



DRYER CATALOGUE

Company Brief Introduction

Shanghai Nasan Industry Co., Ltd. is a professional dryer manufactory located in the China's economic center Shanghai city. Until now Nasan has 18 years manufacturing experience of various dryer machines. Our factory has excellent quality management team, professional research team and skilled production workers to ensure consistent product quality.

At present Nasan product have exported to more than 40 countries and regions except China, such as United States, Canada, Germany, France, Italy, Spain, Sweden, Hungary, Poland, Cyprus, Israel, United Arab Emirates, Iran, Malaysia, Thailand, Vietnam, India, Myanmar, Singapore, South Korea, Russia, Uzbekistan, South Africa, Peru, Uruguay, Mexico, Chile, Brazil, Vanuatu, New Zealand, Australia and so on, product quality and after-sales service was well accepted by these client.

Nasan will insist on company spirit of "pioneering spirit, never satisfied," business philosophy of "socially responsible", company culture of "honesty, pragmatism, innovation, development ", provide better quality products and services for every client around the world.

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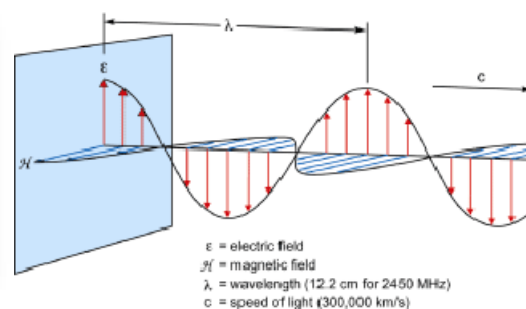
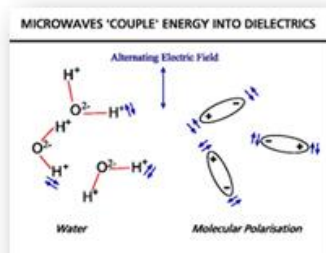
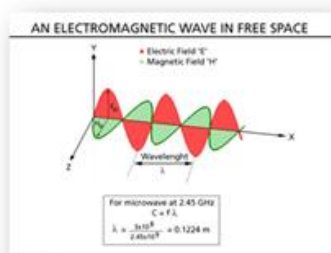
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Part 1. Dryer with microwave drying technology

Microwave brief introduction



● Microwave

Microwave refers to the electromagnetic waves frequency between 300MHz-300GHz, wavelength is between 1mm to 1m. Microwave usually shows penetration, reflection and absorption characteristics. For glass, plastic and porcelain, microwave will penetrate it without being absorbed. For water and food, it will absorb microwave and heating itself. For metal material, it will reflect the microwave.

● Microwave drying

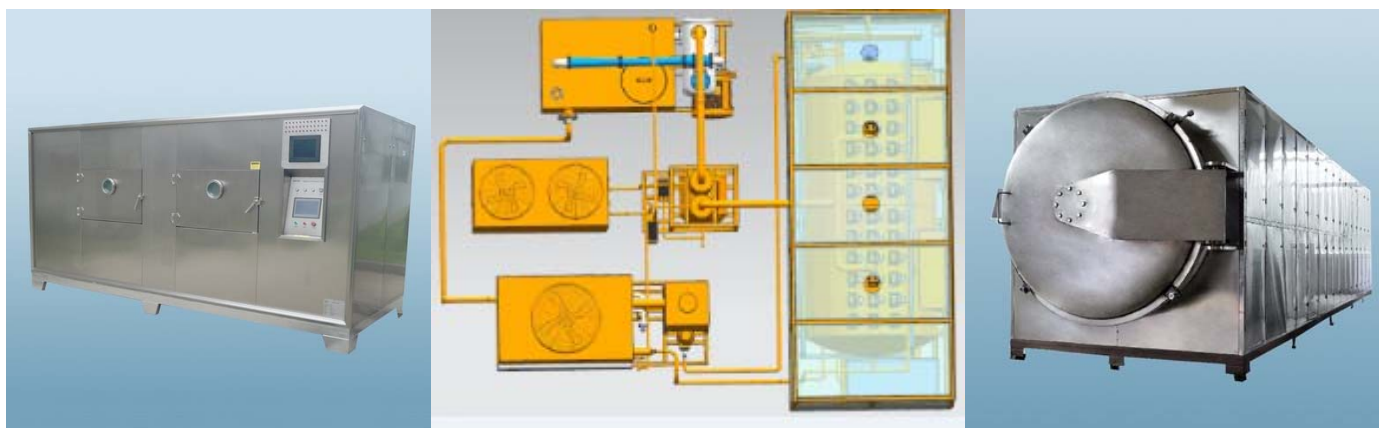
Water molecule is polar molecule, it will change its polarity and friction motion cause by the effect of high speed change of high frequency electromagnetic field. Then the microwave electromagnetic field energy can be converted into heat energy, and achieve the purpose of drying. Microwave uniform heat up the material inside and outside because of the strong penetrability, will not appear outside dry but inside wet. Body heat source state formation shortens the time of heat conduction and save a lot of drying time.

