

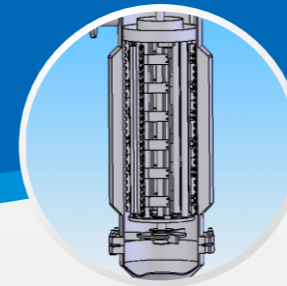


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薄膜蒸发器

Thin Film Evaporator



上海森永工程设备股份有限公司
Shanghai Nagamori Machinery Co., Ltd.

薄膜蒸发器是一种通过设备上的电机，驱动筒体内各种机械刮壁装置，使原料连续均匀地以薄膜形式分布在加热壁面，在真空条件下进行降膜蒸发的新型高效蒸发器。它传热系数大、蒸发强度高、停留时间短，尤其适宜热敏物料、高粘度物料及含颗粒物料的蒸发浓缩、脱气脱溶、蒸馏提纯。

Thin Film evaporator is a new type of high-efficiency evaporator which drives scraping device in the cylinder through the motor on the top of evaporator, so that the raw materials can be continuously and evenly distributed on the heating wall in the form of thin film, and the falling film evaporation is carried out under vacuum condition. It has advantages of high heat transfer coefficient, high evaporation intensity and short residence time, which is especially suitable for evaporation concentration, degassing/desolventizing and distillation purification of heat sensitive mediums, high viscosity mediumssand granular mediums.

优点advantages:

- ≡ 连续的蒸馏过程;
- ≡ 物料停留时间短;
- ≡ 高蒸发率;
- ≡ 由于操作压力低，因而所需的加热温度低;
- ≡ 可以处理高沸点、高粘度、热敏性物料;
- ≡ 蒸发器内壁不易结垢。
- ≡ Continuous distillation ;
- ≡ Short medium residence time;
- ≡ High evaporation efficiency;
- ≡ Availableforheat sensitive mediums;
- ≡ Availableforhigh boiling point material/high viscosity and heat sensitivity medium;
- ≡ Not easy to scale on the inner wall of evaporator.

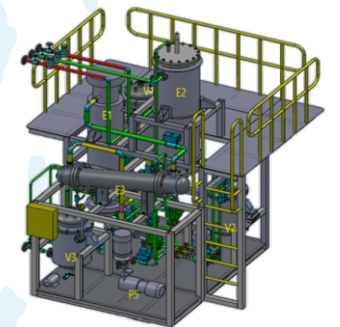
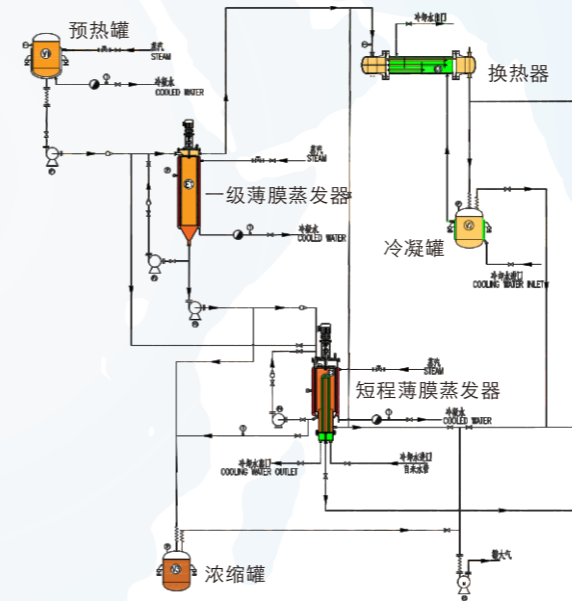
夹套类型 Jacket type	加热介质 Heating medium
整体夹套加热 Integral jacket	蒸汽、导热油、热水 Steam,heat transfer oil,hot water
半管夹套加热 Half pipe jacket heating	蒸汽、导热油、热水 Steam,heat transfer oil,hot water



中试实验系统 Pilot Test system

这套系统中试实验系统集成装置，分别可以进行单级薄膜蒸发或者和短程蒸发器组合进行二级薄膜蒸发中试实验。物料首先被预热，进入已经抽真空的一级薄膜蒸发器内进行分离，一些低沸点组分被蒸发，进入外置冷凝器内冷凝并收集，高沸点浓缩物可以直接进入收集罐内进行收集，也可以进入短程薄膜蒸发器进行二级薄膜蒸发，轻组分被蒸发并在内置冷凝器内冷凝，实现中间沸点组分与高沸物组分的分离。通过物料传输泵，整套装置可实现连续操作。

This system is an integrated device of pilot test system, which can carry out single-stage Thin film evaporation or shortpath evaporator combination for pilot test of secondary film evaporation. Firstly, the medium will be preheated, then pumped into evacuated primary thin film evaporator and separated herein. The low boiling components can be evaporated and condensed in the external condenser for collection. The high boiling concentrate can be directly collected in the collection tank or in the short path film evaporator for secondary film evaporation. The light components will be evaporated and condensed in the internal condenser, finally, the separation of intermediate boiling components and high boiling components is completed. With transfer pumps, continuous operation is achievable by this pilot test system.

