

# 冷冻喷雾塔机组

本设备采用超低温液浴+微晶喷雾冷冻塔结构，控温精度高、温度均匀性高、运行费用低、连续化生产、喷雾结晶颗粒均匀等特点；

目前医药行业很多种药剂需要采用吸入药物方式治疗。传统吸入式粉剂采用冷冻成冰，再进行研磨成粉，再进行冻干流程，粉体结构不均匀，粉粒偏大，吸入后吸收能力不强，治疗效果弱化。

本设备采用超低温液浴+微晶喷雾冷冻塔结构，控温精度高、温度均匀性高、运行费用低、连续化生产、喷雾结晶颗粒均匀等特点；经冻干后粉体颗粒细小球形镂空结构，达到纳米级，经人体吸入后，吸收能力明显提高；

本设备与苏州大学材化部联合设计制造的第一台超低温喷雾冷冻塔，经多年实验，产品已达到临床实验级别，成品品质高于同类粉体。设备运行多年，未发生任何故障。受到高校领导高度评价。

本设备应用范围较广，不仅在医药行业，在其他粉体行业例如食品、金属粉末萃取将拓展使用。

## 设备特点：

- 1: 制冷机组采用自复叠制冷技术，采用原装进口压缩机，噪音低、制冷量大，占地面积小；
- 2: 载冷剂采用低温性能好的，热容量大，流动性、可泵性均具有极佳表现；
- 3: 循环泵采用耐低温进口屏蔽泵，静音型，流量大、扬程高、无泄露隐患；

4: 塔体采用 SUS304 特殊工艺制造，内部电解抛光工艺，表面洁净光滑，粉体附着力弱，对内辐射性能高，流道分布均匀，换热性能好，塔体内表面及塔内空间温度均匀性高；

5: 筒体及所有链接管道均采用 SUS304 材质，真空绝热工艺进行隔温，防止保温材料污染药物；

6: 塔体顶部可选配超细微喷雾头，喷雾颗粒细，均匀，喷雾压力可调；

7: 塔内可选配自动清洗装置，实现生产过程中自动清洗，自动吹扫烘干等，符合药物生产 GMP 要求；

8: 粉体自动收料机构，可与 Deepcold 公司其他生产设备（例如自动冻干机）无缝对接，连续化生产；

9: 控制系统采用西门子+HMI 控制，施耐德电器；保障设备运行可靠性，运行状态一目了然；

10: 配方界面设计，可全程设计、监控操作流程；温度段设计可达 99 条（可扩展）

11: 可选配 RS485 或网络通讯，实现多机连续化、一体化生产；

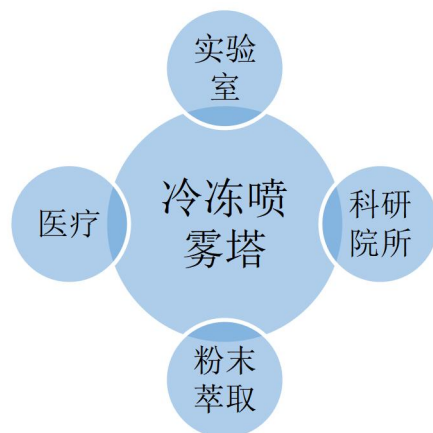
12: 可选配工作站，实现无人化生产；

13: 设备体积小，空间需求低，撬装式安装；方便药厂设备布局；

14: 全程制造工艺符合 ISO9000 质量要求，符合 GMP 要求；

15: 接受特殊规格定制。可咨询 Deepcold 工程技术；

## 应用行业图谱：



## 型号定义：

DC/SF(T) ①-② ③ / ④ / ⑤ / ⑥ / ⑦ / ⑧ / ⑨ / ⑩ / ⑪ / ⑫

## 型号说明：

DC/RST: 蒂珀克<sup>®</sup> 喷雾冷冻（塔）机组；

备注：①~⑤为基础型号，⑥~⑨为扩展型号；

例如：DC/RST1-090/30/20/W/3/C/A/C

DC/RST	1	2	3	4	5	6	7	8	9	说明
蒂珀克										蒂珀克®喷雾冷冻(塔)机组;
制冷原理	1									单机自覆叠
	2									双级覆叠
	3									三级覆叠
	4									单机双级覆叠
使用温度(°C):		080								表示制冷温度-80°C; 依此类推;
冷冻高度(*0.1M)			30							30表示3M; 依此类推;
机组名义功率(HP):				20						20表示20HP; 依此类推;
冷凝方式						W				水冷
						F				风冷
系统电压(V)							2			系统电压220V
							3			系统电压380V
冷冻介质								C		低温载冷剂
								R		制冷剂直接制冷;
收料机构								A		自动收料机构
								M		手动收料机构;
清洗装置									C	带自动清洗装置
									N	无自动清洗装置;
DC/RST	1	2	3	4	5	6	7	8	9	说明