● Microwave sterilization

Microwave sterilization temperature is from 60°C to 110°C, period is from 3 to 8 minutes. Microwave thermal effects change the bacterial protein, make it lose nutrition, reproduction and survival conditions and death. Microwave electromagnetic field can make normal growth and stability of the genetic breeding of bacteria nucleic acid [RNA] and deoxyribonucleic acid [DNA] number of hydrogen bonds slack, breakage and recombination, thereby inducing genetic mutations, chromosomal aberrations and even rupture.

● Microwave Dryer Advantages:

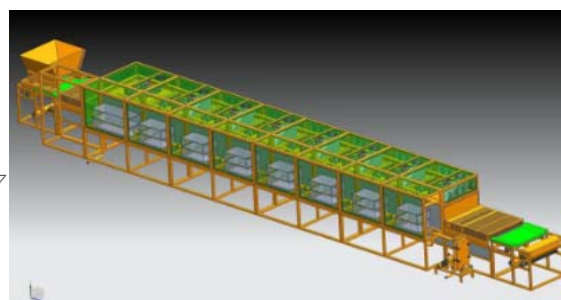
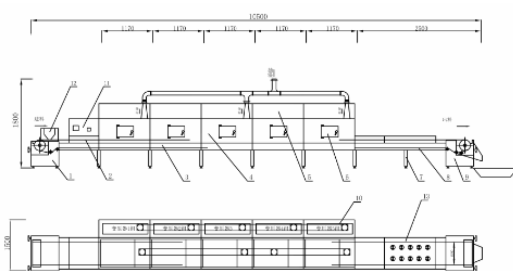
1. Equipment effect at once, power adjustable, transmission speed adjustable, no thermal inertia residues, compare with the conventional process equipment to save energy by 50%.
2. Make the material itself become body heat source state, no need heat transfer process, can achieve the drying temperature within a very short time.
3. Microwave uniform heat up the material inside and outside because of the strong penetrability, will not appear outside dry but inside wet.
4. Microwave can fast sterilization under low temperature sterilization, material store for a long time will not mildew.
5. Due to the fast drying speed microwave drying maximum save the activity of the materials, nutrition ingredient and the original color.
6. Microwave leakage control in metal drying chamber and the waveguide, no radiation damage and harmful gas emissions, not produce waste heat and dust pollution, microwave drying is efficient, economic and environmental.



NV-series Vacuum Microwave Dryer

- Vacuum drying pressure -97Kpa or 40mbar, drying temperature use 40°C to 65°C, every drying batch is 3 to 4 hours
- Vacuum drying system included vacuum chamber, water cooling tower, condenser, vacuum pump and water chiller
- Low temperature vacuum drying maximum save the activity of the materials, nutrition ingredient and original color
- Compare to freeze dryer, dried material quality is similar but energy and time is much less then freeze dryer
- Whole drying machine use famous international brand spare parts, suit to CE and UL quality standard
- Drying machine use rotate and moveable drying structure, make sure drying material is average drying
- Auto finish drying process by Siemens PLC and touch screen program, operate language can be local language
- Drying machine installed remote control system for after sales maintenance

