Guidling

TOTAL SOLUTION FOR DOWNSTREAM FILTRATION OF BIOLOGICAL PRODUCTS

Hangzhou Guidling Technology Co., Ltd

Guidling

Guidling downstream process solutions

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Welcome to consult us about the biotechnological question, look forward to serving you.

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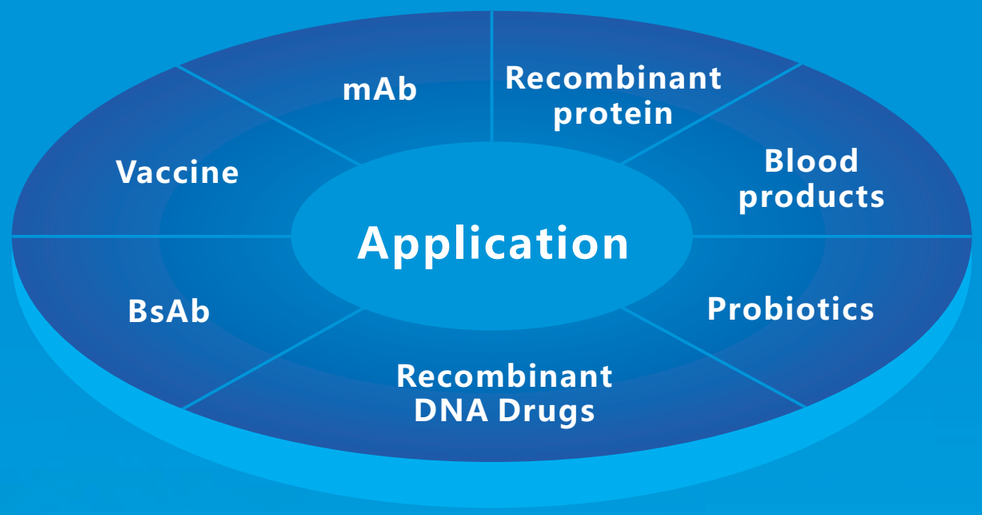
Guidling Technology

Filtration /Separation /Purification



Focus on providing the solution for the downstream field of biopharmaceuticals

Catalogue

About us

- Guidling Technology is a national high-tech enterprise focusing on biopharmaceuticals, cell culture, purification and separation, our products are widely used in filtration, detection, clarification, purification and concentration of biomedicine, diagnosis and industrial fluids. We have successfully developed centrifugal filter devices, ultrafiltration & microfiltration cassettes, virus filter, TFF system, depth filter, hollow fiber, etc. which fully meet the application scenarios of biopharmaceuticals, cell culture, and so on.
- Our membranes and membrane filters are widely used in concentration, extraction and separation of pre-filtration, microfiltration, ultrafiltration and nanofiltration. Our many product lines, from small, single-use laboratory filtration to production filtration systems, sterility testing, fermentation, cell culture and more, meet the needs of testing and production.

Independent research and development of products, master the core technology

At present, the company has applied for 4 domestic invention patents and obtained 15 utility model patents.

Quality is strictly controlled

Passed USP87,88, all inspections are qualified.

Obvious technical advantages
Complete product line

Advanced laboratory Ensure product stability

The company has completed testing laboratories to ensure the stability and consistency of product development and production.

Completed product line, perfect solution

The company has a professional R&D team who is responsible for the formulation design of filtration membrane, product development, process route and quality control. All are done by ourselves.

Company history

In 2017

Set up team in company, successfully completed the pilot production of ultrafiltration cassettes and started to sale, the first in China.

In 2019

The ultrafiltration system and centrifugal filter devices were gone public, and the membrane of virus filter was successfully developed.

In 2020

The pilot test of virus filter was completed, the R&D of hollow fiber membrane and chromatography membrane was started, passed Fangyuan ISO9001 quality management system certification.

In 2021

The ultrafiltration cassettes, centrifugal filter devices and TFF system began to be sold on a large scale.
Depth filter and hollow fiber began to be pilot test.
Virus filter began to small-scale trial production.

In 2022

Virus filter was gone public, hollow fiber membrane module began to be tested
Various specifications of depth filter began to be sold in the market
Anion membrane chromatography was successfully developed.
A major breakthrough has been made in the research and development of fully artificial synthetic filter membranes. and began to sale.
The annual growth rate of products on sale is more than 150%

PESU ultrafiltration cassettes

Guiding microfiltration & ultrafiltration cassettes have the characteristics of quick and easy installation, thorough and convenient cleaning, low working volume, high efficiency retention and large flux. Linear scale-up of process can be achieved from small to large size cassettes.

0.11m²

0.5m²

1.3m²

2.5m²

Material information

Membrane	PESU/RC
Support	Polyester/Polyolefin
Screen mesh	PP
Sealing gasket	Medical silica
Material characteristics	Low adsorption of non-specific protein, high product recovery, high flux, good chemical compatibility

Parameter information

Membrane pore size	ultrafiltration (kd)	microfiltration (μm)
	1/3/5/8/10/30/50/100/300/500/750/1000	0.1/0.22/0.45
Max pressure	≤3bar	
TMP	≤3bar @ 4-45℃	
Working temperature range	4-45℃	
pH	1-14	
Flux test	100% tested before delivery	
Integrity test	100% tested before delivery	

Cassettes size and the selection

Type	Membrane area	Application	Processing capacity	Remark
SM	0.11m²	R&D	200mL-2L	Adapt to stainless steel holder (0.1m²)
LM	0.5m²	pilot scale test	500mL-10L	Adapt to stainless steel holder (0.5-2.5m²)
	1.3m²	Pilot scale test, production	1000mL-50L	
	2.5m²	Pilot scale test, production	50L more than 50L	

Order information

	Pore size	0.11m²filter area	0.5m²filter area	1.3m²filter area	2.5 m²filter area
Microfiltration cassettes	0.1μm	G01100010M	G05000010M	G13000010M	G25000010M
	0.22μm	G01100022M	G05000022M	G13000022M	G25000022M
	0.45μm	G01100045M	G05000045M	G13000045M	G25000045M
Ultrafiltration cassettes	**Cut off**	**0.11m²filter area**	**0.5m²filter area**	**1.3m²filter area**	**2.5 m²filter area**
	1kd	G01100001K	G05000001K	G13000001K	G25000001K
	3kd	G01100003K	G05000003K	G13000003K	G25000005K
	5kd	G01100005K	G05000005K	G13000005K	G25000005K
	8kd	G01100008K	G05000008K	G13000008K	G25000001K
	10kd	G01100010K	G05000010K	G13000010K	G25000010K
	30kd	G01100030K	G05000030K	G13000030K	G25000030K
	50kd	G01100050K	G05000050K	G13000050K	G25000050K
	100kd	G01100100K	G05000100K	G13000100K	G25000100K
	300kd	G01100300K	G05000300K	G13000300K	G25000300K
	500kd	G01100500K	G05000500K	G13000500K	G25000500K
	750kd	G01100750K	G05000750K	G13000750K	G25000750K
	1000kd	G01101000K	G05001000K	G13001000K	G25001000K

TFF system

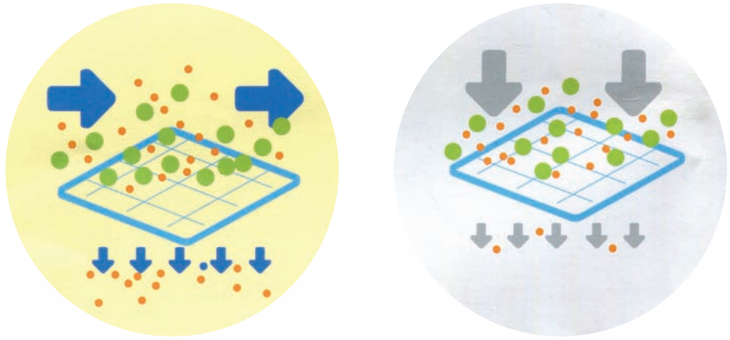
TFF technology is a widely used membrane separation technology for sample concentration, dialysis, separation and filtration. Cut off range: 1-1000kd

Ultrafiltration (UF) is a method of separating very small particles and soluble molecules from solutions. This separation is mainly based on the size of particles or molecules, but the permeability of the membrane material will also be affected by the chemical, molecular and charge characteristics of the sample. Ultrafiltration is usually used to separate molecules with a size difference of more than 3-5 times, and is not suitable for molecules of similar size.

