



## 真空冷冻干燥成套设备

Vacuum Freeze Drying Equipment

➤ 果蔬/肉禽/水产/调理加工/生化制品

Fruits and Vegetables / Meat and Poultry / Aquatic  
Products / Prepared Food / Pharmaceutical

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### 烟台中学冷链设备有限公司

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YANTAI TRUE COLD-CHAIN CO.,LTD.

历程是一种磨练 解析是一种探索  
唯美是一种追求 开创是一种责任

History is the effect of practicing, principle is the effect of exploring;  
Accomplish is our pursuit, innovation is our responsibility.

真空冷冻干燥设备不仅是单一设备的生产，而且还是一个多系统优化配置的成套工程。烟台中孚冷链设备有限公司的科研人员于1995年开始从事冻干机理、冻干工艺、冻干设备的研究和开发工作，在成套设备各系统的优化、冻干工艺的研发、冻干工厂的设计方面积累了丰富的实践经验。

我们伴随了冻干食品加工企业的整个成长过程，我们见证了冻干行业在中国从起步到发展的各个过程。我们始终引领着冻干技术的发展潮流，同时也培养出一大批从事冻干设备设计、研发、安装和操作的人才。

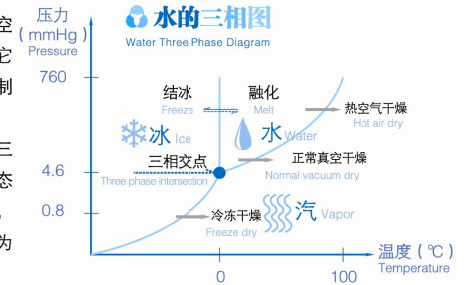
Vacuum freeze drying equipment is not only the equipment that needs to be produced, but also a project that needs many systems to be optimized and disposed. The specialists of True Cold-Chain have been started to research and develop in vacuum freeze drying mechanism and technology since 1995 and we accumulated a plenty of practical experience.

We accompanied with vacuum freezing dry food company's growth process and witnessed every procedure of vacuum freezing dry industry from starting to development. We lead the trending of vacuum freezing dry technology, and train a large number of experts in design, research and installation for vacuum freezing dry equipment.



真空冷冻干燥技术（简称冻干技术）是研究在真空环境下，被冻物料干燥的传热传质过程、特点和规律，它是一门跨学科的综合技术。冻干技术的发展需要真空、制冷、加热、机械传动、自动控制等技术的支持。

真空冷冻干燥的原理是基于水的三相图，在水的三相点压力（610.5Pa）以下，没有液态的水存在，固态的冰可以直接升华为水蒸气，如果此时提供一定的热量，冰即可吸收热量升华为气态，从而使物质脱水，故也称为冷冻升华干燥。



Vacuum freezing dry technology is an interdisciplinary and multiple skill which study frozen products heat and mass transferring process, characteristics and regular when they are dried in vacuum environment. Vacuum freezing dry technology is developing not only depend on vacuum, freezing, heating but also supported by mechanical transmission and automatic control technology.

Principle of vacuum freezing dry base on water three phase diagram, under water three phase point pressure (that is to say under 610.5Pa), liquid water can not exist, solid ice can sublimate to be water vapor, if provide some heat this moment, ice can absorb these heat and sublimate to be water vapor, and then the frozen product will be dehydrated, it is also called freezing sublimating dry.

真空冷冻干燥技术应用范围非常广泛，只要是含水、无毒、无腐蚀性的物质都可以运用真空冷冻干燥技术将其制成冻干品，以达到长期贮藏的目的。

真空冷冻干燥技术应用于食品行业，使用该技术加工出来的产品，就称之为冻干食品（FD食品）。几乎所有的农副产品，如肉、禽、蛋、水产品、蔬菜、瓜果等都可以制成冻干食品。冻干技术还应用于生物制药行业、医疗行业、保健品行业等。

真空冷冻干燥技术是食品所有贮藏加工方法中最为先进的加工技术，能够最大限度的保持原有食品的颜色、香、味、形及营养成分，复水效果极佳。

Vacuum freezing dry technology is used very widely, the products which are hydrous, innocuous and non-corrosive can all be used in this kind technology to make freeze-dried products, in order to be storage for a long time.

Vacuum freezing dry technology is applied to food industry to process freeze-drying food (FD Food). Almost all of the agricultural and sideline products such as meat, poultry, eggs, aquatic products, vegetables, fruits, etc. can be processed to freeze-drying food. The technology is also used in pharmaceutical industry, medical treatment industry, health care products industry, etc.