## **Refrigerating Spray Tower Unit**

This equipment applies the ultralow temperature liquid-bath and microcrystalline spray refrigerating tower structure featured by a high temperature control precision and temperature uniformity, low operation cost, continuous production, and uniform spray crystalline particle etc.; Currently there are many medicament treatment requiring the nebulization drugs in pharmaceuticals industry. The traditional nebulization powder applies the process of freezing to ice, grinding to powder and then freeze-drying, which causes a low absorbing ability and weakened treatment effect due to the non-uniform structure and large particles.

This equipment applies the ultralow temperature liquid-bath and microcrystalline spray refrigerating tower structure featured by a high temperature control precision and temperature uniformity, low operation cost, continuous production, and uniform spray crystalline particle etc.; The particles upon freeze-drying are in a fine, spherical and hollowed-out structure and reaching the nanoscale, its absorbing ability is apparently improved upon inhalation by human body;

This equipment is the first ultralow temperature spray tower that our company jointly designs and manufactures with the Material Chemistry College of Suzhou University. This product has reached the clinical trial class upon testing for years, and the quality of finished products is superior to the similar powder. This equipment hasn't have any failure since its

operation for years, which has been highly praised by the management of universities.

This equipment has been widely applicable to the pharmaceuticals industry, and it will also be expanded to other powder industries e.g. food, metal powder extraction etc.

### **Equipment Feature:**

- 1: Refrigerating unit applies the auto-cascade refrigeration technology and original imported compressor with a low noise, high refrigeration capacity and saving space;
- 2: Refrigerating medium of good low temperature performance is featured by high heat capacity, liquidity and pumpability;
- 3: Circulating pump applies the imported canned motor pump of low temperature resistance is featured by silence, high flow, high lift without leakage hazard;
- 4: Tower applies SUS304 special production process and inner electrolytic polishing technology with a clean and smooth surface, low powder adhesion, high inner radiance, uniform flow channel and good heat exchange performance. The inner surface and temperature inside tower demonstrate a high uniformity;
- 5: Tower body and all connection pipes all apply SUS304 material with the heat insulation by vacuum adiabatic process to prevent insulation material contaminating medicament;

6: Optional ultra-fine spray nozzle can be equipped on the tower top, the spray particles are fine and uniform with an adjustable spraying pressure;

7: Optional auto-cleaning device can be equipped in the tower, realizing an automatic cleaning, blowing and drying during production so as to meet GMP requirement of pharmaceutical production;

8: Power auto-receiving mechanism can be perfectly connected with the other production equipment produced by Deepcold Company (e.g. auto-freeze dryer) so as to realize a continuous production;

9: Control system applies Siemens +HMI control and Schneider electric appliances to ensure a reliable operation of equipment and a transparent operation status;

10: Formulation interface design supports the full-process design and monitor to operation procedure; Temperature design can up to 99 items (Extendable);

11: Optional RS485 or network communication can realize a multi-machine, continuous and integral production;

12: Optional workstation can realize a unmanned production;

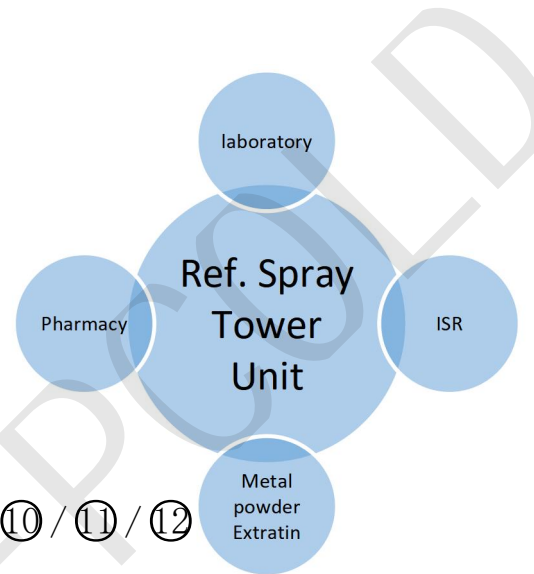
13: Equipment is featured by small dimension, saving space and skid-mounting to facilitate the equipment arrangement in pharmaceutical factory;