Microfiltration (MF) is a process of separating soluble substances from large granular matter (cell debris, etc.), which can significantly improve the clarity of sample, reduce the turbidity of solution， so as to facilitate subsequent downstream processing.

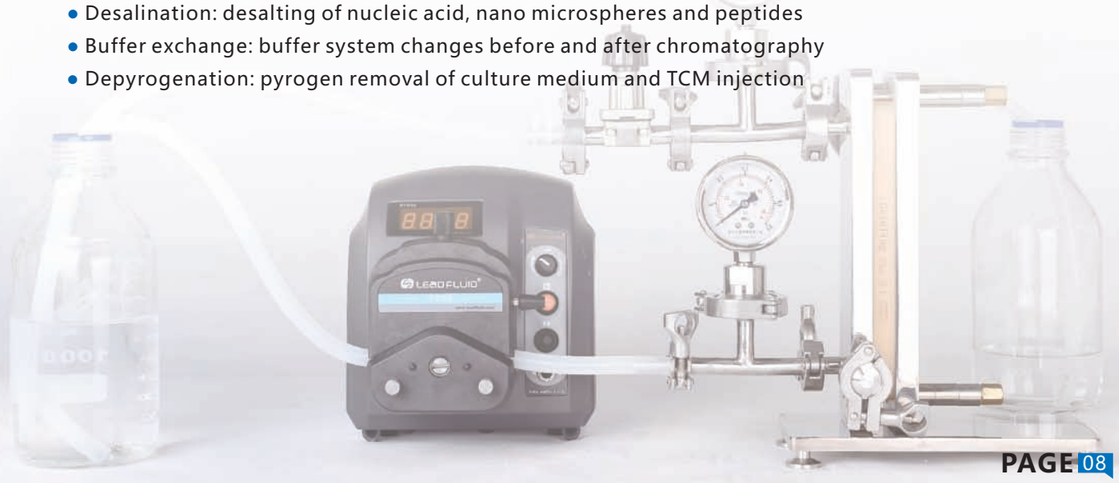
Application field

- Vaccine
- Monoclonal antibodies(mAb)
- Recombinant proteins
- Plasmid
- Cell therapy, Gene therapy
- Chemical drugs
- Traditional Chinese medicine injection



Typical Applications

- Clarification: such as separate cell /cell debris
- Concentration: protein concentration
- Desalination: desalting of nucleic acid, nano microspheres and peptides
- Buffer exchange: buffer system changes before and after chromatography
- Depyrogenation: pyrogen removal of culture medium and TCM injection



Mini TFF system

The Mini TFF system is easy to operate, simple configuration, small in space, hygienic design, can be used for trial test, pilot test, small-scale production, can be completely linear amplification.

Pump	Peristaltic pump
Holder	Hhygienic holder
Cassettes	S：0.11m² L：0.5m² 1.3m² and 2.5m²
Pipeline	Hygienic silicone tube, autoclavable steam sterilization
Pressure gauge	Hygienic diaphragm pressure gauge
Connection way	Hygienic clamp connection

A:Stainless steel holder (0.11m²)

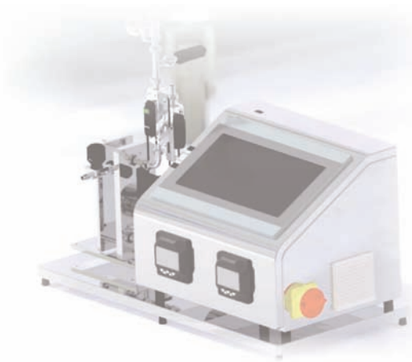
Can install 1-3pcs 0.11m² S type cassettes
For process development and small volume production
Size: 21*10*27cm (L*W*H)
Weight: 10kg
Model: G011100001S

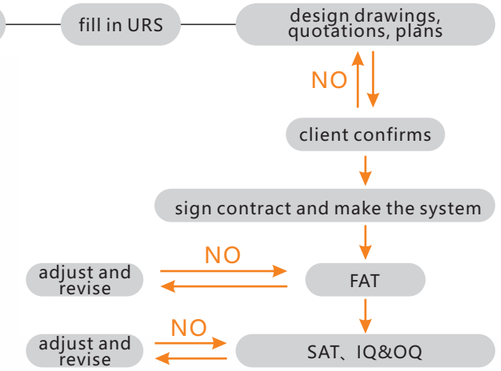
B:Stainless steel holder (0.5-2.5m²)

Can install 1-10pcs 0.5m² L type cassettes
Size: 28*10*26cm (L*W*H)
Weight: 25kg
Model: G050000001S

Customized ultrafiltration or microfiltration system

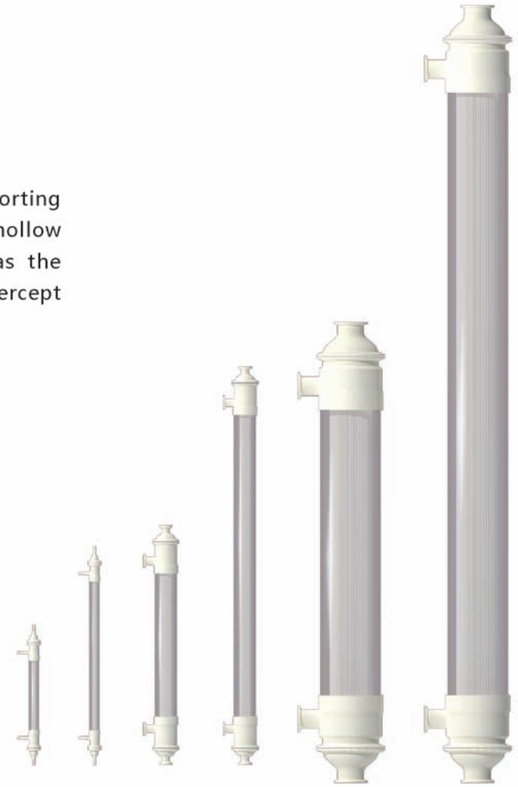
- Testing equipment such as flowmeter, Ph meter, conductivity, etc. can be selected as required
- Design complies with cGMP requirements
- Material complies with FDA requirements
- The system is easy to operate
- All hygienic structure designs
- Excellent and comprehensive technical team support





Use ultrafiltration process optimization , maintenance and other training services follow-up system services

Hollow fiber



Hollow fiber membrane: It is a self-supporting membrane that looks like a fiber and has a hollow structure inside. It uses tangential pressure as the driving force to filter out particles, bacteria or intercept targets, and has selective permeability.

Product Advantage

- Open flow channel, high dust holding capacity
- Good membrane uniformity, complete range of pore sizes
- Flexible and modular for easy linear scaling
- Low shear force, especially suitable for sensitive protein products and virus processing
- Compatible with mainstream R&D industrial hollow fiber TFF systems

Hollow fiber feature

The hollow fiber has the characteristics of open flow channel and is suitable for the separation of materials with low shear force.

1.High filtration accuracy: Micron and even nanoscale particles and bacteria in the water will be filtered out.

