Zhejiang Yaguang Technology Co., Ltd.
www.china-yaguang.com

浙江亞光科技股份有限公司
ZHEJIANG YAGUANG TECHNOLOGY CO., LTD.

地址: 温州经济技术开发区滨海园区滨海三道4525号
电话: 0577-86906886
传真: 0577-86906900
邮箱: sales@china-yaguang.com

Address: No.4525, Binhai Rd3, Binhai Zone, Economic-Technical Development Area, Wenzhou City, Zhejiang Province, P.R.China
Tel: +86-577-86906885
Fax: +86-577-86906900
E-mail: sales@china-yaguang.com
P.C.: 325025

© 亚光企业(AGT INDUSTRY)版权所有
采用生态纸印刷 Adopt the ecological paper for printing
设计印刷. 墨者策略. 13676580595

中文网

English website

国家重点新产品
Awarded Key New Product of China

高效旋转精馏床

专业的制药装备和整体方案供应商

EFFICIENT ROTATING DISTILLATION BED

Professional pharmaceutical equipment and overall solution supplier

AGT 亞光科技
YAGUANG TECHNOLOGY

公司简介
Company Profile

浙江亚光科技股份有限公司创建于1996年，是专业从事制药机械的研发、生产与销售的高新技术企业。亚光公司多年来一直专注于制药装备领域，1997年研制出第一台胶塞清洗机、2000年研制出第一台过滤洗涤干燥机等制药工艺系统核心设备，树立起行业产品细分市场的龙头地位。

公司的主要产品有三大类别：清洗机系列(包括胶塞、铝盖清洗机)、API精烘包生产线(反应釜、结晶罐、过滤洗涤干燥机、单锥混合干燥机、分装称重系统等)、高效旋转精馏床。其中胶塞清洗机、过滤洗涤干燥机为国家行业标准起草单位，拥有专利技术100余项，产品分别在国内外众多药企通过美国FDA、欧盟cGMP、日本GMP验证。

公司拥有一个省级研发中心，中心具有一、二级压力容器及ASME设计资质。凭借着扎实的的技术基础，先进的管理理念和优秀的企业文化，亚光公司一路稳步向前，努力将公司打造成一流的面向全球的专业制药工艺方案服务商。

Zhejiang Yaguang Technology Co., Ltd is a national certified high-tech enterprise specializing in the design, production and sales of pharmaceutical equipment since established on 1996. Yaguang has been focusing on pharmaceutical equipment industry for years and developed the first Rubber Stopper Washing Machine in 1997, the first Agitated Nutsche Filter Dryer and other core equipment of pharmaceutical process system in 2000, Yaguang has a leading position in China's pharmaceutical industry.

The main products of Yaguang fall into three categories: Washing Machine (including Rubber Stopper / Aluminum Cap Washing Machine), API production line (Reaction Tank, Crystallizing Tank, Agitated Nutsche Filter Dryer, Conical Pulse Mixing Dryer, Split Charging Weighing System and so on), Efficient Rotating Distillation Bed. More than that, Yaguang is the drafting unit for industry standards of Rubber Stopper Washing Machine and Agitated Nutsche Filter Dryer, has obtained more than 100 patented technologies, the equipment has passed certifications such as American FDA, EU cGMP, Japanese GMP in a number of domestic and abroad pharmaceutical industries.

Yaguang has a provincial R&D center with manufacturing licenses of D1, D2 pressure vessel in China. With the solid technical foundation, advanced management concepts and excellent corporate culture, Yaguang is developing with a steady pace and being a global professional pharmaceutical process program supplier.