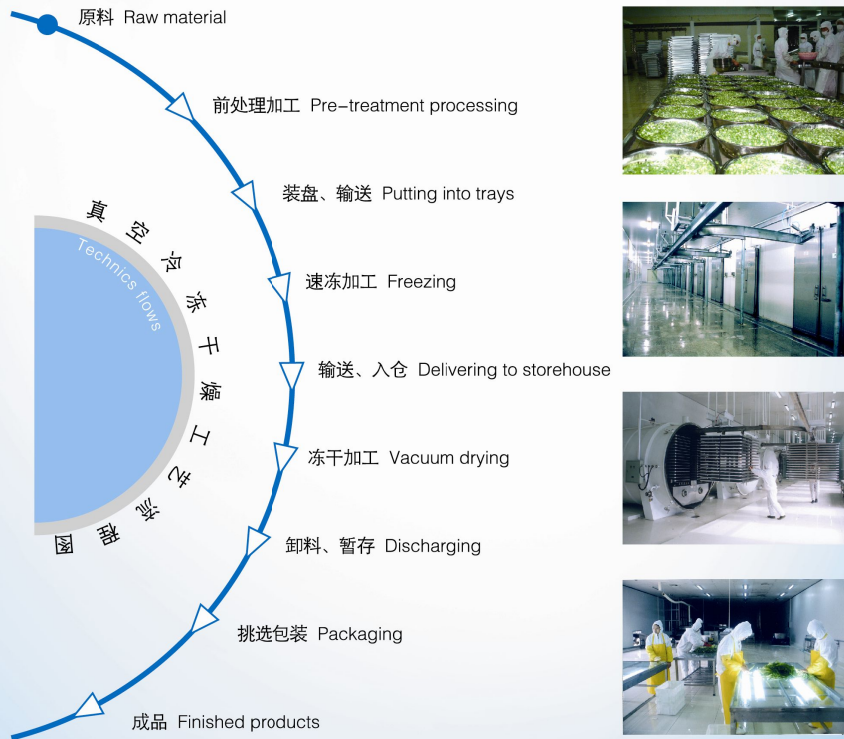
Vacuum freezing dry technology is the most advanced processing technology among food storage and processing methods, it can retain the original food color, smell, taste, shape and nutritional content, water recovery effect is excellent.



烟台中孚冷链设备有限公司开发了适应不同行业需求、不同冻干产品的多种形式、各种规格的成套设备。

Yantai True Cold-Chain Co., Ltd. develops various vacuums freezing dry equipments which can meet different industry requirement and different kind of freeze-drying foods.

- 冻干设备种类最多
- 涉足的行业最广泛
- 规格、品种最齐全
- 了解和掌握冻干加工工艺最全面
- Various kinds vacuum freeze drying equipment
- Involved in widely-ranging industries
- Complete specifications and varieties
- Overall vacuum freezing dry processing technique



中孚冷链生产配套的冻干成套设备具备生产效率高、运行成本低；次品率低，产成品率高；长期安全、稳定、可靠运行，使用寿命长；操作控制简单、自动化程度高，维护保养方便等性能特点。

Vacuum freezing dry equipments manufactured by True Cold-Chain have following characteristics: high productivity, low operating cost, low substandard products rate, long service life, and easy operation, convenient maintenance, etc.



TFDS系列蒸汽换热型冻干设备（一型） TFDS Series Heat Steam Exchange Type Freeze Drying Equipment ( I )

项目 型号 Project Model	有效干燥面积 Effective Drying Area	标准进料能力 Standard Feed Capacity	托盘尺寸 Tray Size	托盘制作形式 Tray Form	托盘数量 Tray Quantity	加热板数量 Heating Plate Quantity	加热板尺寸 Heating Plate Size	小车数量 Trolley Quantity	筒体内径 Cylinder Internal Diameter	筒体壁厚 Cylinder Wall Thickness	冷却水量 Quantity of Cooling Water	单仓最大用量 Max. Steam Consumption each Cylinder	冷阱最大捕冰能力 Cold Trap Max. Ice Absorb Capacity
	m <sup>2</sup>	Kg/仓.班次	mm				mm		mm	mm	m <sup>3</sup> /h	Kg/h	Kg/仓.班次
TFDS60	58.9	600	710*610*37	一次冲压成型 One-time Impact Briquette	136	36	2950*630*16	2	φ 2500	10	8	180	>800
TFDS90	88.4	900			204	36	4400*630*16	3			12	270	>1200
TFDS120	117.8	1200			272	36	5850*630*16	4			15	360	>1600
TFDS200	206.1	2000			476	72	5100*630*16	7			25	600	>2700