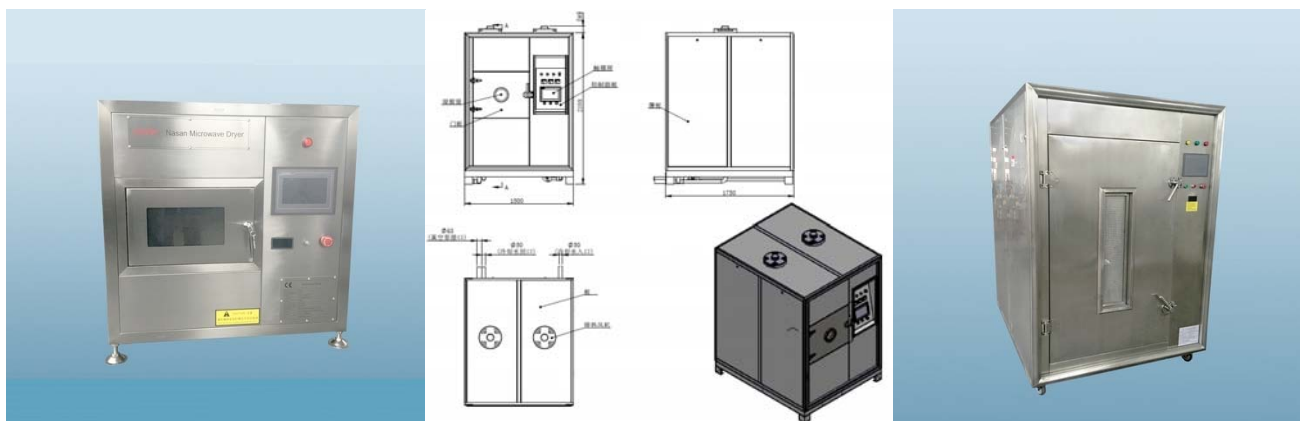
Model	Unit	NV-6	NV-18	NV-36	NV-48	NV-60	NV-72	NV-90	NV-156	NV-252
Microwave Power	KW	6	18	36	48	60	72	90	156	252
Max Water Vaporize	Kg/h	6.6	19.8	39.6	52.8	66.0	79.2	99.0	171.6	277.2
Voltage	V	110-440	110-440	110-440	110-440	110-440	110-440	110-440	110-440	110-440
Frequency	HZ	50/60	50/60	50/60	50/60	50/60	50/60	50/60	50/60	50/60
Magnetron Control	KW	±1	±1	±1	±1	±1	±1	±1	±1	±1
Frequency Converter	%	25-100	25-100	25-100	25-100	25-100	25-100	25-100	25-100	25-100
Temperature Control	°C	±1	±1	±1	±1	±1	±1	±1	±1	±1
Drying Temperature	°C	40-65	40-65	40-65	40-65	40-65	40-65	40-65	40-65	40-65
Drying Period	h	3-4	3-4	3-4	3-4	3-4	3-4	3-4	3-4	3-4
Vacuum Degree	mbar	40	40	40	40	40	40	40	40	40
Microwave Leakage	mw/cm ²	≤1	≤1	≤1	≤1	≤1	≤1	≤1	≤1	≤1
Working Condition	°C	-5-45	-5-45	-5-45	-5-45	-5-45	-5-45	-5-45	-5-45	-5-45
Working Humidity	%	≤80	≤80	≤80	≤80	≤80	≤80	≤80	≤80	≤80
Machine Length	mm	1700	2700	4500	4500	4500	6600	6600	9600	12500
Machine Depth	mm	1740	1860	1860	2120	2120	2120	2120	2250	2250
Machine Height	mm	2080	2240	2240	2560	2560	2560	2560	2440	2440
Machine Weight	Kg	2400	3000	4500	5500	5800	7500	7800	9600	11800



NT-series Tunnel Microwave Dryer

- Atmospheric pressure drying by temperature 70°C to 120°C, drying time depend on machine drying power
- Continue drying model for high efficiency operate, could connect to feed and discharge system
- Conveyor belt and be included holes or no holes, conveyor speed could be adjust too
- Tunnel dryer system included dry chamber parts and water cooling tower
- Machine could do sterilize to kill the insert and bacteria, temperate use 60°C to 90°C, time 3 to 8 minutes
- Whole drying machine use famous international brand spare parts, suit to CE and UL quality standard
- Auto finish drying process by Siemens PLC and touch screen program, operate language can be local language
- Drying machine installed remote control system for after sales maintenance
- Could add on hot air drying chamber, infrared drying chamber and dehumidifier chamber to get bigger quantity drying