优秀的技术和质量推动明天中国制药装备的发展
Advanced technology and excellent quality facilitate the development of pharmaceutical and chemical equipment in China

人力资源
Human Resource

公司始终把人才培养作为企业发展的基础，通过多层次、多形式、多渠道的培训，全方位培养各级各类人才；亚光招贤纳士，不断引进经验丰富的中高级人才，加大人才储备力度，讲究专业门类齐全、重视理论与实践经验并行，以雄厚的技术实力，为客户提供“诚信公正，优质高效”的服务。

Our company always regards talent cultivation as the foundation for enterprise development. Through trainings at various levels, in multiple forms and from varied channels, we cultivate all kinds of talents. Yaguang continuously introduces experienced senior and intermediate talents, enhances talent storing, reinforces combination of theory and practical experience and provides customers with services of "sincerity, fairness, high quality and high efficiency" with our powerful technical strength.

生产实力
Production Strength

市场竞争的基础，离不开生产实力，离不开完善先进的硬件设施。深知硬件设施重要性的亚光，在同行业内率先引进国外先进的生产设备，几年来更先后投入资金对硬件设施进行更新换代，以国际化的生产设施生产出符合GMP标准的高端优质产品。

The basis of market competition, inseparable from the production capability, and can not do without an advanced hardware facilities. Fully aware of the importance of hardware facilities, Yaguang takes the lead in the introduction of foreign advanced production equipment in the industry; during recent years Yaguang has further invested in updating the hardware facilities, to produce high-end quality products with the internationalized production facilities to meet the GMP standard.

生产实力
Production Strength

先进的高、精、尖
设备保证了高品质的产品

The sophisticated equipment bring up high quality products

产品和服务
Products and Services

产品

1、清洗机系列：主要产品有药用胶塞清洗机、铝盖清洗机等。为胶塞清洗机国家行业标准起草单位。
2、固液分离和粉体处理系列：主要产品有无菌溶解罐、结晶罐、过滤洗涤干燥机、粉碎机、混合机、自动秤量分装系统等。其中过滤洗涤干燥机为国家行业标准起草单位。
3、溶媒回收：精馏床。

Products

1. Washing machine series: The main products include medical rubber stopper washing machines, aluminum cap washing machines and etc. Yaguang is the drafting unit of national industrial standard of rubber stopper /aluminum cap washing machines.
2. Solid-liquid separation and powder treatment series: The main products include Aseptic Dissolving Tanks, Crystallizing Tanks, Agitated Nutsche Filter Dryer, Comminutor, Mixers, Automatic Weighing and Split-charging Systems. Yaguang is the drafting unit of national industrial standard of pharmaceutical Agitated Nutsche Filter Dryer.
3. Solvent recovery: Distillation Bed.

服务

设备的设计、制造、安装、调试及技术支持。

Services

Design, manufacturing, installation, commissioning and technical support for the equipment.

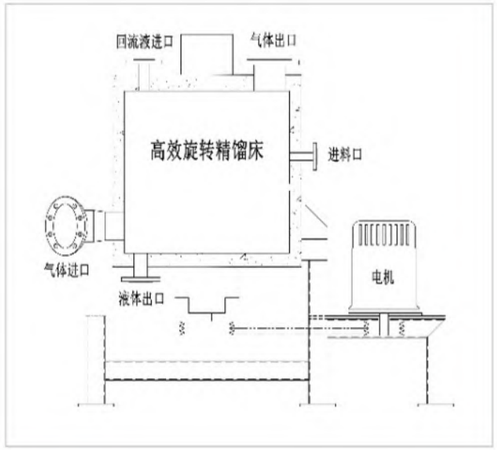
高效旋转精馏床
Efficient Rotating Distillation Bed

产品特点
高效旋转精馏床是一种新型高效节能的精馏设备，主要用于有机溶剂的回收和产品的分离提纯。精馏的原理是利用混合物中各组分挥发度（沸点）的不同而将各组分加以分离的一种分离过程。设备结构主要由圆形外壳和转子组成，具有特定结构的转子在壳体内高速旋转，气体从转子外缘进入转子内，液体从转子中心在离心力的作用下往外甩出，在转子内气液两相形成比表面积极大而又不断更新的气液界面，具有极高的传质传热速率，通过强化传质传热来提高分离效率缩小设备体积。