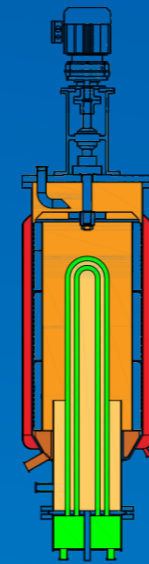
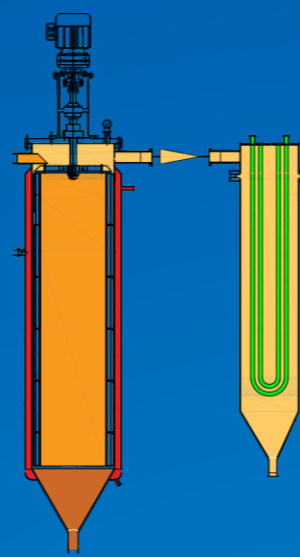


薄膜蒸发器结构及型号

THIN FILM EVAPORATOR TYPE AND MODEL

物料从上部进料口进入蒸发器，然后被旋转的液体分布器抛射，从而被均匀地分布在圆筒内壁上，再通过刮板的搅拌驱动，在蒸发圆筒加热内壁上形成均匀分散的液膜。液膜吸收夹套中加热介质（加热蒸汽、导热油）传给蒸发表面（圆筒内壁）的热量，使溶剂迅速蒸发，从而使物料得到浓缩，气化的轻组分在外置冷凝器中被冷凝液化，从而实现分离。薄膜蒸发器使用于热敏及高沸点产品的分离。

The medium enters the evaporator from the upper feed inlet, and then gets ejected by rotating liquid distributor, to be distributed evenly on inner wall of cylinder. Then, the stirring of the scraper will form a uniformly dispersed liquid film on the heating inner wall of the evaporation cylinder. The liquid film absorbs the heat transmitted by the heating medium (heating steam and heat transfer oil) in the jacket to the evaporation surface (inner wall of the cylinder), to evaporate solvent rapidly, and get medium concentrated, vaporized light components condensed and liquefied in the external condenser, and finally complete separation. Film evaporator can be used for the separation of heat sensitive and high boiling mediums.

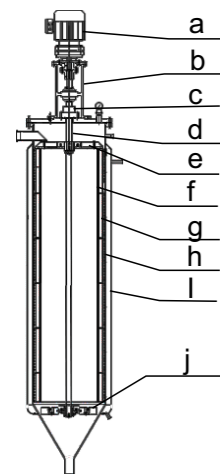
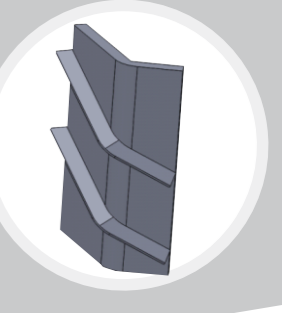
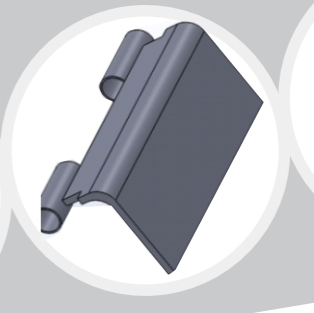
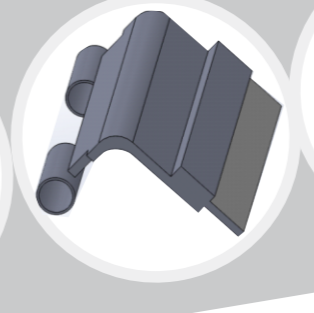
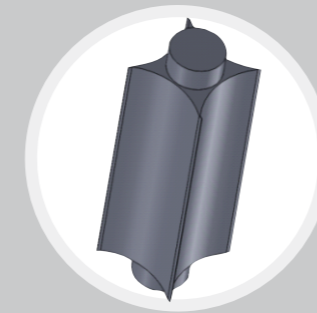
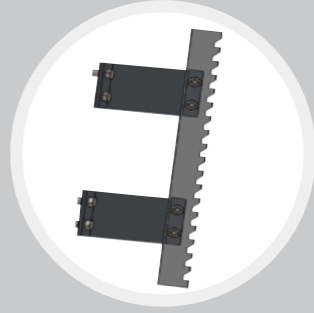
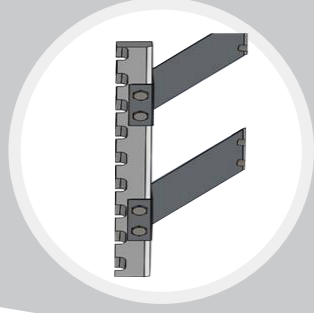