Model	Unit	NT-18	NT-36	NT-48	NT-60	NT-90	NT-120	NT-150	NT-200	NT-360
Microwave power	KW	18	36	48	60	90	120	150	200	360
Max Water Vaporize	Kg/h	18.9	37.8	50.4	63.0	94.5	126.0	157.5	210.0	378.0
Voltage	V	110-440	110-440	110-440	110-440	110-440	110-440	110-440	110-440	110-440
Frequency	HZ	50/60	50/60	50/60	50/60	50/60	50/60	50/60	50/60	50/60
Magnetron Control	KW	±1	±1	±1	±1	±1	±1	±1	±1	±1
Temperature Control	°C	±1	≤±1	≤±1	≤±1	≤±1	≤±1	≤±1	≤±1	≤±1
Drying Temperature	°C	70-120	70-120	70-120	70-120	70-120	70-120	70-120	70-120	70-120
Microwave Leakage	mw/cm ²	≤1	≤1	≤1	≤1	≤1	≤1	≤1	≤1	≤1
Feeding Height	mm	60-990	60-990	60-990	60-990	60-990	60-990	60-990	60-990	60-990
Transport Speed	M/min	0.1-30	0.1-30	0.1-30	0.1-30	0.1-30	0.1-30	0.1-30	0.1-30	0.1-30
Working Condition	°C	-5-45	-5-45	-5-45	-5-45	-5-45	-5-45	-5-45	-5-45	-5-45
Working Humidity	%	≤80	≤80	≤80	≤80	≤80	≤80	≤80	≤80	≤80
Drying Chamber	pcs	3	5	6	8	9	10	12	16	24
Conveyor Belt Width	mm	800	1000	1000	1200	1200	1400	1400	1600	1800
Machine Width	mm	1460	1680	1680	1860	1860	2060	2060	2180	2260
Machine Height	mm	1820	1820	1820	1820	1820	1820	1820	1820	1820
Machine Length	Kg	7700	9900	11000	13200	14300	15400	17600	22000	30800
Machine Weight	Kg	1800	2800	3200	4800	5600	6500	7800	9600	11800



NB-series Box Microwave Dryer

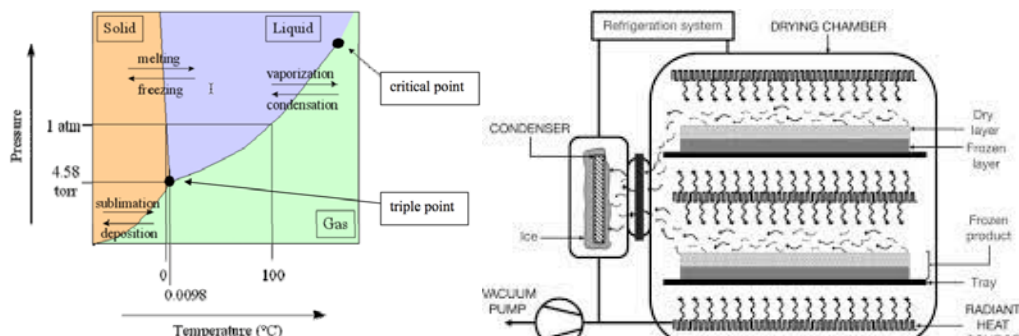
- Atmospheric pressure drying by temperature 70°C to 120°C, drying time depend on machine drying power
- Could be small scale model for laboratory to do microwave research
- Could be higher microwave power design for high temperature 1500°C sintering
- Machine could do sterilize to kill the insert and bacteria, temperate use 60°C to 90°C, time 3 to 8 minutes
- Whole drying machine use famous international brand spare parts, suit to CE and UL quality standard
- Auto finish drying process by Siemens PLC and touch screen program, operate language can be local language
- Drying machine installed remote control system for after sales maintenance
- Could add on hot air drying chamber, infrared drying chamber and dehumidifier chamber to get bigger quantity drying