Features
Efficient Rotating Distillation Bed is a new type of efficiency and energy saving distillation equipment, which is mainly used for the recovery of organic solvents and the separation and purification of products. The principle of distillation is a separation process in which each component is separated according to its volatility (boiling point). The structure of the equipment is mainly composed of a circular shell and a rotor. The rotor with a specific structure rotates at high speed in the shell. The gas enters the rotor from the outer edge of the rotor. The liquid is thrown out from the center of the rotor under the action of centrifugal force. The gas-liquid interface with a large specific surface is formed in the rotor, with high heat and mass transfer rate. Enhance the mass and heat transfer to improve the separation efficiency and reduce the volume of equipment.

产品优势
- ◆分离效率高、节省投资和管理成本；
- ◆设备体积小、能耗低；
- ◆操作简单、维修方便；
- ◆高效旋转精馏床由于分离效率高、设备体积小，在生产车间与其它反应釜、蒸发釜等设备相结合直接对溶剂进行分离提纯，可以优化工艺流程、降低能耗、节省成本和方便管理。

Advantages
- ◆High separation efficiency, saving investment and maintenance cost.
- ◆Small size and low energy consumption.
- ◆Easy operation and convenient maintenance.
- ◆Because of its high separation efficiency and small size, the Efficient Rotating Distillation Bed can directly separate and purify the solvent in the production workshop with other reactor and evaporator, which can optimize the process flow, reduce energy consumption, save cost and facilitate management.



适用范围
广泛应用于甲醇、乙醇、异丙醇、丙酮、乙腈、四氢呋喃、二氯甲烷、乙酸乙酯、甲苯等有机溶剂的回收及产品的分离提纯，在化工、制药、环保、生物医药等行业已产业化应用。

Application
The Efficient Rotating Distillation Bed is widely used in the recycling or separation and purification of solvents such as methanol, ethanol, isopropyl alcohol, acetone, acetonitrile, tetrahydrofuran, dichloromethane, ethyl acetate, toluene and other organic solvents, has been industrially applied in chemical, pharmaceutical, environmental protection, biological and other industries.

主要材质
设备材质根据用户需求分别采用S30408、S31603、S2205、哈氏合金等。

Main material
Equipment material according to user requirements are S30408, S31603, S2205, Hastelloy alloy, etc.

基本参数 Basic parameters

设备型号 Model	处理量 Capacity kg/h	精馏床尺寸 ERDB size (L*W*H)mm	系统尺寸 System size (L*W*H)mm	重量 Weight (kg)	功率 Power (kW)
DN300	5–100	550x550x1500	1700x1500x2400	400	2.2–3
DN550	100–400	1400x900x1500	3100x2100x4500	950	5.5–7.5
DN750	300–700	1900x1400x2100	3800x2500x5000	1700	7.5–11
DN950	600–1000	2200x1600x2200	4400x2600x5500	3000	7.5–18.5
DN1100	900–1500	2400x1700x2400	5000x3000x5800	4000	18.5–30
DN1300	1200–2200	2500x2100x2600	5000x3500x6000	4700	30–45
DN1600	1800–3000	3400x2500x3000	6000x4500x7000	6000	45–55

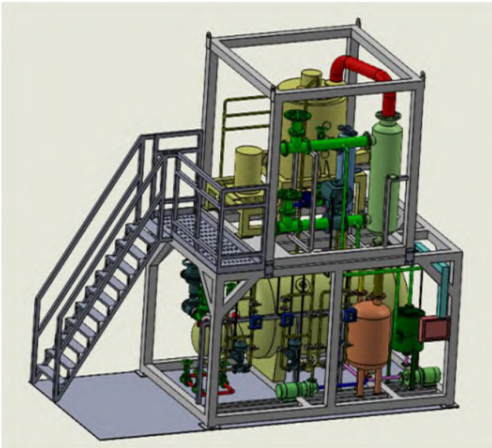
注：上表中的处理量会随着进料组成、浓度和产品要求的不同而不同。
Note: the amount of treatment in the table above will vary according to feed composition, concentration and product requirements