2.High filling density: In the membrane element per unit volume, the effective membrane area of the hollow fiber membrane is larger, and the filtration and separation efficiency is higher, thus the occupied area of the membrane filtration equipment is greatly reduced。

3.Low filtration pressure: Use the continuous membrane filtration equipment of hollow fiber separation membranes, has extremely low operating pressure, thereby reduce energy consumption.

4.Easy to clean: It can be backwashed, because the structure of the hollow fiber membrane is a single layer, the performance of the membrane can be recovered maximize, so extend the service life.

How to choose hollow fiber or flat cassettes in tangential flow filtration technology

Compared with hollow fibers, the microfiltration membrane of flat cassettes has greater limitations in the clarification and filtration of high-solid content and high-viscosity samples, and are easy to block the flow channel. The screen channel structure is suitable for the concentration of low viscosity and low concentration samples without solid particles, such as buffer exchange and concentration between chromatographic columns.

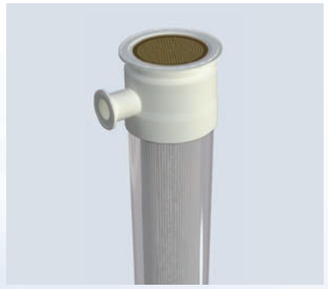
Application	Hollow fiber	Flat cassettes
E. coli collection	√	×
Yeast clarification	√	×
Clarification after E. coli mean	√	√
Yeast fermentation broth clarification	√	√
The ultrafiltration concentration of the recombinant proteins	√	√
Perfusion culture	√	×
Ultrafiltration of viral vector mRNA	√ (Subunits, LNP particles, multimeric proteins or particles)	√ (More suitable for small particle size)
Large intestine renaturing solution clarification	√ (priority)	√

Uniform membrane pore size

Guidling hollow fiber membrane adopts advanced processing technology and strict quality control, the membrane pore size uniformity is good, choose a filter membrane that is closer to the molecular weight of the target molecule when concentration, faster penetration speed can be obtained while ensuring the retention rate. It is beneficial to remove impurities, improve product quality and production efficiency.

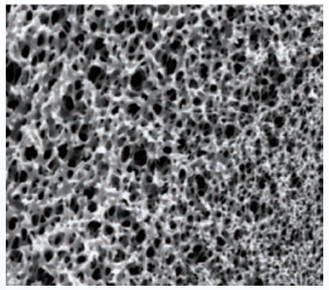
Good physical tolerance

Guidling hollow fiber membrane adopts advanced membrane processing and manufacturing technology, and its own membrane structure has strong and durable strength, all products have passed the strict membrane integrity test, and the inlet pressure of the hollow fiber ultrafiltration membrane can reach more than 4bar.



Filter Structure

Hollow fiber section



Hollow fiber internal structure - dense sponge-like structure

The complete types and models of products

Guidling has a complete range of hollow fiber membranes, ultrafiltration hollow fiber membranes include 30kd, 100kd, 300kd, 500kd and 750kd, which are used for concentration and separation of various biological samples. Microfiltration hollow fiber membranes include 0.2um and 0.45um, which are used for filtration and clarification of biological samples and solid-liquid separation. The inner diameter of the hollow fiber tube is divided into two specifications: 0.5mm and 1.0mm, and there are also different length specifications such as 30, 60, and 120 cm, which can flexibly meet various application requirements of different scales and different properties of solutions.

Summary of application scenarios

Some application scenarios	Hollow fiber specification
The culture medium of rabies and influenza virus was concentrated at low shear stress	750kd
Foot-and-mouth disease virus concentrated at low shear stress	500kd
Concentration of recombinant hepatitis B vaccine	300kd
Thalli collection of gene therapy plasmids	750kd
Pyrogen free buffer was prepared by ultrafiltration	5kd
mAb ultrafiltration and concentration, buffer exchange	30k/50kd
E.coli and Yeast cells were collected and washed	750kd/0.1um
Pyrogens were removed by ultrafiltration of small molecular active substances	5kd/10kd

Q1 In the field of biopharmaceuticals, what drug manufacturing processes can use hollow fibers?

Hollow fiber can be used in many drug manufacturing processes in the field of biopharmaceuticals, such as cell culture, separation and purification, protein purification, and depth filtration. They are usually used as a means of separating impurities, reducing contamination, increasing yield and increasing purity.

Q2 Which steps can use hollow fiber in gene therapy, cell therapy companies?

In gene therapy and cell therapy companies, hollow fibers can be used in these process, such as cell culture, cell separation, washing, concentration, purification, etc. Specific applications include:

Cell culture: hollow fibers can be used as support materials for cell culture, providing greater cell density and surface area.

Cell separation: hollow fibers can be used for cell isolation and collection, increasing the purity and productivity of individual cells.

Washing and concentration: hollow fibers can be used for washing, protein concentration and cell preparation.

Purification: hollow fibers can be used in the purification steps of biological agents such as proteins, viruses, and plasmids to improve product purity and productivity.

Case applications include:

When preparing cell preparations related to CAR-T therapy, use hollow fibers to concentrate ,collect and purify T cells.

Screen and purify the gene sequences through hollow fiber to prepare plasmids for gene therapy.

Recombinant proteins were purified and concentrated using hollow fibers for the preparation of biological drugs.

Q3 Case study of hollow fiber used in the collection of bacteria

Hollow fibers are widely used in the collection of bacteria, the following is one of the case studies

Cultivate and collect Rhodotorula strains, which grow slowly in culture medium and are difficult to collect by traditional methods such as centrifugation. The use of hollow fibers will quickly and conveniently collect the bacteria and replace them with the buffer we needed.

A liquid medium containing Rhodotorula is added to the membrane module. Bacteria enter the hollow fiber through the holes inside the fiber and precipitate in it. Wash the hollow fiber with a buffer such as PBS to remove non-specifically bound substances.

At last, the bacteria were extracted with methanol and chloroform for subsequent analysis, advantages of using hollow fibers for collection include high collection efficiency, easy to operate, avoid sample damage or inactivation, and multiple samples can be processed at the same time.

Q4 Hollow fibers are used for the process steps of polysaccharide concentration

Hollow fiber is a kind of material usually used for polysaccharide concentration, the following are the process steps for polysaccharides concentration using hollow fibers:

Preparing hollow fibers: Put the hollow fiber in deionized water to make it fully wet.

Install samples: The solution containing polysaccharide is poured into the hollow fiber, and the solution can flow into the hollow fiber through the pressure difference.

Process the samples: The polysaccharide solution in the hollow fiber can be processed, such as to remove unnecessary water and increase the concentration of polysaccharide by heating, evaporating, etc.

Collect concentrate: The concentrated polysaccharide solution is collected from the hollow fibers, the unnecessary water and other impurities can be removed by backwashing or using a small pressure difference.

Verify the concentration effect: Use appropriate methods (e.g. UV absorption spectroscopy, HPLC, etc.) to verify that the concentration of the polysaccharide after concentration is as expected.

Store concentrate: For the polysaccharide concentrates that have been verified as qualified, they can be stored under appropriate conditions for subsequent application research, etc.