Model	Unit	NB-3	NB-6	NB-18	NB-24	NB-36	NB-48	NB-60	NB-90	NB-120
Microwave Power	KW	3	6	18	24	36	48	60	90	120
Max Water Vaporize	Kg/h	3.2	6.3	18.9	25.2	37.8	50.4	63.0	94.5	126.0
Voltage	V	110-440	110-440	110-440	110-440	110-440	110-440	110-440	110-440	110-440
Frequency	HZ	50/60	50/60	50/60	50/60	50/60	50/60	50/60	50/60	50/60
Magnetron Control	KW	≤±1	≤±1	≤±1	≤±1	≤±1	≤±1	≤±1	≤±1	≤±1
Frequency Converter	%	25-100	25-100	25-100	25-100	25-100	25-100	25-100	25-100	25-100
Temperature Control	°C	≤±1	≤±1	≤±1	≤±1	≤±1	≤±1	≤±1	≤±1	≤±1
Drying Temperature	°C	70-200	70-200	70-200	70-200	70-200	70-200	70-200	70-200	70-200
Drying Period	h	2-4	2-4	2-4	2-4	2-4	2-4	2-4	2-4	2-4
Microwave Leakage	mw/cm ²	≤1	≤1	≤1	≤1	≤1	≤1	≤1	≤1	≤1
Working Condition	°C	-5-45	-5-45	-5-45	-5-45	-5-45	-5-45	-5-45	-5-45	-5-45
Working Humidity	%	≤80	≤80	≤80	≤80	≤80	≤80	≤80	≤80	≤80
Machine Length	mm	1150	1350	2150	2150	4200	4200	4200	5600	6300
Machine Depth	mm	1000	1500	2100	2100	2100	2100	2800	5800	2800
Machine Height	mm	1500	1860	2300	2300	2300	2300	2600	2600	2600
Machine Weight	Kg	300	500	900	1000	1600	1800	2400	2800	3200

Part 2. Dryer with freeze drying technology

According to physics, water has three phases, O point is the common point of the three phases, and OA is the melting point of ice. According to the principle of pressure reduction and boiling point reduction, as long as the pressure is below the triple point pressure, the moisture in the material can be directly sublimated from water to water vapor without passing through the liquid phase. According to this principle, the wet raw material of the food can be first frozen to below freezing point, so that the moisture in the raw material becomes solid ice, and then in a suitable vacuum environment, the ice can be directly converted into steam and removed, and then used in the vacuum system. The water vapor condenser will condense the water vapor, so that the material can be dried. This method of obtaining drying by vacuum freezing is the process of changing and moving the physical state of water. This process occurs at low temperature and low pressure. Freeze drying works by freezing the material, then reducing the pressure and adding heat to allow the frozen water in the material to change directly to a vapor

Primary applications of freeze drying include biological, biomedical, food processing and preservation.



● Freeze

First, the material to be freeze-dried is cooled to about 0-2 °C with cooling equipment, and then placed in a freeze-drying box. Close the drying box, and quickly enter the refrigeration to completely freeze the product, and then the sublimation can be carried out.

● Sublimation

The sublimation of the product is carried out under a high vacuum, and during the pressure reduction process, the frozen state of the items in the box must be maintained. After the pressure in the box drops to a certain level, turn on the Roots vacuum pump (or vacuum diffusion pump), the pressure drops to 1.33Pa, and when the temperature is below minus 60°C, the ice begins to sublime, and the sublimated water vapor forms in the condenser. ice crystals. In order to ensure the sublimation of the ice, the heating system should be turned on to heat the shelf to continuously supply the heat required for the sublimation of the ice.

● Re-dry

In the sublimation stage, the ice sublimates a lot. At this time, the temperature of the product should not exceed the minimum eutectic point, so as to prevent the product from being stiff or the appearance of the product being damaged. The shelf temperature is usually controlled within $\pm 10^{\circ}\text{C}$ during this stage. The moisture removed in the re-drying stage of the product is the combined moisture. At this time, the water vapor pressure of the solid surface decreases to different degrees, and the drying speed decreases significantly. On the premise of ensuring product quality, the temperature of the shelf should be appropriately increased at this stage to facilitate the evaporation of water. Generally, the shelf is heated to 30-35. C. The actual operation should be carried out according to the freeze-drying curve of the product until the temperature of the product coincides with the temperature of the shelf to dry.

● Freeze Drying Advantages:

- To maximize the preservation of the color, aroma and taste of food, such as the natural pigment of vegetables remains unchanged, the loss of various aromatic substances can be reduced to a minimum
- It is especially suitable for heat-sensitive substances, which can keep heat-sensitive components after drying the heat-sensitive materials, and can preserve various nutrients in food, such as vitamin C, can preserve more than 90%.
- Under vacuum and low temperature operation, growth of microorganisms and action of enzymes are inhibited.
- Thorough dehydration, dried product light in small volume, occupy less space and convenient to transport or storage
- Shape is well preserved, the rehydration is fast, easy to absorb water to restore original state, and convenient to eat
- Drying under vacuum with very little oxygen, easily oxidized substances (such as oils and fats) are protected.
- The freeze-drying method can remove more than 95% to 99% of the moisture, and the product can be stored for a long time without deterioration.