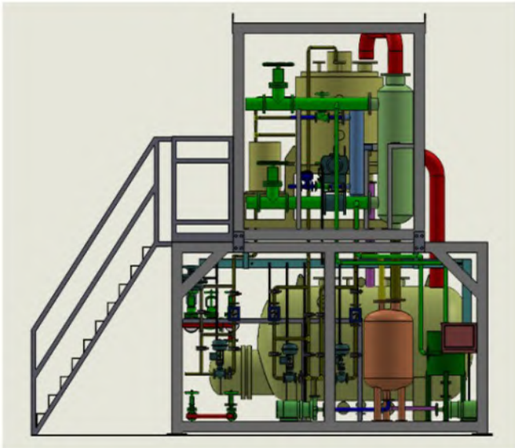
高效旋转精馏床
Efficient Rotating Distillation Bed

撬装设计
亚光科技研发的超重力床系统采用整体预制的成套撬装模块化设计，撬装式设备的生产、组装都在工厂内完成，现场安装工作量少，只需完成接口管道及外部电气的连接，设备紧凑，比传统的安装方式占地面积小，便于安装、运输迁移和维护。

Skid mounted design
The high gravity bed system researched and developed by Yaguang technology adopts the whole prefabricated skid mounted modular design. The production and assembly of skid mounted equipment are completed in the factory, and the workload of on-site installation is less. It only needs to complete the connection of interface pipeline and external electrical. The equipment is compact and covers less area than the traditional installation method, which is convenient for installation, transportation, migration and maintenance.

工厂预制 | **标准设计** | **三维建模**



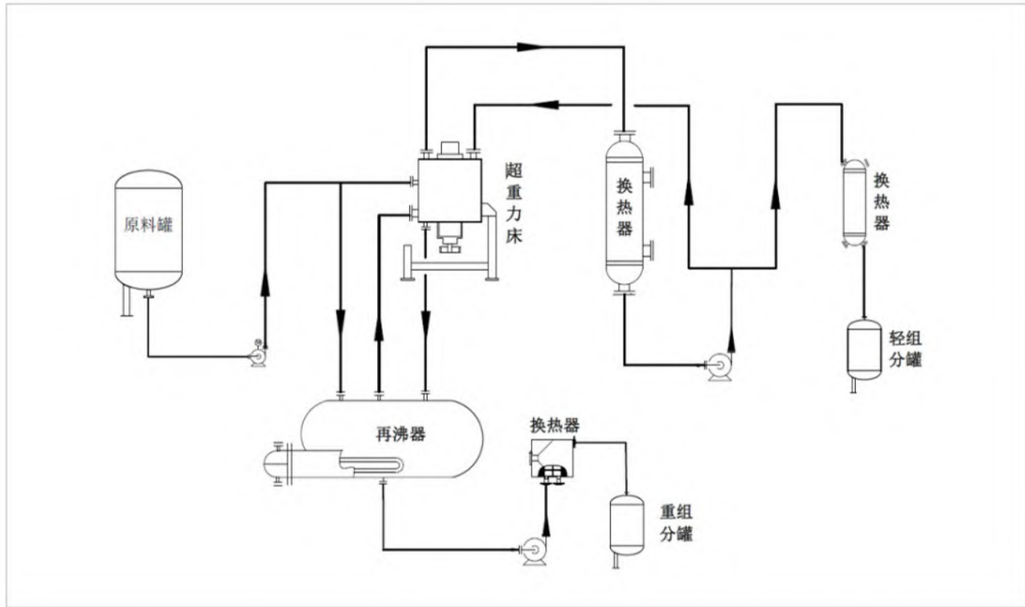


工艺流程
高效旋转精馏床系统主要由高效旋转精馏床、再沸器、冷凝器、泵、储罐、温度表、压力表、阀门以及相应的控制系统等组成。

Workflow
The whole distillation system is mainly composed of Efficient Rotating Distillation Bed, reboiler, condenser, pump, storage tank, thermometer, pressure gauge, valve and corresponding control system.