Quality Assurance

- High quality, high stability and high reliability
- Pyrogen: Production and assembly are performed under strict conditions to ensure minimal endotoxin levels
- Tested and certified by USP87 and USP88, in line with corresponding biocompatibility standards
- The production is completed under ISO9001 quality management system
- Animal -free: The materials used in the production of membrane modules do not contain any animal origin or derivatives

Product Application

- E.coli, yeast, cell lysate clarification
- Diafiltration and separation of nanoparticles
- Target protein concentrate
- Virus purification
- Upstream cell perfusion culture

Product parameter

Parameters of hollow fiber with inner diameter of 1.0mm

Specs	Inner diameter (mm)	Outer diameter (mm)	Valid length (cm)	Inner diameter of fiber (mm)	Process volume	(NWCO)	area	Inlet/reflux size	Permeate size
XS	13	16	15	1.0	<1L	1kd 3kd 5kd 8kd 10kd 30kd 50kd 100kd 300kd 500kd 750kd 1000kd	94cm²	25TC	16#/17#hose
S	13	16	30	1.0	<3L		260cm²	25TC	16#/17#hose
M	36	40	30	1.0	<15L		0.15m²	25TC/50TC	25TC
M	36	40	60	1.0	<30L		0.3m²	25TC/50TC	25TC
L	108	114	60	1.0	<500L		4.5m²	64TC	50TC
L	108	114	120	1.0	<1000L		9m²	64TC	50TC

Parameters of hollow fiber with inner diameter of 0.5 mm

Specs	Inner diameter (mm)	Outer diameter (mm)	Valid length (cm)	Inner diameter of fiber (mm)	Process volume	(NWCO)	area	Inlet/reflux size	Permeate size
XS	13	16	15	0.5	<1L	1kd 3kd 5kd 8kd 10kd 30kd 50kd 100kd 300kd 500kd 750kd 1000kd	94cm²	25TC	16#/17#hose
S	13	16	30	0.5	<3L		260cm²	25TC	16#/17#hose
M	36	40	30	0.5	<15L		0.15m²	25TC/50TC	25TC
M	36	40	60	0.5	<30L		0.3m²	25TC/50TC	25TC
L	108	114	60	0.5	<500L		4.5m²	64TC	50TC
L	108	114	120	0.5	<1000L		9m²	64TC	50TC

Ordering Information

H	E	S	0	1	0	0	0	5	0	3	0

Hollow Fiber Fiber HF

membrane
E=PES

type
XS=mini
S=small
M=medium
L=large

pore size
0001=1kd
0003=3kd
0005=5kd
0008=8kd
0010=10kd
0030=30kd
0050=50kd
0100=100kd
0300=300kd
0500=500kd
0750=750kd
1000=1000kd
010U=0.10μm
022U=0.22μm
045U=0.45μm

fiber diameter
05=0.5mm
10=1.0mm

tube
015=15cm
030=30cm
060=60cm
120=120cm

Order Information

Fiber diameter 1.0mm

	Membrane pore sise	15cm tube length	30cm tube length		60cm tube length		120cm tube length
Microfiltration	0.1μm	HEXS010U10015	HES010U10030	HEM010U10030	HEM010U10060	HEL010U10060	HEL010U10120
	0.22μm	HEXS022U10015	HES022U10030	HEM022U10030	HEM022U10060	HEL022U10060	HEL022U10120
	0.45μm	HEXS045U10015	HES045U10030	HEM045U10030	HEM045U10060	HEL045U10060	HEL045U10120
Ultrafiltration	1kd	HEXS000110015	HES000110030	HEM000110030	HEM000110060	HEL000110060	HEL000110120
	3kd	HEXS000310015	HES000310030	HEM000310030	HEM000310060	HEL000310060	HEL000310120
	5kd	HEXS000510015	HES000510030	HEM000510030	HEM000510060	HEL000510060	HEL000510120
	8kd	HEXS000810015	HES000810030	HEM000810030	HEM000810060	HEL000810060	HEL000810120
	10kd	HEXS001010015	HES001010030	HEM001010030	HEM001010060	HEL001010060	HEL001010120
	30kd	HEXS003010015	HES003010030	HEM003010030	HEM003010060	HEL003010060	HEL003010120
	50kd	HEXS005010015	HES005010030	HEM005010030	HEM005010060	HEL005010060	HEL005010120
	100kd	HEXS010010015	HES010010030	HEM010010030	HEM010010060	HEL010010060	HEL010010120
	300kd	HEXS030010015	HES030010030	HEM030010030	HEM030010060	HEL030010060	HEL030010120
	500kd	HEXS050010015	HES050010030	HEM050010030	HEM050010060	HEL050010060	HEL050010120
	750kd	HEXS075010015	HES075010030	HEM075010030	HEM075010060	HEL075010060	HEL075010120
	1000kd	HEXS100010015	HES100010030	HEM100010030	HEM100010060	HEL100010060	HEL100010120

Fiber diameter 0.5mm

	Membrane pore sise	15cm tube length	30cm tube length		60cm tube length		120cm tube length
Microfiltration	0.1μm	HEXS010U05015	HES010U05030	HEM010U05030	HEM010U05060	HEL010U05060	HEL010U05120
	0.22μm	HEXS022U05015	HES022U05030	HEM022U05030	HEM022U05060	HEL022U05060	HEL022U05120
	0.45μm	HEXS045U05015	HES045U05030	HEM045U05030	HEM045U05060	HEL045U05060	HEL045U05120
Ultrafiltration	1kd	HEXS000105015	HES000105030	HEM000105030	HEM000105060	HEL000105060	HEL000105120
	3kd	HEXS000305015	HES000305030	HEM000305030	HEM000305060	HEL000305060	HEL000305120
	5kd	HEXS000505015	HES000505030	HEM000505030	HEM000505060	HEL000505060	HEL000505120
	8kd	HEXS000805015	HES000805030	HEM000805030	HEM000805060	HEL000805060	HEL000805120
	10kd	HEXS001005015	HES001005030	HEM001005030	HEM001005060	HEL001005060	HEL001005120
	30kd	HEXS003005015	HES003005030	HEM003005030	HEM003005060	HEL003005060	HEL003005120
	50kd	HEXS005005015	HES005005030	HEM005005030	HEM005005060	HEL005005060	HEL005005120
	100kd	HEXS010005015	HES010005030	HEM010005030	HEM010005060	HEL010005060	HEL010005120
	300kd	HEXS030005015	HES030005030	HEM030005030	HEM030005060	HEL030005060	HEL030005120
	500kd	HEXS050005015	HES050005030	HEM050005030	HEM050005060	HEL050005060	HEL050005120
	750kd	HEXS075005015	HES075005030	HEM075005030	HEM075005060	HEL075005060	HEL075005120
	1000kd	HEXS100005015	HES100005030	HEM100005030	HEM100005060	HEL100005060	HEL100005120

Virus Prefilter

Product Feature

- Effectively removes polymers from protein solutions
- The specially treated membrane can greatly increase the filtration capacity
- Specific adsorption of impurities to prevent blockage of the filter after virus removal
- Filter protein solutions at high flow rates

Quality Assurance

- Each product is 100% integrity tested
- Increase the membrane capacity of virus removal filters
- Stable physical and chemical properties, wide pH compatibility

Technical Parameter

Connector	Luer or quick chuck joint
Animal-derived	All filters are made of synthetic materials and are not derived from animals
Integrity test	Pass the aerosol test
Operating pressure	Inlet pressure ≤3bar
Operating temperature	≤37℃
Alkali resistance	At 25°C, the maximum resistance to 0.5N sodium hydroxide is 45min
pH	2-13

Order information

Area	Package Specifications (pcs)	Model
3.1cm^2	10	PA0000031L10P
0.11m^2	1	PA0011000L01P
0.6m^2	1	PA0060000L01P

Virus Filter

Product Features

- Filter protein solutions at high flow rates
- High protein recovery rate
- The specially treated membrane can greatly increase the filtration capacity and prevent the clogging of the virus filter
- Specific adsorption of impurities, even viruses smaller than the membrane pore size can be effectively removed
- High quality stability, scalability and security
- Each product is 100% integrity tested
- Dynamic load testing ensures high capacity at high flow rates
- Stable physical and chemical properties, extensive pH compatibility