NLL-series Minitype Laboratory Freeze Dryer

- Patented products with advanced technology.
- The products are beautiful and fashionable and the dimension is small.
- Operate on touch screen, one key start and automatically control freeze-drying process, easy and convenient operation.
- Set and real-timely adjust freeze-drying technology by requirement and show the freeze-drying data and curve.
- The imported key components are characterized by low noise, great power, high quality and high performance.
- Advanced system, small running current and low energy consumption.
- Dish and inner tank are made of SUS304 stainless steel, which guarantees the safety of product.
- Fast defrosting technique and automatic protection for overheat.
- The transparent organic glass door is helpful in observing the freeze-drying process of materials.

Model	Unit	NLL-1	NLL-4	NLL-6	NLS-2	NLS-3	NLS-5	NLS-10
Lyophilize Area	M ²	0.1	0.4	0.6	0.2	0.3	0.5	1.0
Load Capacity	Kg	1	3-4	5-6	1-2	2-3	4-5	9-10
Voltage	V	220	220	220	220	220	220	220
Frequency	HZ	50	50	50	50	50	50	50
Power	W	1000	1550	2000	4.5	5.5	6.5	8
Cold Trap Temperature	°C	-40	-40	-40	-70	-70	-70	-70
Ultimate Vacuum	Pa	10	10	10	5	5	5	5
Shelf Spacing	Mm	45	45	70	70	70	70	70
Tray Dimension	Mm	145*275	195*445	345*425	280*380	280-380	360*480	360*480
Tray Layer	Layer	3	4	4	2+1	3+1	3+1	6+1
Shelf Quantity	Pcs	3	4	4	2+1	3+1	3+1	6+1
Shelf Temperature	°C	-35~70	-35~70	-35~70	-50~80	-50~80	-50~80	-50~80
Temperature Difference	°C	±1	±1	±1	±1	±1	±1	±1
Machine Length	Mm	550	600	770	780	780	780	1000
Machine Depth	Mm	750	800	810	1350	1500	1500	1750
Machine Height	Mm	830	870	1200	1700	1700	1700	1900
Machine Weight	Kg	50	80	120	300	450	500	800



NLF-series Food Freeze Dryer

- Freeze-drying box and shelf made with GMP standards, chamber made of 304SS, the interior is mirror-polished
- Integrated design for chamber and cold trap, with observation window, structure easy to clean without dead angle
- Shelf can be customized built, 304SS plate is made of brushed square steel surface, flat and easy to clean
- Cold trap water capture coil made of stainless steel, integral structure or split structure can be optional
- Refrigeration system use famous brand components, better refrigeration capacity and faster cooling speed
- Vacuum system can provide a combination of multi-purpose vacuum pump sets according to customer requirements
- Using OMRON PLC control manual or automatic, diversified control modes and diversified process procedures
- Use soaking or steam defrosting, quick defrosting, high efficiency and clean process
- With pre-freezing function, no need pre-freezing warehouse to avoid liquefaction and pollution during movement
- With process adjustment and curve temperature control, can be adjusted to requirements of different materials

Model	Unit	NLF-5	NLF-10	NLF-20	NLF-30	NLF-50	NLF-100	NLF-200	NLF-300
Lyophilize Area	M ²	5	10	20	30	50	100	200	300
Drying Capacity	Kg	50	100	200	300	500	1000	2000	3000
Voltage	V	110-440	110-440	110-440	110-440	110-440	110-440	110-440	110-440
Frequency	HZ	50/60	50/60	50/60	50/60	50/60	50/60	50/60	50/60
Power	Kw	40	63	90	125	150	290	570	750
Ultimate Vacuum	Pa	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7
Shelf Size	Cm	100-100-2	150-100-2	200-100-2	214-54-2	310-54-2	608-54-2	1216-54-2	912-54-2
Shelf Quantity	Pcs	5+1	7+1	10+1	(13+1)*2	(15+1)*2	(15+1)*2	(15+1)*2	(15+1)*2*2
Shelf Distance	Mm	65	65	70	77	77	77	77	77
Tray Size	Mm	495-495-30	495-495-30	495-495-30	620-540-35	620-540-35	620-540-35	620-540-35	620-540-35
Tray Quantity	Pcs	20	42	80	60	120	240	480	720
Trolley Quantity	Pcs	/	/	/	1	2	4	8	12
Catcher Capacity	Kg	100	200	400	600	800	1500	3000	4500
Shelf Temperature	°C	-45~80	-45~80	-45~80	-45~80	-45~80	-45~80	-45~80	-45~80
Catcher Temperature	°C	65	65	65	65	65	65	65	65
Dicing Water	Kg	400	1000	2000	3000	4000	8000	15000	20000
Cooling Water	m3/h	20.7	29.3	40.6	52.5	55.3	110.7	206.1	137.3*2
Electric heat	Kw	9	16	24	12*3	16*	24*4	32*6	48*6
Air Consumption	L/M	60	60	60	60	80	120	160	160
Machine Length	Mm	4500	6300	7600	7000	9100	16000	29000	44000
Machine Width	Mm	2100	2100	2100	2500	2500	2500	2500	2500
Machine Height	Mm	3600	3600	3600	3600	3600	3600	3600	3600
Machine Weight	Kg	5000	6500	7500	10000	14000	20000	36000	60000