工作流程
1. 物料从原料罐经进料泵输送到再沸器至一定液位后停止进料，开启再沸器蒸汽加热开关，加热建立全回流；
2. 全回流一段时间后，开采出；
3. 调节回流比、再沸器温度等参数使系统稳定生产。

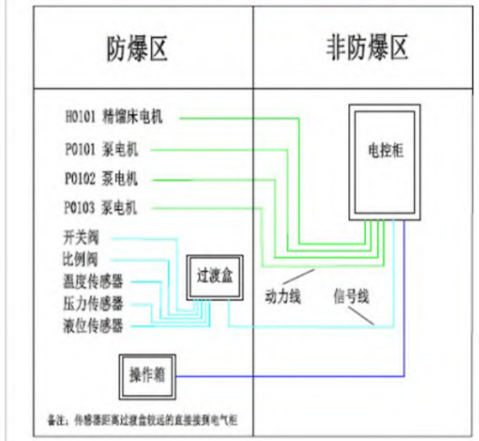
Work process
1.Material is transported from raw material storage tank to reboiler through raw material pump and stops feeding until a certain liquid level. The steam heating switch of reboiler is opened and the full reflux is established by heating.
2.Collect finished products after full reflux for a period of time.
3.The system is stable by adjusting reflux ratio, feeding flow rate and reboiler temperature.



控制系统 Control system
整个系统可自控和手控操作。采用西门子PLC- S7-1200系列以及现场操作柜，人机界面，操作简洁，维护方便，可扩展输出，提供设备升级空间。

The whole system can be operated automatically and manually. Siemens PLC-smart series and field operation cabinet, man-machine interface, simple operation, easy maintenance, expandable output, provide equipment upgrade space.

设备功率（KW）	2.2	3.0	4.0	5.5	7.5	15	18.5	22	30	45
电缆（平方）	1.0	1.5	2.0	2.5	4.0	10.0	16	16	25	25



高效旋转精馏床
Efficient Rotating Distillation Bed

实验机
根据客户需求提供小试实验机。实验机由高效旋转精馏床，再沸器，冷凝器，原料罐，成品罐，进料泵等组成，接上水、电、气即可实验，操作方便，开机半小时后，可获得产品。

The pilot system
Provide small pilot system to customers. The system is mainly composed of Efficient Rotating Distillation Bed, reboiler, condenser, raw material tank, finished product tank and feeding pump and etc. Operations are very easy, we can have final product within half an hour.