短程薄膜蒸发器结构及型号

THIN SHORT PATH FILM EVAPORATOR STRUCTURE AND TYPE

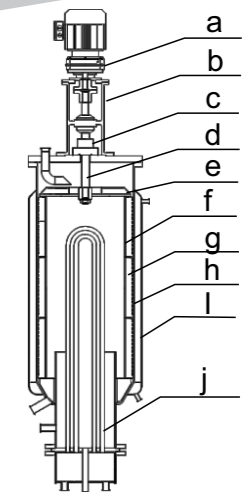
短程薄膜蒸发器是一个具有内置冷凝器的薄膜蒸发器。内部冷凝器是一个从下部安装到蒸发圆筒中心的垂直多程管束。内部冷凝器显著缩短了蒸汽从蒸发表面到冷凝表面的距离，大部分蒸汽分子从蒸发表面溢出后，直接到冷凝表面冷凝，而不会返回到蒸发表面冷凝，这样强化了物质和能量的传递，从而强化了蒸发操作。操作压力低至0.001mbar。

The short path film evaporator is a thin film evaporator with an internal condenser, which is a vertical multi-pass tube bundle installed from the lower part to the center of evaporation cylinder. The internal condenser significantly shortens the distance of steam from the evaporation surface to the condensation surface. Most steam molecules overflow from the evaporation surface and condense directly to the condenser surface instead of returning to the evaporation surface for condensation, which strengthens the transfer of material and energy, thus strengthening the evaporation operation. The operating pressure can be as low as 0.001mbar.



- a. 电机减速机 Motor reducer
- b. 机架 Motor Support
- c. 机械密封 Mechanical seal
- d. 主轴 Shaft
- e. 分布器 Distributor
- f. 支撑柱 Support
- g. 刮板 Scraper
- h. 筒体 Cylinder
- i. 夹套 Jacket
- j. 底轴承 Bearing

型号Type	传热面积(m ²) Heat transfer area	筒体内径 (mm) DN Inner diameter of the cylinder	夹套内径 (mm) D Jacket inner diameter	设备总高 (mm) H Total equipment height	电机功率 (KW) Motor power	重量 (KG) Weight
TFE-002	0.25	Φ200	Φ250	1960	0.55	195
TFE-010	1	Φ400	Φ500	2630	1.1	800
TFE-035	3.5	Φ500	Φ600	4700	5.5	1500
TFE-050	5	Φ700	Φ800	5890	7.5	2500
TFE-080	8	Φ800	Φ900	6000	7.5	3800
TFE-100	10	Φ900	Φ1000	7790	7.5	5200
TFE-150	15	Φ1400	Φ1500	11500	11	8500
TFE-200	20	Φ1400	Φ1500	11500	15	15000
TFE-250	25	Φ1400	Φ1500	12210	18.5	16500
TFE-300	30	Φ1600	Φ1700	13530	22	17300
TFE-350	35	Φ1600	Φ1700	14750	37	20000
TFE-400	40	Φ1600	Φ1700	16080	37	22000



- a. 电机减速机 Motor reducer
- b. 机架 Motor Support
- c. 机械密封 Mechanical seal
- d. 主轴 Shaft
- e. 分布器 Distributor
- f. 支撑柱 Support
- g. 刮板 Scraper
- h. 筒体 Cylinder
- i. 夹套 Jacket
- j. 内部冷凝器 Internal condenser

型号Type	传热面积(m ²) Heat transfer area	筒体内径 (mm) DN Inner diameter of the cylinder	夹套内径 (mm) D Jacket inner diameter	设备总高 (mm) H Total equipment height	电机功率 (KW) Motor power	重量 (KG) Weight
SPE-002	0.25	Φ200	Φ300	1600	0.55	400
SPE-010	1	Φ500	Φ600	2420	1.1	1100
SPE-035	3.5	Φ700	Φ900	4000	5.5	2000
SPE-050	5	Φ1000	Φ1200	5410	7.5	3700
SPE-080	8	Φ1100	Φ1300	5860	7.5	4600
SPE-100	10	Φ1200	Φ1400	7500	7.5	7500
SPE-150	15	Φ1600	Φ1700	11000	11	12000
SPE-200	20	Φ1600	Φ1700	11000	15	17300
SPE-250	25	Φ1600	Φ1700	12210	18.5	19200
SPE-300	30	Φ1700	Φ1800	13530	22	22600
SPE-350	35	Φ1700	Φ1800	14750	37	27000
SPE-400	40	Φ1700	Φ1800	16080	37	30000

应用领域 APPLICATION INDUSTRY

薄膜蒸发器和短程薄膜蒸发装置在化工、制药、食品、石油等工业中的用于产品的蒸发、浓缩、脱溶、干燥等。
Thin Film evaporator and short path film evaporator are applicative in evaporation, concentration, desolventizing and drying in chemical, pharmaceutical, food, petroleum and other industries.

