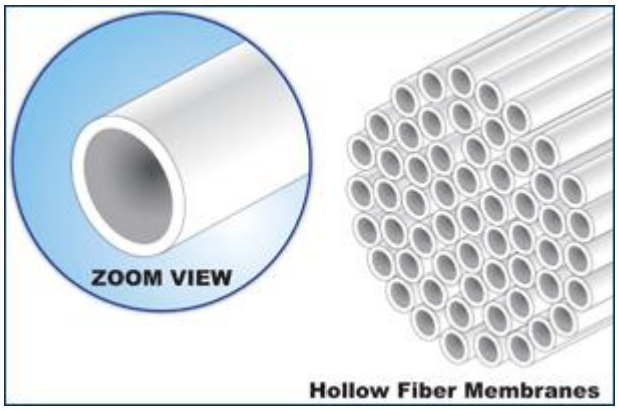

Use, Cleaning and maintenance of membrane module

The UF membrane module must be used in the regulated pressure , temperature and pH, The turbidity of the water entering the UF membrane is less than 50NTU, the particle size of the water entering the ultrafiltration membrane is 50-100 μm,and the SDI of the water produced by the UF membrane module is less than or equal to 0.2 NTU, and its SS is less than 0.2. The rejection rate of UF membrane on microbial,bacterial, E. coli, pathogen is more than 99.99%. The membrane surface of UF membrane in the course of application is easy to pollute, resulting in membrane water production decline. UF membrane module should be cleaned regularly in a timely manner by physical and chemical cleaning methods.

Specifications and parameters

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UF model	Material	Operation Mode	Lateral Center distance (L1)	Module dimensions	Effective membrane area	Design flux (for most feed water)/m³/ 0.1Mpa 25℃	Nominal pore size
JXUFA90	PES	Inside-out	910	90*1100	4.5	50-80L(L/㎡·h)	0.01μm
JXUFA160			990	160*1330	20		
JXUFA200			1000	200*1415	25		
JXUFA225			1600	225*1730	40		
JXUFA225-1			1630	225*1760	40		
JXUFA250			1600	250*1715	50		
JXUFA273				273*1830	80		
JXUFA219			1742	219*1902	40		
JXUFA315			780	315*1302	55		
JXUFA315			1300	315*1822	80		
JXUFA90-1				90*1010	4		
JXUFA200-1				200*1016	18		
JXUFA200-2				200*1527	40		
JXUFB-160		Outside-in	990	160*1330	30	50-80L(L/㎡·h)	0.01μm
JXUFB160-2			1386	160*1810	40		
JXUFB225			1600	225*1730	60		
JXUFB225-1			1630	225*1760	60		
JXUFB250			1600	250*1715	75		
JXUFB225-3			1630	225*1860	50		
JXUFB225-4			2130	225*2360	75		
JXUFC90	PAN	Inside-out	910	90*1100	4	60-120L(L/㎡·h)	0.02μm
JXUFC160			990	160*1330	10		
JXUFC200			1000	200*1415	18		
JXUFC225			1600	225*1730	30		
JXUFC225-1			1630	225*1760	30		
JXUFC250			1600	250*1715	35		
JXUFC90-1				90*1010	3.5		
JXUFC200-1				200*1010	15		
JXUFD90	PVDF	Outside-in	910	90*1100	9	40-100L(L/㎡·h)	0.08μm
JXUFD160			990	160*1330	30		
JXUFD160-1			1386	160*1810	40		

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JXUFD200			1000	200*1415	40		
JXUFD225			1600	225*1730	60		
JXUFD225-1			1630	225*1760	60		
JXUFD250			1600	250*1715	75		
JXUFD225-2			1630	225*1830	50		
JXUFD225-3			2130	225*2360	75		

Parameters:				
Material	PES		PVDF	PAN
Module	Inside-out	Outside-in	Outside-in	Inside-out
Membrane diameter ID/OD(mm)	1.0/1.6	0.7/1.3	0.7/1.3	1.4/2.2
Maximum feed turbidity	＜50NTU		＜100NTU	＜80NTU
Maximum chlorine resistance	Continuously 50ppm Instantaneously 500ppm		Continuously 200ppm Instantaneously 2000ppm	Continuously 5ppm Instantaneously 100ppm
Temperature range	5-45℃			
pH range	2-10		2-12	2-10
Operation module	Cross flow or dead-end			
Maximum permeate Flux	120L/㎡·h		150L/㎡·h	150L/㎡·h
Maximum feed pressure	0.5Mpa			
Maximum trans membrane pressure	0.2Mpa			
Maximum back wash pressure	0.25Mpa			
Back wash frequency	15-60Min			