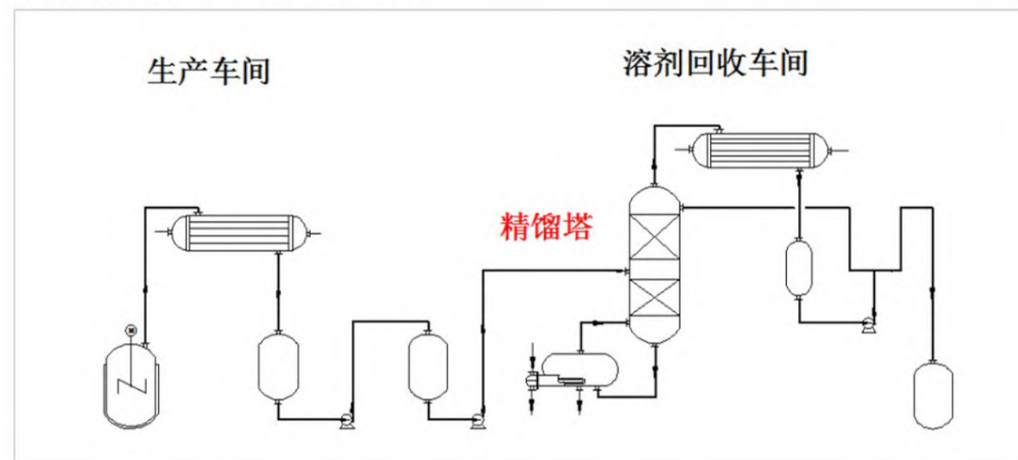
应用案例
Application Cases

1 超重力精馏与反应耦合连续分离
ERDB and reaction coupled continuous separation

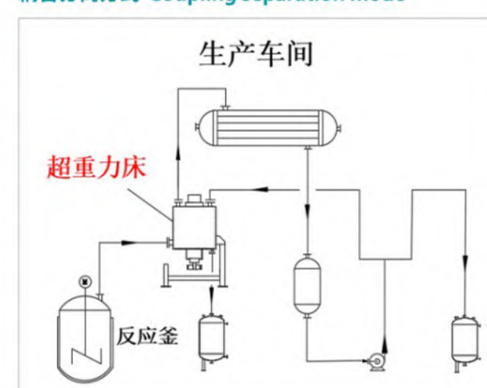
传统反应过程副产物分离需要先从反应釜蒸出冷凝收集，然后输送到精馏车间分离提纯。超重力精馏耦合反应连续分离，减少溶剂二次上塔加热和冷凝的能耗，无中间转运环节，节能、省时省力。

In the traditional reaction process, the by-products need to be evaporated from the reactor, condensed and collected, and then transported to the distillation workshop for separation and purification. ERDB coupling reaction continuous separation can reduce the energy consumption of solvent secondary heating and condensation, without intermediate transfer link, saving energy, time and labor.

传统分离方式 Traditional separation mode



耦合分离方式 Coupling separation mode



应用案例
Application Cases

2 离心/过滤母液的分离提纯
Separation and purification of centrifugation / filtration mother liquor

在原料药或精细化工等的生产过程中，结晶后经过滤洗涤干燥机（三合一）或离心机固液分离后的母液，溶剂成分复杂，如甲醇母液、乙醇母液和丙酮母液等，通过高效旋转精馏床分离提纯后，纯度、外观、色度、水分、残留物等可满足回收套用标准。

In the production process of API or fine chemical industry, the mother liquor crystallized by filtration, washing and drying machine (ANFD) or centrifuge after solid-liquid separation has complex solvent components, such as methanol mother liquor, ethanol mother liquor and acetone mother liquor. After separation and purification by ERDB, the purity, appearance, chromaticity, moisture and residue can meet the recycling standards.

提纯前
Before purification

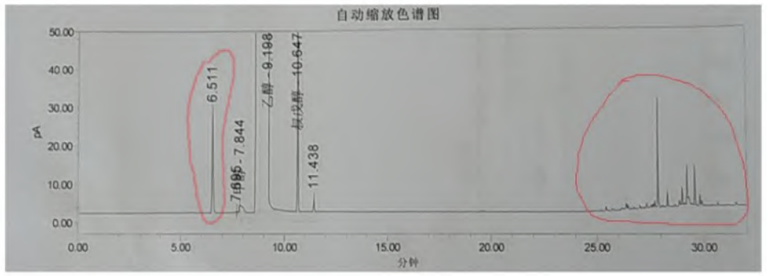
提纯后
After purification

3 中药提取中乙醇的精馏回收
Distillation recovery of ethanol in traditional Chinese medicine extraction

中药提取成分复杂，蒸发后的乙醇母液含量60-70%，通过高效旋转精馏床先分离低沸杂质，然后提纯到95%乙醇，回收套用。

The content of ethanol mother liquor after evaporation is 60-70%. Low boiling impurities are separated by high efficiency rotary distillation bed, and then purified to 95% ethanol for recycling.

提纯前母液组成 Composition of mother liquor before purification



应用案例
Application Cases

3 中药提取中乙醇的精馏回收
Distillation recovery of ethanol in traditional Chinese medicine extraction

提纯后组成 Composition after purification

4 超重力精馏与渗透气化膜耦合制备无水乙醇、异丙醇等。
ERDB coupled with pervaporation membrane to prepare anhydrous ethanol, isopropanol, etc.