TFDS系列蒸汽换热型冻干设备（二型） TFDS Series Heat Steam Exchange Type Freeze Drying Equipment ( II )

项目 型号 Project Model	有效干燥面积 Effective Drying Area	标准进料能力 Standard Feed Capacity	托盘尺寸 Tray Size	托盘制作形式 Tray Form	托盘数量 Tray Quantity	加热板数量 Heating Plate Quantity	加热板尺寸 Heating Plate Size	小车数量 Trolley Quantity	筒体内径 Cylinder Internal Diameter	筒体壁厚 Cylinder Wall Thickness	冷却水量 Quantity of Cooling Water	单仓最大用量 Max. Steam Consumption each Cylinder	冷阱最大捕冰能力 Cold Trap Max. Ice Absorb Capacity
	m <sup>2</sup>	Kg/仓.班次	mm				mm		mm	mm	m <sup>3</sup> /h	Kg/h	Kg/仓.班次
TFDS20	20.6	200	650*610*37	一次冲压成型 One-time Impact Briquette	52	28	1380*630*16	1	φ 2200	10	2.5	60	>270
TFDS35	34.9	350			88	24	2710*630*16	2			4.5	105	>475
TFDS50	52.3	500			132	24	4040*630*16	3			6.5	150	>675
TFDS70	69.8	700			178	24	5370*630*16	4			9	210	>945
TFDS100	104.7	1000			260	24	4015*630*16	6			13	300	>1350

TFDS冻干设备特点:

- 1、此型号冻干设备的加热方式为蒸汽换热型。通过对板式换热器通入蒸汽和冷却水来实现加热板的升温 and 降温，从而完成冻干过程。
- 2、冻干仓筒体为卧式圆筒形，前端开门，物料小车从前端进出。冻干仓仓体材质有碳钢Q235-A和不锈钢SUS304两种选择。碳钢仓体内表面喷涂进口船舱饮用水漆，不锈钢仓体内表面打砂处理，外表面采用橡塑海绵保温。
- 3、加热板由口形铝型材整体阳极氧化制成，加热板进出水连箱采用板翅式换热器，保证了板层温度均匀性和高辐射效率。
- 4、物料托盘为食用铝合金一次冲压成型，表面阳极氧化处理，不沾盘。
- 5、物料小车为悬挂式，车体框架采用轻型不锈钢SUS304制成，托盘支撑采用铝合金角铝制成，小车底部有定位滚轮，用于在干燥仓内精确定位。

TFDS Vacuum Freeze Drying Equipment Characteristics:

- 1、This model is steam heat exchange type. By accessing steam and cold water to increase and decrease its temperature, thus complete the freeze drying process.
- 2、Freeze drying cylinder is opened in front, so the trolley can go in and out. There are two kinds of cylinder, one is carbon steel Q235-A which is coated imported cabin drinking water paint inside; the other is stainless steel SUS304, the inside of this kind is polished, and the outside uses rubber sponge to preserve heat.
- 3、Heating plate is made of "口" shape aluminum which is completely anodic oxidation, the water box adopt plate-fin heat exchanger that ensure plate temperature uniformity and high radiation efficiency.
- 4、Material tray is food degree aluminum alloy one-time impact briquette; the surface is processed anodic oxidation
- 5、Material trolley is hanging type, the frame is made of stainless steel SUS304, tray support is made of aluminum alloy, there is position roller on the bottom of trolley, and it can fix the position in freeze drying cylinder.

TFDX系列电热换热型冻干设备 TFDX Series Electric Heating Type Freeze Drying Equipment

项目 型号 Project Model	有效干燥面积 Effective Drying Area	标准进料能力 Standard Feed Capacity	托盘尺寸 Tray Size	托盘制作形式 Tray Form	托盘数量 Tray Quantity	加热板数量 Heating Plate Quantity	加热板尺寸 Heating Plate Size	送盘方式 Tray's Feeding Form	筒体内径 Cylinder Internal Diameter	筒体壁厚 Cylinder Wall Thickness	冷却方式 Cooling Type	冷阱最大捕冰能力 Cold Trap Max. Ice Absorb Capacity
	m <sup>2</sup>	Kg/仓.班次	mm				mm		mm	mm		Kg/仓.班次
TFDX0.25	0.25	2.5	270*310*37	焊接成型 Welded	3	4	330*380*16	手动送盘 Manual	φ 600	5	风冷冷凝器冷却 Air-cooled Condenser	>3.5
TFDX0.5	0.5	5	270*310*37		6	4	330*690*16		φ 600	5		>7
TFDX1	1	10	610*410*37		4	5	670*480*16		φ 800	5		>14
TFDX3	3	30	650*570*37		8	9	710*640*16		φ 1100	6		>40
TFDX5	5.2	50	710*610*37	一次冲压成型 One-time Impact Briquette	12	13	770*680*16		φ 1500	6		>67
TFDX10	10.4	100	710*610*37		24	13	770*1290*16		φ 1500	6		>135