Technical Parameter

Connector	Luer or Quick Clamp Fittings
Animal-derived	All filters are made of synthetic materials and are not derived from animals
Integrity test	Pass the aerosol test
Operating pressure	Inlet pressure≤3bar
Operating temperature	≤37℃
Alkali resistance	45min At 25°C, the maximum resistance to 0.5N sodium hydroxide is 45min
pH	2-13
Sterilization method	Steam sterilization, ethylene oxide sterilization, gamma-ray sterilization

Order information

Area	Package specification (pcs)	Model
3.1 cm^2	10	PE0000031L10R
0.02m^2	1	PE0002000L01R
0.07m^2	1	PE0007000L01R
0.2m^2	1	PE0020000L01R
0.55m^2	1	PE0055000L01R
1.65m^2	1	PE0165000L01R

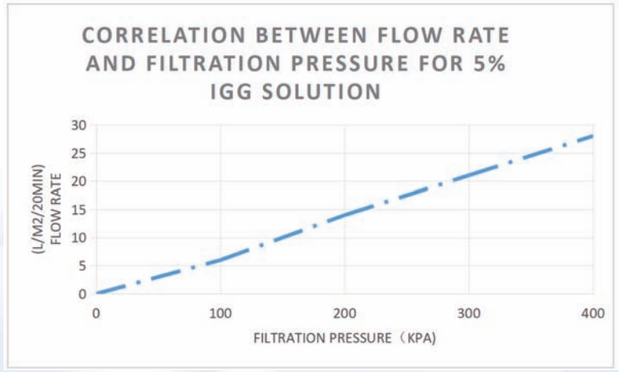
Protein recovery and virus removal log

	Thrombin	Monoclonal antibodies	Polyclonal antibody	Albumin
20nm	98%	98%	98%	98%
Parvovirus LRV	> 5	> 5	> 5	> 5

Remark: LRV: virus removal log

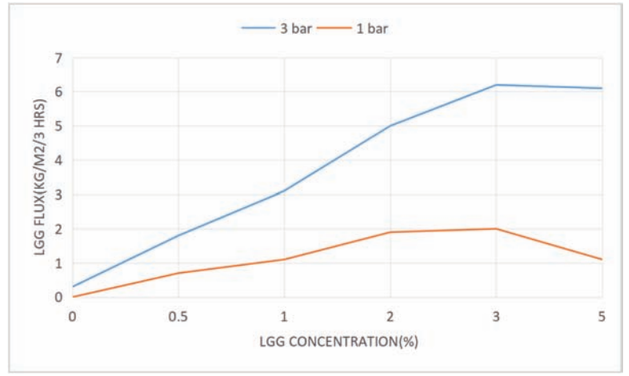
Virus filter selection and constant pressure test

Correlation between flow rate and filtration pressure for 5% IgG solution



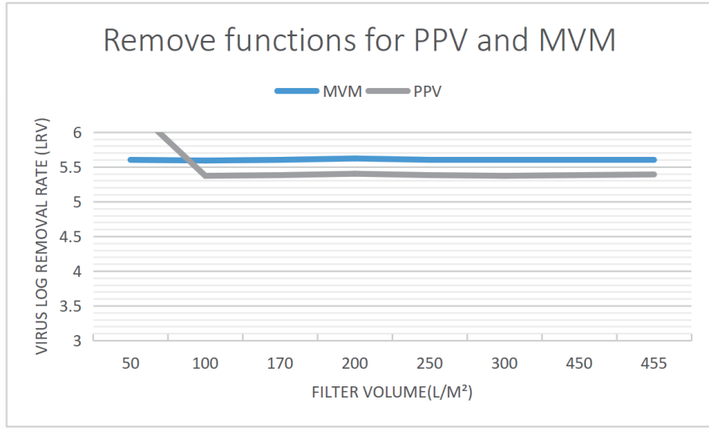
The flow rate is positively related to the filtration pressure, the higher the pressure, the faster the flow rate

The relationship between IgG flux and IgG concentration



The filter can withstand high concentration solutions, and improve the protein handling capacity

Remove functions for PPV and MVM



No virus particles detected in filtration
Test solution: add 0.5% by weight to 5% IgG for each virus solution
Filtration pressure: 3 bar

Quality Assurance

- The perfect production quality system ensures the high flux and high capacity of the virus removal filter, as well as the retention capacity of parvovirus
- Independent testing of each product ensures membrane module integrity
- Reliable and effective retention can be ensured under various conditions;
- Reliable virus retention guarantee, advanced membrane structure can ensure that pressure changes, high load or process interruption will not affect the virus retention effect

Depth filter

Application field

- Filtration of mammalian cell culture medium
- Clarification of bacterial and yeast cell lysates
- Remove host cell proteins（HCP）
- Remove viruses and DNA
- Remove endotoxin
- Removal of defoamer

Filter principle

The filter paperboard of depth filter modules is mainly composed of three media:

Natural plant cellulose as base frame--- Interweave to a form tight three-dimensional structure, the pore size of filtration shows increasing distribution:

High efficiency filter aid, diatomite--- in the process of removing impurities such as cells, cell debris and miscellaneous proteins, its internal natural porous structure and increase the membrane load of filtration.

Deep filter medium of compounded with cationic resin--- Provides a good particle adsorption effect and can effectively remove part of negatively charged host cells, nucleic acids and impurities.

Product Features and Advantage

Performance	Advantage
Small holdup volume	The higher product recovery rate and a smaller cleaning volume after use. It can be purged forward or reverse after use.
Good pressure resistance	Snap-type and spiral structure design, strong and durable, excellent pressure resistance
Capsule shell structure	No need for stainless steel housing, easy to install, no need for cleaning verification, single-use, reducing production costs
Can be linearly amplified	Multi-specification design to ensure the success and flexibility of the process, complete specifications to meet the needs of process design and amplification
Cover a small area	Disc type capsule structure, compact structure design, can be used in series with other equipment
Carry a positive charge	Impurities such as endotoxin can be better removed
Low dissolution	High purity of product material
Compact structure	Stable flow rate, long life, low use cost

Ergonomically and precisely designed bracket system ensures that the filtered liquid is in full contact with the filter medium and effectively utilizes the filter medium.

The cellulose in the filter paperboard is interwoven to form a tight three-dimensional structure, the pore size shows decreasing distribution, the turbidity of the liquid can be effectively reduced through multi-stage interception , the filter aid diatomite and positively charged resin can greatly improve its filtering ability and the removal ability of endotoxin, DNA and other impurities.

Order information

Item	Filter area	Filtration accuracy	Model
Depth filter module (plastic shell for single use)	25cm²	GA-0.10-0.45μm	S00025GA
			S00025GD
			S00025GH
	0.12m²	GD-0.45-0.80μm	S01200GA
			S01200GD
			S01200GH
	1.5m²	GH-1.00-10.0μm	S15000GA
			S15000GD
			S15000GH

Technical parameters

Membrane material	Cellulose, diatomite, resin, etc.
Skeleton support layer/separation plate	Polypropylene
Housing material	Polypropylene
O-ring and gasket	Silicone
Maximum working pressure difference	2.4bar
Maximum using temperature	40℃
Inlet/outlet connection	Sanitary grade joint

Centrifugal Filter Devices

The filtration structure of the centrifugal filter devices adopt the optimized design method, which can reduce concentration polarization.

It has higher sample recovery rate (e.g. usually more than 90% dilute starting solution), the concentration can reach 20-30 times, the entire centrifugal ultrafiltration takes about 5-10 minutes.