乙醇、异丙醇、乙腈等溶剂常压精馏与水共沸，只能达到共沸组成。通过高效旋转精馏床与渗透气化膜耦合，超重力精馏将溶剂提纯到共沸组成，然后通过渗透汽化膜脱水，制备无水溶剂，系统能耗低、体积小、自动化程度高。

The azeotropic composition of ethanol, isopropanol and acetonitrile can only be achieved when they are azeotropic with water. The solvent was purified to azeotropic composition by high gravity distillation, and then dehydrated by pervaporation membrane to prepare anhydrous solvent. The system has low energy consumption, small volume and high degree of automation.

超重力精馏
ERDB

渗透气化膜脱水
Pervaporation membrane dehydration

应用案例
Application Cases

5 高效旋转精馏床其它应用
Application case 5 Other applications of ERDB

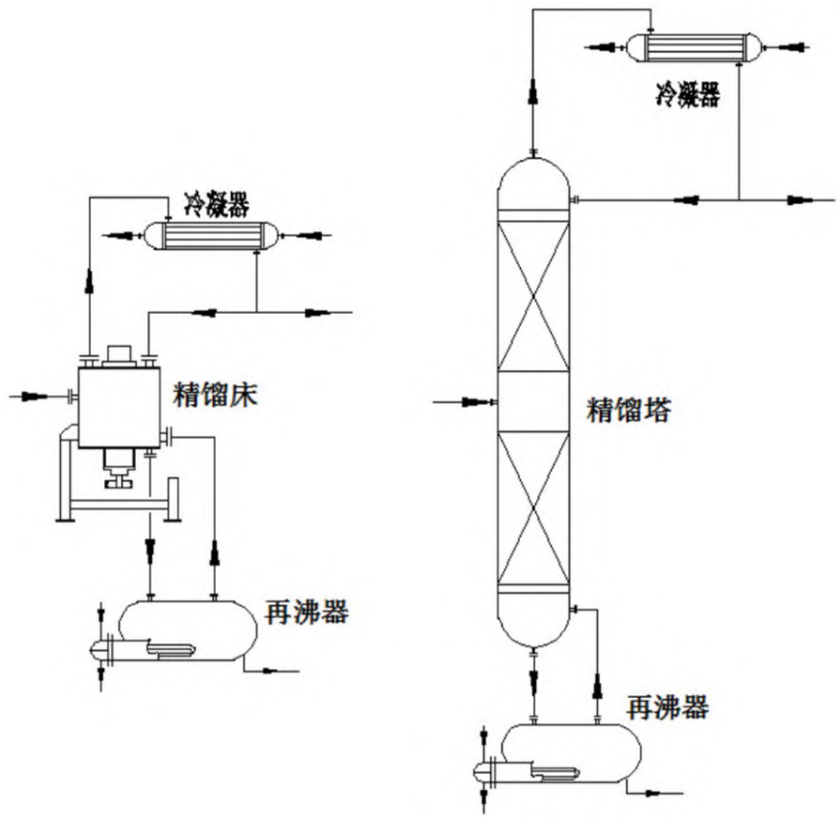
与传统精馏塔对比表
Comparison Table With Traditional Distillation Column

与传统精馏塔对比

超重力技术是上世纪发展起来的强化气液传质的新型技术，其工作原理是利用高速旋转产生的数百至千倍重力的离心力场来代替常规的重力场。在超重力场下，液体呈现出极其细小的液滴、液丝和液膜，气液两相接触的比表面积极大，极佳的微观混合以及极快的相界面更新特征，可以极大地强化气液传质传热过程，从而使巨大的塔设备变为高度不到2米的高效旋转精馏床。

Comparison with traditional distillation column

HIGEE technology is a new technology developed in the last century to enhance gas-liquid mass transfer. Its working principle is to use centrifugal field generated by high-speed rotation to replace conventional gravity field. Under the super gravity field, the liquid presents extremely small droplets, filaments and liquid membranes. The specific surface of the gas-liquid two-phase contact is active, the micro-mixing is excellent, and the phase interface renewal is very fast. It can greatly enhance the process of gas-liquid mass transfer and heat transfer, thus turning the huge tower equipment into Efficient Rotating Distillation Bed with a height of less than 2 meters.