TFDD系列电加热型冻干设备 TFDD Series Electric Heating Type Freeze Drying Equipment

项目 型号 Project Model	有效干燥面积 Effective Drying Area	标准进料能力 Standard Feed Capacity	托盘尺寸 Tray Size	托盘制作形式 Tray Form	托盘数量 Tray Quantity	加热板数量 Heating Plate Quantity	加热板尺寸 Heating Plate Size	送盘方式 Tray's Feeding Form	筒体内径 Cylinder Internal Diameter	筒体壁厚 Cylinder Wall Thickness	冷却方式 Cooling Type	冷阱最大捕冰能力 Cold Trap Max. Ice Absorb Capacity
	m <sup>2</sup>	Kg/仓.班次	mm				mm		mm	mm		Kg/仓.班次
TFDD0.25	0.25	2.5	340*245*37	焊接成型 Welded	3	4	330*380*30	手动送盘 Manual	400*450	6	关闭加热电缆自然冷却 Turn-off Cable and Natural Cooling	>3.5
TFDD0.5	0.5	5	360*345*37		4	5	330*690*30		500*540	6		>7
TFDD1	1	10	610*410*37		4	5	670*480*30		550*600	6		>14
TFDD3	3	30	650*570*37		8	9	710*640*30		900*1100	6		>40
TFDD5	5.2	50	710*610*37	一次冲压成型 One-time Impact Briquette	12	13	770*680*30		1100*1400	6		>67
TFDD10	10.4	100	710*610*37		24	13	770*1290*30		1100*1400	6		>135

冻干设备特点:

- 1、TFDX冻干设备的加热方式为电热换热型。升温时，通过电加热棒对加热水罐内的水加热，利用水泵将热水送至加热板；降温时，关闭电加热棒，通过风冷冷凝器来冷却加热管路内的水；TFDD冻干设备的加热方式为电加热型，通过对加热电缆的开关控制来实现加热板的升温 and 降温，从而完成冻干过程。
- 2、TFDX冻干仓筒体为卧式圆筒形，TFDD冻干仓筒体为卧式方形，均为前端开门，冻干仓仓体材质有碳钢Q235-A和不锈钢SUS304两种选择。碳钢仓体内表面喷涂进口船舶饮用水漆，不锈钢仓体内表面抛光处理，冻干仓仓体外表面采用橡塑海绵保温。
- 3、TFDX加热板为板翅换热器阳极氧化制成；TFDD加热板由加热电缆盘制而成，电缆外层材质为抛光不锈钢管，内部为加热丝和氧化镁填充物，电阻值随温度变化小，加热均匀、辐射效率高。
- 4、物料托盘有焊接成型和一次冲压成型两种，均采用食用铝合金制成，表面阳极氧化处理，不沾盘，托盘进出仓体为手动送盘。

Vacuum Freeze Drying Equipment Characteristics:

- 1、The heating form of TFDX model is electric heating. First the electric heating rod heat the water in water heating tank, then the hot water is sent to heating plate through water pump, so the temperature increased; turn off electric heating rod, air-cooled condenser cool the water in heating pipe, and the temperature will be decreased. TFDD type is electric heating. It can increase and decrease temperature by turn off and on heating cable to complete freeze drying process.
- 2、TFDX type's cylinder is horizontal and cylindrical, and TFDD cylinder is horizontal and rectangular; they are all opened in front. There are two kinds of cylinder, one is carbon steel Q235-A which is coated imported cabin drinking water paint inside; the other is stainless steel SUS304, the inside of this kind is polished. The outside of cylinder and heating water tank use rubber sponge to preserve heat.
- 3、Heating plate of TFDX type is plate-fin heat exchanger, TFDD type is made of twined cable, the outside of cable is polished stainless steel pipe, and inside is heating strip and MgO filler, resistance value change small with the temperature change, so the plate is heating uniformly and high radiation efficiency.
- 4、There are welded and one-time impact briquettes trays, both are made of food degree aluminum alloy, the surface is processed anodic oxidation and non-sick, and the trays go in and out cylinder manually.