NLF-series Pharmacy Freeze Dryer

- Meet the cGMP standard, the material of the chamber is AISI304 or AISI316L
- Inner chamber use round corner design, make the chamber easy to access and reduce dead corners
- Internal welding of the chamber is smooth treated, shelf material is heated evenly during the manufacture, avoiding welding stress and ensuring the flatness of the shelf
- Heat transfer medium uses low-viscosity silicone oil, temperature uniformity is good at the extreme low temperature
- Main unit parts use famous international brand spare to ensure the quality of the equipment
- Using OMRON PLC control system, the control mode and process program are diversified, included the functions of authority management and traceability
- Can provide 4Q certification documents, provide comprehensive training and services

Model	Unit	NLP-1	NLP-3	NLP-5	NLP-10	NLP-15	NLP-20	NLP-30	NLP-40
Lyophilize Area	M ²	5	10	20	30	50	100	200	300
Voltage	V	380	380	380	380	380	380	380	380
Frequency	HZ	50	50	50	50	50	50	50	50
Power	Kw	15	30	36	72	72	101	139	205
Liquid Volume	L	20	65	100	220	300	400	600	850
Φ16mm Bottle Capacity	Pcs	3900	15000	21000	46400	60000	83000	120000	168000
Φ22mm Bottle Capacity	Pcs	2000	7500	10500	23700	30500	42000	60000	8200
Shelf Width	Mm	450	600	900	915	1200	1200	1495	1495
Shelf Depth	Mm	600	900	1200	1215	1200	1495	1800	2000
Shelf Quantity	Pcs	4+1	6+1	5+1	9+1	10+1	11+1	11+1	14+1
Shelf Distance	Pcs	100	100	100	100	100	100	100	100
Shelf Temperature	°C	-55~80	-55~80	-55~80	-55~80	-55~80	-55~80	-55~80	-55~80
Catcher Temperature	°C	-75	-75	-75	-75	-75	-75	-75	-75
Catcher Capacity	Kg	20	65	100	220	300	400	600	850
Ultimate Vacuum	Pa	1	1	1	1	1	1	1	1
System Leakage	Pa.m ³ /s	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.025
Machine Length	Mm	2100	4500	5300	5800	5600	7500	8000	9000
Machine Width	Mm	1200	1800	2000	2500	2200	2350	2720	3000
Machine Height	Mm	2500	3300	3050	3400	3700	4200	4300	4600
Machine Weight	Kg	1200	5500	6000	10500	11500	16000	22000	26000

Part 3- Material dried photo and customers for reference



Lemon Drying



Graphene Drying



Food Drying



Rose Drying



Sea cucumber Drying



Fish Drying



Protease (polypeptide) drying



Insect Drying



Blood Drying



Powder material Drying



Two set 50m2 Food factory



20m2 Small Food factory



200m2 Big Food factory



150m2 Food factory with trolley



Probiotics Pharmacy Factory



Strawberry Drying



Banana Drying



Pineapple Drying



Fragrans Drying



Rose Drying



Beef Drying



Wood Drying



Paper pipe Drying



Chemical material drying



Broccoli Drying



Onion Drying



Chemical Powder Drying



France customer factory



Sweden customer factory



Spain customer factory

Shanghai Nasan Industry Co., Ltd.