行业 Materials	物料 Materials	加工 Process	行业 Industry	物料 Materials	加工 Process
化工及石油化工 Chemical and petrochemical	氯化石蜡Chlorinated paraffin grease	蒸馏 Distillation	医药 Medicine	抗生素溶液Antibiotic 高粘性物料High viscosity material 热敏性物料Heat sensitive material 维生素 Vitamin	浓缩 Concentration 浓缩 Concentration 浓缩 Concentration
	三氯化钛Titanium trichloride	蒸馏 Distillation			
	氧化锰Manganese oxide	蒸馏 Distillation			
	硅油Silicone oil	蒸馏 Distillation			
	蜡油Wax Oil	浓缩 Concentration			
	聚乙烯醇 Polyvinyl alcohol	浓缩 Concentration			
	保险粉Sodium powder	浓缩 Concentration			
	甲苯二异氰酸Toluene diacetyl cyanide	浓缩 Concentration			
	琥珀酸Succinic acid	浓缩 Concentration			
	烧碱溶液（氯碱）Caustic soda	回收精馏 Recovery and rectification			
	高淳Higher alcohol	回收精馏 Recovery and rectification			
	苯乙烯单体Styrene monomer	回收精馏 Recovery and rectification			
	BDO	回收精馏 Recovery and rectification			
	甲基丙烯酸Methacrylate acid	精馏 Rectification			
丙烯酸Acrylic acid	回收精馏 Recovery and rectification				
改性MDI	脱磷酸酯类催化剂Carbamates catalyst				
合成树脂、橡胶和 纤维 Synthetic, rubber and fiber	环氧树脂 Epoxy resin	脱溶剂 Desolvent	食品 Food	饮料 Drink 凝胶体 Gel 氨基酸 Amino acid 蜂蜜 Honey 低聚 Oligosaccharide	浓缩 Concentration 浓缩 Concentration 脱水 Dehydration 浓缩 Concentration
	EE橡胶 ED rubber	脱水 Dehydration			
	聚丙烯 Polypropylene	脱溶剂 Desolvent			
	聚二烯橡胶 Polydiene rubber	脱溶剂 Desolvent			
	尼龙六 Pa6	脱溶剂 Desolvent			
	尼龙六六 Pa66	脱溶剂 Desolvent			
	聚酯纤维素 Polyester cellulose	脱溶剂 Desolvent			
	对苯二甲酸盐 Terephthalate	浓缩 Concentration			
	聚碳酸树脂 PC	浓缩 Concentration			
	己内酰胺 Caprolactam	精馏 Rectification			
	聚丁烯 Polybutene	蒸馏 Distillation			
	聚丁二烯 Polybutadiene	浓缩 Concentration			
	聚乙烯 Polyethylene	浓缩 Concentration			
	农药 Pesticide	甲胺磷 Methamidophos			
氰戊菊酯 Fenvalerate		脱溶剂 Desolvent			



薄膜蒸发器
Thin film evaporator



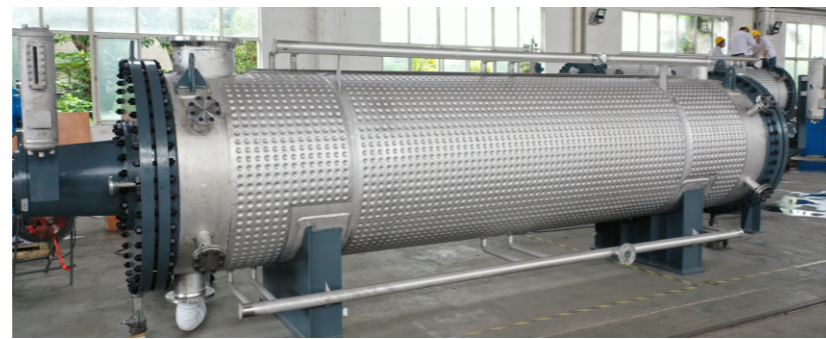
安装调试
Installation and debugging



中试实验系统
Pilot test system



薄膜蒸发器18m²
Thin Film Evaporator18m²
适用：甲基丙烯酸甲酯项目
Application industry: MMA Project
材质Material: S31603
外形尺寸（长X宽X高）Size (L x W x H)
1020X195X190cm



薄膜蒸发器12m²
Thin Film Evaporator12m²
适用：甲基丙烯酸甲酯项目
Application industry: MMA Project
材质Materia : S31603
外形尺寸（长X宽X高）
Size (L x W x H) 900X175X180cm