### 冻干设备使用条件 Vacuum freeze drying equipment using condition

- 干燥仓工作真空度：13~133Pa
- Drying Cylinder Working Vacuum Pressure：13~133Pa
- 冷阱工作温度：-30~-45℃
- Cold Trap Working Temperature：-30~-45℃
- 加热板工作温度：室温~120℃
- Heating Plate Working Temperature：Room Temperature~120℃
- 加热方式：辐射加热
- Heating Form：Radiation Heating
- 冷阱形式：内置式、后置式
- Cold Trap Form：Inside Form, Back Form
- 从大气压到133pa时间：≤20min
- Time from Standard Pressure to 133Pa：≤20min

### 我们的服务原则：Our service principle:

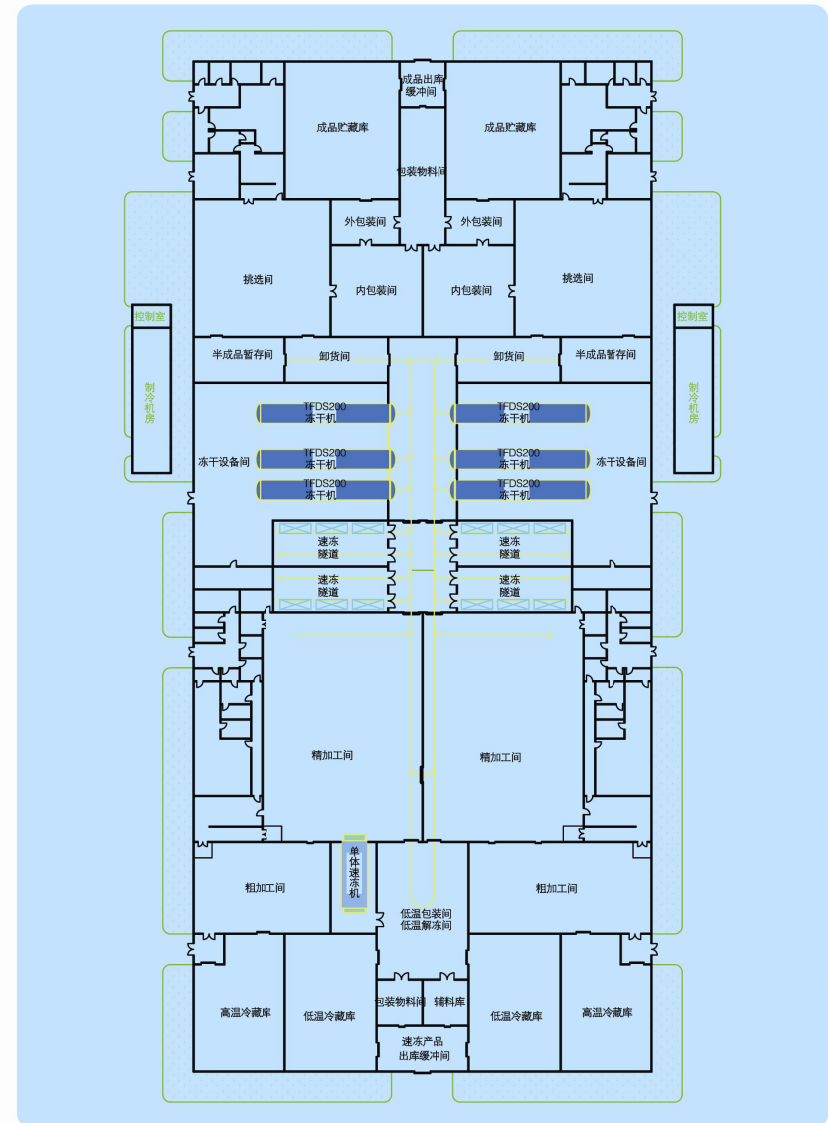
烟台中学冷链设备有限公司的全体科研人员、技术服务人员、项目管理人员本着“客户至上”的原则，凭借一流的技术，高度的责任心和过硬的产品质量，服务于客户。

All the researchers, technicians and project managers of True Cold-Chain will base on “customer first” principle to serve for clients with our best technology and high sense responsibility.

### 我们能够为您提供如下服务：We provide the bellowing service:

- 冻干工厂的总体设计
- Overall design of vacuum freezing dry plant
- 真空冷冻干燥设备成套布置图设计
- Layout of vacuum freezing dry equipment
- 冻干工厂的工艺流程设计
- Plan of technological process
- 冻干成套设备各系统的工艺设计
- Project of vacuum freezing dry every system
- 提供产品实验、冻干工艺实验方法
- Method of vacuum freezing dry technology

### TFDS200X6冻干工厂平面布置图



样本修改 恕不通知 欢迎多联系  
Further notice if sample changed