Application field

- The protein is concentrated and desalted
- Buffer exchange or desalting operation was performed between chromatographic lotion and physiological gradient fragments
- Recovery of biomolecules from bacterial culture supernatants or lysate solutions
- Clarify the tissue homogenate
- Clean and concentrate latex suspensions

Introduction of selection

For proteins, It is recommended to select an molecular weight cut-off 3-6 times smaller than the solute molecular weight cut-off. If the flow rate is considered, it is recommended to select centrifugal filter devices with MWCO lower than this range (3X-6X).

Recommended cut-off molecular weight for proteins

MWCO	Biomolecule Molecular Weight
3kd	10-20kd
5kd	20-30kd
10kd	30-100kd
30kd	90-150kd
50kd	150-300kd
100kd	300-800kd
300kd	800-2000kd

Technical Parameter

(1)Maxim initial sample processing capacity: 15ml, Typical final volume after concentration is 200uL
(2)The built-in filter membrane is polyether sulfone filter membrane
(3)The operation temperature range: 0-45℃
(4)Ph range : 1-14
(5)The maximum centrifugal force 5000g
Centrifuge: need to use the capacity of 50ml tube, fixed angle or dump rotor type capable of withstanding 1000-5000g centrifugal force

Order Information

MWCO	Sample volume	Model		
		Package size 8/pkg	Package size 36/pkg	Package size 96/pkg
3kd	15mL	GU0003150K08	GU0003150K36	GU0003150K96
5kd	15mL	GU0005150K08	GU0005150K36	GU0005150K96
10kd	15mL	GU0010150K08	GU0010150K36	GU0010150K96
30kd	15mL	GU0030150K08	GU0030150K36	GU0030150K96
50kd	15mL	GU0050150K08	GU0050150K36	GU0050150K96
100kd	15mL	GU0100150K08	GU0100150K36	GU0100150K96
300kd	15mL	GU0300150K08	GU0300150K36	GU0300150K96

The performance of centrifugal filter devices

Factors that affect flow rate include sample concentration, initial volume, chemical nature of the solute, relative centrifugal force, angle of the centrifuge rotor, membrane type, and temperature. The below chart can be used to estimate the time required to achieve a given filtrate volume or concentration. The rotation time for a 10 mL sample generally takes about 10 to 20 minutes. Although most samples are filtered in the first 10 to 15 minutes of the centrifugation process, the minimum concentration volume (0.8-1 ml) is generally reached after 15 to 20 minutes of rotation.

Typical Concentrate Volume and Rotation Time

Rotation time (min)	Concentrate volume (mL)	
	swing bucket rotor4000×g	fixed angle rotor5500×g
10	2.5	1.9
15	1.8	1.5
20	1.4	1.2

Rotation conditions: room temperature, 10 mL initial volume

The standards of used protein molecular weight: Cytochrome c, n=6 (average value of 3 filter batches). The gray volume is the volume used to calculate the protein recovery in Table 3.

Protein retention rate and concentrate recovery rate

The membrane characteristics of the Guidling ultrafiltration device are described by the molecular weight cutoff (MWCO), that is their ability to retain molecules beyond a certain molecular weight. Solutes with molecular weights close to MWCO may only be partially retained. The retention rate of the membrane depends on the molecular size and shape of the solute. In the most applications, molecular weight is a convenient parameter to evaluate cut-off characteristics. For best results, use a filter membrane with a MWCO at least twice the molecular weight of the protein solute to be concentrated. Please see the below table.

Standard typical retention rates for protein molecular weight

Molecular weight standard /concentration	Molecular weight(kd)	Load MWCO	Retention rate % Swing bucket	Retention rate % fixed angle	Rotation time (min)
α-Chymotrypsinogen (1 mg/mL)	25	10kd	>95	>95	15
cytochromeC (0.25mg/mL)	12.4		>95	>95	15
vitaminB-12(0.2mg/mL)	13.5		<15	<15	15

Rotation condition: Rotating bucket rotor, 4,000 × g, or 35° fixed-angle rotor, 5,500 × g, 10 mL initial volume, room temperature, n=6 (average value of 3 membrane batches).

Factors that determine sample recovery include the nature of the protein solute relative to the MWCO of the chosen device, initial concentration, and concentration factor. The below table provides typical recoveries for GU001015K-10K units.

Typical volume of concentrate and rotation time

			Concentrate volume(mL)		Concentration factor(x)		Recovery rate of concentrated solution(%)	
standard of Molecular weight /concentration	Device MWCO	Rotation time (min)	Swing barrel	fixed angle	Swing barrel	fixed angle	Swing barrel	fixed angle
cytochromec(0.25mg/mL)	10kd	15	1.8	1.5	5.6	6.7	96.3	97.5

Rotation condition: Drum rotor, 4,000 × g or 35°fixed angle rotor 5,500 X g, 10ml initial volume, insulation n=6(average of 3 filter membrane batches)

Maximize sample recovery

Low sample recovery in concentrate may be due to adsorption loss, over-concentration, or sample passing through the filter membrane.

- Adsorption loss depends on the solute concentration, its hydrophobicity, temperature, contact time with the surface of the filter device, sample composition and pH value. To minimize loss, remove concentrated sample immediately after centrifugation.
- If the initial sample concentration is high, monitor the centrifugation process so as not to over-concentrate the sample. Over-concentration can lead to precipitation and sample loss.
- If the sample permeates through the filter membrane, please choose an ultrafiltration tube with a lower MWCO.

Classic question and answer of centrifugal filter devices

▶ It is necessary to separate proteins of different molecular weights, so how much difference should the molecular weights of the proteins need?

The size of the two proteins needs to differ by 10 times or more.

▶ Can centrifugal filter devices be sterilized and resistant to alkali washing?

It can be sterilized with 75% ethanol aqueous solution, and the membrane can withstand 0.1-0.5N sodium hydroxide alkali washing.

▶ How to deal with if the protein precipitated during concentration?

If the protein is concentrated too fast or too concentrated, it may cause protein precipitation, and the final concentration of the protein after concentration should not be too high; Proteins that are sensitive to concentration rate and tend to precipitate, suggested improvements method:

1) Reduce the centrifugal speed
2) Use ultrafiltration membrane with a higher molecular weight cut-off
3) Blow and suck the concentrated tube and then centrifuge

▶ What is the possible reason why centrifugal filter devices cannot be centrifuged down?

You can use about 20% ethanol aqueous solution for initial centrifugation if centrifugal filter devices cannot be centrifuged, because the ultrafiltration membrane is completely dry, the surface of the membrane is weakly hydrophobic, and the flux can be restored after infiltration with a low surface tension solvent.

▶ Correct use methods and storage of centrifugal filter devices

The centrifugal filter devices should be centrifuged with purified water before use to verify its integrity. After each use, it is required to be stored in a wet state to prevent the membrane from drying out.

▶ How does the centrifugal filter devices remove endotoxin ?

The centrifugal filter devices we provided have not been treated with endotoxins, and because endotoxins exist widely in nature, samples that require endotoxins can be pre-cleaned with 0.5N sodium hydroxide before the experiment, and then washed with RO water to remove most of the endotoxin.

▶ When the concentrated protein is used for downstream analysis, it is found that there is interference, what is the reason?

The centrifugal filter devices can be pre-washed with buffer solution or purified water. If the interference still exists, wash with 0.1N sodium hydroxide, and then wash with purified water.

▶ It is found that there is no target protein in the concentrate after concentration. What are the possible reasons?

1) The initial concentration of the protein should not be too low, if the concentration is too low, the membrane may not be able to retain.

2) Select the appropriate membrane pore size. The centrifugal concentration of filter tube belongs to dead-end filtration, and the membrane pore size is generally less than 2 times or more than the target protein.