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Back wash duration	30-60sec		
Back wash flux	100-360L/㎡·h		
Chemical enhanced backwash frequency	1-15days		
Chemical enhanced backwash duration	1-10min		
Chemical cleaning frequency	30-180days		
Chemical cleaning duration	90-480min		
Chemical cleaning chemicals	NaClO H_2O_2(500ppm), NaOH(pH≤12)，HCl(pH≥2)	NaClO H_2O_2(2000ppm), NaOH(pH≤12)，HCl(pH≥2)	NaClO H_2O_2(100ppm), NaOH(pH≤12)，HCl(pH≥2)

Advantages:

The filtration membrane does not change during operation, and can be operated at normal temperature or low pressure, so that its operating energy consumption is low.
Membrane elements will not cause any qualitative changes in the concentration and separation process, and will not cause secondary pollution.
Substances of different molecular weights can be fractionated.
During the operation of the ultrafiltration membrane, no impurities will fall off, ensuring the purity of the ultrafiltrate.
The ultrafiltration membrane has the characteristics of selective separation, which can retain the mineral elements that are beneficial to the human body.
The equipment is compact in structure, small in floor space and easy to operate.
It has strong applicability to water quality and has a wide range of applications.

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Application:

Electronics industry: semiconductor industry ultrapure water equipment, integrated circuit cleaning water treatment equipment;

Pharmaceutical industry: medical pure water, drug concentration and separation;

Water treatment project: pure water preparation, drinking water purification, reverse osmosis device.

Food industry: juice concentration and clarification, protein concentration and separation.

Wastewater treatment project: industrial wastewater, municipal wastewater treatment and reuse, etc.

Wastewater treatment: With the increasing importance of environmental pollution control, industrial wastewater and urban sewage treatment have been further developed to advanced treatment, and reclaimed water projects have been put on the agenda. Ultrafiltration deep purification and utilization of membrane bioreactors combined with biotechnology and ultrafiltration technology have begun to be applied in urban sewage and industrial wastewater treatment. A new starting point for the development of ultrafiltration technology in my country will be the industrial application of wastewater treatment. Compared with the industrial application of water purification, wastewater treatment is more difficult and lacks practical experience. Therefore, a lot of work needs to be done in the development of membrane module production and application technology. At present, the fouling-resistant coarse capillary ultrafiltration membrane has achieved good results in preliminary application.

Application of purification function: a. Water industry

①Pretreatment of reverse osmosis in the preparation of ultrapure water and pure water. The SDI of pretreated water quality can reach 0~1;

②Pretreatment in seawater desalination removes suspended solids, particles, bacteria and algae, which greatly prolongs the service life of reverse osmosis desalination membranes;

③Using UF ultrafiltration membrane to prepare tap water, compared with the commonly used pretreatment method, the water quality is higher, the process is simple, and the floor area is small;

④ In-depth purification of drinking water, using urban tap water or drinking raw water to further purify to the national drinking water purification standard, can provide direct drinking water source;

⑤ Purification of mineral water, the natural mineral water is purified by ultrafiltration without changing the composition of trace elements, and at the same

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time achieves the purpose of direct drinking.

b. Manufacturing of sterile liquid food

①Remove turbidity of low-alcohol wine;

② Refinement of fruit wine, beer and rice wine;

③ Refinement of liquid seasoning;

④ purification of beverages.

c. Applications in medicine and health

① blood ultrafiltration purification;

② Oral liquid purification treatment;

③ large injection infusion in addition to pyrogen.

2. Application of concentration function:

a. Application in food fermentation industry

①Concentration of enzyme preparations;

②Protein concentration, soybean protein and egg protein concentration.

b. Application in dairy industry

Milk concentrate and recovery of whey protein from whey, etc.

c. Medical applications

① Ascites is concentrated by ultrafiltration;

② blood filtration.

d. Application in biological preparations

①Concentration and separation of biological agents such as leptospira, hepatitis B vaccine, thymosin, and human growth hormone;

②Concentration and separation of human serum albumin

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Project case:

Linglong International (Thailand) Co., Ltd.， 7200T/D ， Self-provided power plant boiler water

Malaysian palm oil production water 18000T/D

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Jiangnan Shipyard, 50000T/D, domestic water, ballast water

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Shanghai Disneyland 17000T/D, landscape circulating water


Malaysia palm oil 18000T/D, Palm oil production water.


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