与传统精馏塔对比表
Comparison Table With Traditional Distillation Column

序号 No.	对比项 Compare the item	精馏塔 Rectifying column	超重力精馏床 ERDB
01	分离原理 Separation principle	相同 The same	相同 The same
02	工艺 Process	相同 The same	相同 The same
03	回收溶剂 Recovered solvents	乙醇水 Ethanol water	乙醇水 Ethanol water
04	进料量 Feed rate (T/h)	1.5	1.5
05	回收浓度 Recycling concentration (V/V)	95	95
06	设备规格 Equipment specification (m)	ϕ0.8×16	ϕ1.3×1.2
07	安装 Installation	室外，需要考虑基建、平台和塔体设备吊装。 Outdoor, need to consider infrastructure, platform and tower equipment hoisting.	室内或室外，安装简单，不需大型吊装机械。 Indoor or outdoor, simple installation, no need for large lifting machinery.
08	维护 Maintenance	困难，更换填料、捡漏或清洗比较费时费力。 Difficult, replace packing, pick up leakage or cleaning more time-consuming and laborious.	简单，更换皮带、轴承，只需几小时。 Simple, replace the belt, bearing, only a few hours.
09	操作 Operation	开车时间长，操作弹性小，易发生液泛。 Long running time, small operation elasticity, easy to occur liquid flooding.	开车时间短，操作弹性大，不易发生液泛。 Running time is short, operation flexibility is large, not easy to happen liquid flooding.
10	效率 Efficiency	建立全回流和达到采出纯度时间长，相同处理量和回收要求下，较超重力精馏床效率低。 Under the same treatment capacity and recovery requirements, the efficiency of high gravity distillation bed is lower than that of high gravity distillation bed with long time to establish full reflux and reach recovery purity.	通过超重力强化气液传质传热实现高效分离效率高 High separation efficiency is achieved by enhancing gas-liquid mass transfer and heat transfer through high gravity.
11	能耗 Energy consumption	塔体积大热量流失大，塔体高预热时间长，操作压降大，需要消耗更长时间的供热和预热，能耗高。 Large volume tower heat loss, high tower preheating time is long, the operation pressure drop is large, need to consume longer time for heating and preheating, high energy consumption.	体积小，热量利用率高，节能环保。 Small volume, high heat utilization rate, energy saving and environmental protection.
12	回收形式 Recycling form	集中回收，各车间产生溶剂需要通过管道或转移罐输送至回收塔处，管道残留大、投入高、清洗和安全性差。 Centralized recovery. Solvents produced in each workshop need to be transported to the recovery tower through pipelines or transfer tanks, resulting in large pipeline residues, high input, poor cleaning and safety.	作为独立小单体，可选用就近1对多集中回收方式或是1对1分散式回收，配套及选择方式更灵活。 As an independent small monomer, it can choose the nearest 1 pair of multi-centralized recycling or 1-to-1 distributed recycling, and the matching and selection methods are more flexible.
13	安全性 Security	塔式回收一般采用大批量规模化处理方式，对溶剂转运、存储、设备场所、管理等安全条件要求严格。需要考虑雷击和高空作业。 Tower recovery generally adopts large quantities of large-scale treatment, and requires strict safety conditions such as solvent transport, storage, equipment site and management. Lightning strikes and high altitude work need to be considered.	因体积小，可小批量处理，甚至可采用直接处理方式，减少或去除中间转运和存储环节，规避存储和转运中的安全问题。不需要考虑雷击和高空作业。 Due to its small size, it can be handled in small batches, or even directly handled to reduce or remove intermediate transport and storage links, so as to avoid safety problems in storage and transport. Lightning strikes and altitude work are not to be considered.