3) Choose the right centrifugal speed

4) Whether the target protein precipitates

▶ Passivation treatment of centrifugal filter devices

Passivation pretreatment of the surface of the centrifugal filter devices can reduce the adsorption loss of protein on the membrane surface, in most cases, pretreatment of the column before concentrating the diluted protein solution can improve the recovery, Because the solution can fill the exposed empty protein adsorption sites on the membrane and surface, the passivation method is to pre-soak the column with a high volume of passivation solution for more than 1 hour, flush the column thoroughly with distilled water, and then centrifugate the column once with distilled water to completely remove the passivation solution that may remain on the membrane, be careful not to let the membrane dry after passivation, if you want to keep it for future use, you need to add sterile distilled water to keep the membrane wet., please contact our engineers for common passivation solutions.

▶ Does the ultrafiltration membrane filter the molecules hierarchically?

Generally speaking, if the dead-end filtration method is used, it is difficult to accurately remove small molecules among several large molecules by ultrafiltration method. This is because the membrane is a porous network structure, and its filtration mechanism is based on retention rather than passage, such as, the cut off rate of molecules larger than 100kd is >95% if using a 100kd ultrafiltration membrane, however, molecules smaller than the pore size of the membrane do not completely pass through the membrane freely. The molecular retention rate of 67kd is more than 70%, and the protein of 43kd is also more than 40% cut off, the various components in a mixed solution pass through the membrane not as simple and easy as a single component solution, In practice, if you want to isolate two macromolecules, the molecular weight difference between them should be eight times or more.

▶ How to effectively separate large and small molecules through ultrafiltration?

Due to the needs of the process, the impurities in the macromolecules are removed, or the small molecules are removed from the macromolecules, it is normal in production. It is very necessary to choose the appropriate membrane pore size, filtration method and operating conditions. Generally speaking, If the MWCO specification of the membrane is selected between the two proteins, a relatively ideal separation can be achieved. If the protein solution is relatively dilute, operating under low pressure will also help to achieve better results. Choose tangential flow filtration and perform multiple diafiltration to get better separation effect.

Sterilization filter

Product Advantage

- Verified reliable bacteria interception ability
- High flow rate and high interception efficiency
- Multiple connector options available
- Good chemical compatibility (pH 1~14)
- Excellent handling capability for substances prone to clogging (culture medium solutions, etc.) - 100% integrity tested

Application Area

- Cell culture media sterilizing filtration
- Buffer solution filtration
- Intermediate and raw material filtration
- Pre-filtration before column/ultrafiltration
- Sterilizing filtration of final products

Product Type

K	S	D	0	5	0	2	2	S	1

- Filter Type: K=capsule filter
- Membrane Type: S=hydrophilic PES
- Membrane layer: S=single layer; D=double layer
- Filter Size: 02=2inch; 04=4inch; 05-5inch; 10=10inch; 20=20inch
- Membrane Pore Size: 010=0.10μm; 022=0.22μm; 045=0.45μm; 402=0.45+0.22μm; 202=0.22+0.22μm; 201=0.22+0.10μm
- Connector Type: S=TC25 connector; T=TC50 connector; C=3/8 hose
- Package Specification: 1pc/pkg

Technical Parameter

Type	Capsule filter				
Filter length	2"	4 "	5"	10"	20"
Filtration precision	0.10μm、0.22μm、0.45μm、0.45+0.22μm、0.22+0.22μm、0.22+0.10μm				
Connector type	TC50、TC25、3/8hose	TC50、TC25、3/8hose	TC50	TC50	TC50
Filtration area	0.11m^2	0.22m^2	0.3m^2	0.6m^2	1.2m^2

Material Information

Filter membrane	hydrophilic PES
Support	polypropylene (PP)
Shell/skeleton	polypropylene (PP)
Vent O ring	silicon

Operate parameter

Max temperature	40℃	60℃
Max pressure	50psi@25℃	80 psi@25℃
Sterilize	45KGy gamma radiation sterilization, 121℃ high pressure steam sterilization 3 times/1h	

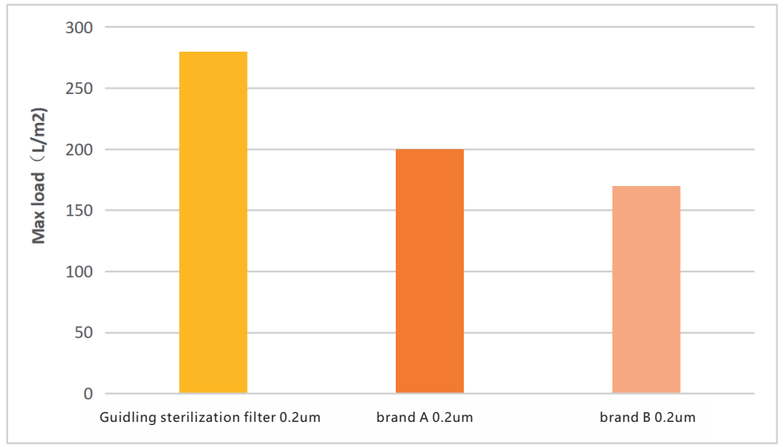
Quality Control

Bubble point	According to different membrane material and pore size
Bacterial endotoxin	According to the method for bacterial endotoxin detection as stipulated in General Rules (1143) of the Chinese Pharmacopoeia 2020 Edition, the endotoxin content in the filtrate is determined, and the endotoxin content in the filtrate is less than 0.25EU/ml.
TOC/ conductivity	The test was conducted according to the determination method of total organic carbon in pharmaceutical water according to the General Rule of Chinese Pharmacopoeia 2020 Edition (0682) and the determination method of electrical conductivity of pharmaceutical water according to the General Rule (0681). The tested TOC value was ≤0.5mg/L and the electrical conductivity value was ≤1.3us/cm.
Cleanliness	According to the lamp examination method stipulated in the General Rules of Chinese Pharmacopoeia 2020 Edition (0904), no fibers or other visible foreign matter were detected in the filtrate。
Bacterial retention ability	According to ASTM testing methods, retention testing for 107 CFU/cm^2 of Pseudomonas aeruginosa (ATCC® 19146) can be conducted.
Biosafety	All materials comply with USP<88> on biosafety evaluation of VI-121 ℃ grade plastic materials
Quality system	Quality management system accredited by ISO 9001 quality system standard certification organization

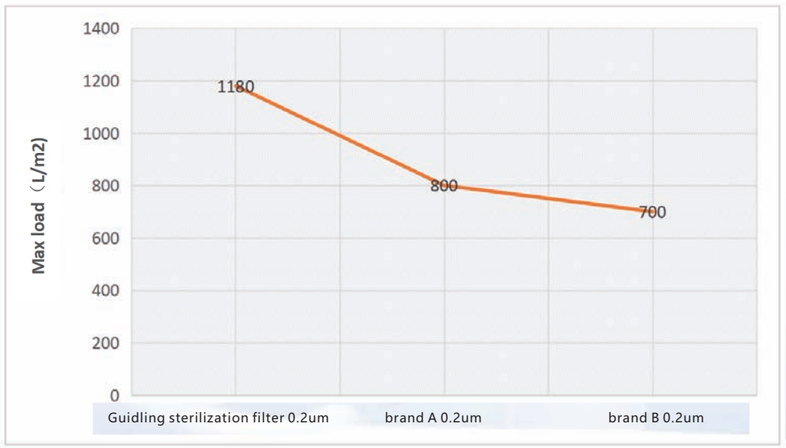
Sterilizer load

Guidling sterilizing-grade membrane filters provide excellent flux and capacity in a variety of applications. These filters contain two-layer or single-layer polyethersulfone (PES) membranes (0.45μm and 0.2μm), which provide sterility assurance, broad chemical compatibility, high flow rate and capacity.