14: Whole-process manufacturing process complies ISO9000 quality requirements and GMP requirements;

15: We are willing to accept any of your customization demand for special configuration. Please consult with Deepcold's

Technical Engineering Department;

### Applicable Industry Guide:



### Model Definition:

DC/RST ① - ② ③ / ④ / ⑤ / ⑥ / ⑦ / ⑧ / ⑨ / ⑩ / ⑪ / ⑫

Model Definition:

DC/RST:Deepcold<sup>®</sup> Refrigerating Spray Tower Unit;

Remarks: ① ~ ⑤ are basic models, ⑥ ~ ⑨ are expanding model;

Example: DC/SFT1--090/30/20/W/3/C/A/C



DC/RST	1	2	3	4	5	6	7	8	9	Remarks
Deepcold										Deepcold®Refrigerating Sprav Tower Unit:
Ref. Prin.	1									ARC
	2									Double-Stage Cascade
	3									Three-Stage Cascade
	4									Single-Machine Double-Stage Cascade
Temp. (°C) :		080								For example:080~-80°C ; and so on;
ff. Height of Ref. (*0.1M)			30							For example:30-3M(30*0.1);;and so on;
Unit Nom. Power(HP) :				20						For example: 20 ~ 20HP, and so on;
Condensation Mode										Water Cooling
										Forced-air Cooling
System Voltage(V)								2		220Vac
								3		380Vac
Refrigerating Medium									C	Low-temperature Refrigerating Medium
									R	Direct Refrigeration by Refrigerant
Receiving Mechanism										Automatic Receiving Mechanism
									M	Manual Receiving Mechanism;
Cleaning Device										C Automatic Cleaning Device
										N Automatic Cleaning Device;
DC/RST	1	2	3	4	5	6	7	8	9	Remarks

## 配置说明: Configuration Table

型号 Model	DC/RST1-80/12	DC/RST1-100/12	DC/RST1-80/24	DC/RST1-100/24
塔体温度 (°C) Temp. tower	-80	-100	-80	-100
塔体控温精度 Temp. Control Precision	±2°C			
喷雾高度 (M) Eff. Height of Spray	1.2	1.2	2.4	2.4
制冷介质 Ref. Medium	超低温型载冷剂 (-100°C~-120°C) Ultralow Temperature Refrigerating Medium (-100°C~-120°C)			
介质有效容量 (L)	80		160	
压缩机功率 (HP) Compressor power	10	10	20	20
压缩机品牌 Compressor brand	富士豪/比泽尔 Frascold/Bitzer			
循环泵功率 (KW) Circulating Pump Power	1.5		2.2	
循环泵品牌 Circulating Pump Brand	SPECK			
制冷温度 (°C) Ref. Temp.	-80~-120°C			
制冷剂 Control system	新型环保多元混合制冷剂 Deepcold independently developed system +5 inch/7 inch/10 inch HMI.			
冷却水管径 (inch) Cooling water pipe diameter	1		1 1/2	
冷却水流量 (L/min) Cooling water flow	30		50	
总功率 (KW) Total Power	12.5		25	
控制系统 Control system	西门子PLC+HMI/Deepcold开发专用控制器+HMI (选一) Siemens PLC+HMI controls OR Controlling system professionally developed by Deepcold			
数据记录 Data record	温度实时曲线记录、温度历史曲线记录、报警记录、设备运行状态记录, 远程控制; Temperature historical curve record, parameter setting, alarm record, equipment operation state record; Remote control, formula setting;			
安全防护 Safety Protection	相序错相断相保护、压缩机内保护、过载保护; 压力保护, 过热保护装置、冷凝温度保护、传感器故障保护等多种安全保障功能 Configured with various safety protection functions e.g. phase sequence, phase dislocation, open-phase protection, electric leakage protection, compressor inner protection, overload protection, overheat protection device, sensor failure protection etc.; Configured with various safety protection functions e.g.			
电器指标 Electrical indicators	AC380V*3PH*50/60Hz			