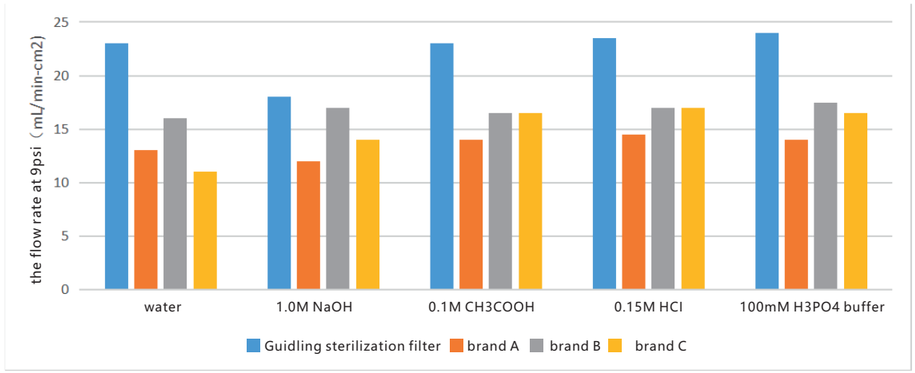
Guidling Sterilization Filters are designed for extended capacity and fewer filter changes, Sterilization filters (0.45+0.22μm) are designed to maximize the capacity of restricted filters. With their high flux and superior capacity, these filters can double your output without increasing your filter area.



CHO cell culture growth medium: no prefilter



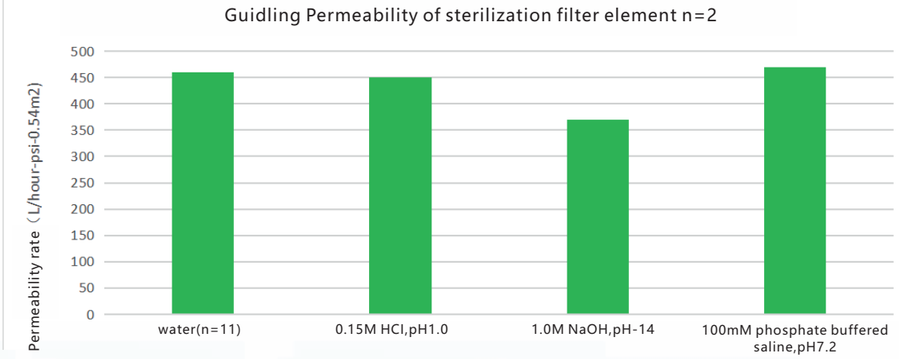
Protein Concentrate after ultrafiltration



Membrane Flux of Sterilization Filters

Filter selection

Testing with a range of commonly used buffers and cleaning solutions (pH 1-14) using Guidling filters showed an average permeability of 450 liters/psi per hour per 10 inch filter element.



Chemical compatibility Table

		PP	PES	PTFE	PVDF	Nylon	Silastic	Fluoroelastomer	Ethylene propylene rubber
Acid	Glacial acetic acid	R	NR	R	R	NR	LR	NR	LR
	Hydrochloric acid (concentrated)	R	R	R	R	NR	NR	R	LR
	Hydrochloric acid 6N	R	R	R	R	NR	NR	R	LR
	Nitric acid (concentrated)	R	---	R	R	NR	LR	LR	NR
	Nitric acid 6N	R	---	R	R	NR	LR	R	NR
	Phosphoric acid (concentrated)	R	---	R	R	LR	NR	R	NR
	Sulphuric acid (concentrated)	R	NR	LR	R	NR	NR	R	NR
	Boric acid	R	R	R	R	R	R	R	R
	Hydrofluoric acid 6N	NR	---	R	R	NR	NR	--	NR
Alkali	Ammonium hydroxide	R	R	R	LR	R	R	R	LR
	Potassium hydroxide 3N	R	R	R	LR	R	LR	R	R
	Sodium hydroxide 3N	R	R	R	LR	R	R	R	R
	Sodium hydroxide 6N	R	R	R	NR	R	R	R	LR
Halogenic hydrocarbons	Carbon tetrachloride	LR	LR	LR	LR	LR	NR	R	NR
	Trichloromethane	LR	NR	LR	LR	NR	NR	R	NR
	Dichloroethylene	LR	NR	LR	LR	LR	NR	LR	LR
	Freon TF	LR	LR	LR	LR	LR	NR	R	NR
	Freon TMC	LR	NR	LR	LR	LR	NR	LR	NR
	Dichloromethane	LR	NR	LR	LR	NR	NR	LR	NR
	Trichloroethylene	LR	LR	LR	NR	LR	NR	R	NR
Alcohol	Amyl alcohol	R	R	R	R	R	NR	R	R
	Benzyl alcohol 100%	NR	NR	NR	R	NR	LR	R	R
	Butanol	R	R	R	R	R	NR	R	NR
	Ethanol	R	R	R	R	R	R	R	R
	Isopropanol	R	R	R	R	R	R	R	R
	Methanol	R	R	R	R	R	R	R	R
	Ethylene glycol	R	LR	R	R	R	R	R	R
	Glycerol	R	LR	R	R	R	R	R	R
	Propylene glycol	R	LR	R	R	R	R	R	R

R: it can be used. NR: it is not recommended. LR: it can be used under certain conditions.
The contents of the table are for reference only, please contact Guidling for details

		PP	PES	PTFE	PVDF	Nylon	Silastic	Fluoroelastomer	Ethylene propylene rubber
Ether	Ethyl ether	LR	LR	LR	LR	NR	LR	NR	NR
	Isopropyl ether	R	---	R	R	---	NR	NR	NR
	Dioxane	R	---	R	R	NR	NR	NR	
	Tetrahydrofuran	LR	NR	R	LR	R	NR	NR	R
Ketones	Acetone	R	NR	R	R	R	NR	NR	R
	Cyclohexanone	NR	NR	NR	NR	NR	NR	NR	R
	Methyl ethyl ketone	R	---	R	LR	R	NR	NR	R
	Methyl isobutyl ketone	R	NR	R	R	LR	NR	NR	LR
Benzene	Benzene	LR	LR	NR	NR	LR	NR	R	NR
	Toluene	LR	NR	LR	LR	NR	NR	R	NR
	Xylene	NR	LR	LR	LR	NR	NR	R	NR
Ester	Amyl acetate	LR	---	LR	R	LR	NR	NR	R
	Butyl acetate	LR	---	LR	R	LR	NR	NR	R
	Ethyl acetate	R	LR	R	R	LR	NR	NR	R
	Methyl acetate	R	NR	R	R	R	---	NR	R
	Isopropyl acetate	R	R	R	R	R	LR	NR	R
Oil	Cottonseed oil	R	---	R	R	R	R	R	LR
	Lube	R	NR	R	R	R	R	R	R
	Peanut oil	R	---	R	R	R	R	R	LR
	Sesame oil	R	NR	R	R	R	R	R	R
	Turpentine	LR	LR	LR	LR	LR	NR	R	NR
Other	Aniline	LR	NR	LR	R	LR	NR	R	R
	Dimethylformamide	R	NR	R	NR	NR	R	NR	R
	Formaldehyde 37%	R	R	R	R	R	R	NR	R
	Formaldehyde 4%	R	R	R	R	R	R	R	R
	Gasoline	LR	LR	LR	LR	LR	NR	R	R
	Hexane	LR	NR	LR	LR	LR	NR	R	NR
	kerosene	R	R	R	R	R	NR	R	NR
	Phenol	R	NR	R	R	R	NR		NR
	Capronitrile	R	R	R	R	LR	---	NR	R
	Nickel sulfate solution	R	---	R	R	R	R	---	R

R: it can be used. NR: it is not recommended. LR: it can be used under certain conditions.
The contents of the table are for reference only, please contact Guidling for details