Centrifugal Atomizer Type Spray Dryer

LPG Siries

Instruction manual

CHANGZHOU KODI MACHINERY CO., LTD

General Introducing

Thank you for using LPG series Centrifugal Spray Dryer produced by Changzhou Kodi Machinery Co., Ltd, the products are strictly in accordance with corporate standards 《LPG Centrifugal Spray Drier》 to organize this production.

Before you install and use, please read this manual carefully. If you do not comply with the instructions in this manual, personal injury caused by damage to the machine and other property damage we will not accept any responsibility. For any questions, please contact us, we will promptly enthusiasm for your service.

This manual is intended primarily for LPG series structural characteristics of centrifugal spray dryer, how it works, installation and commissioning, operation and maintenance, fault analysis and removal and transportation and storage making a statement. Material reports about contact with the material part, the main devices (such as PLC controller, touch screen, etc.), and other technical information will be of randomly attached (text) pieces way we provide you.

This manual applies to LPG-5 series to LPG-6500 series centrifugal spray dryer is also applicable to ZLPG series centrifugal spray dryer. The other specifications of this series and user special customized similar products of other specifications also reference use.

If product appearance diagram or other diagram or menu screen in this manual are different with the actual product, please take the actual product as the standard in use.

Under the premise of user to comply with the maintenance and use rules, within 12 months of the date of commissioning and acceptance, as indeed for reasons of product manufacturing affect the use, enterprise could provide free repair and replacement.

The company's product technical parameters will continue to update and innovation, product manual also changed. All updates in the future without notice.

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0 Key prompts

0.1 Security warning listed in Table 0.1 will appear in different places in this manual, please be sure to pay attention to.

Table 0.1 Security and warning prompts

	Shock Hazard , could result in death or serious injury
	The risk of mechanical injury, could result in death or serious injury
	Fall risk, could result in serious injury or death
	Hazard warning, may cause injury
	Could lead to equipment failure or unexpected shutdown
	Operation prompts useful information
	Non-maintenance state, prohibited touch, or could cause injury

0.2 To comply with the provisions of this manual is to protect your personal and property safety, equipment quality assurance and the normal operation of the premise.

0.3 This manual provides LPG centrifugal spray drier proper installation, use and maintenance, please near the equipment installation location for safekeeping.

1 Safety instructions

The following safety instructions involving LPG centrifugal spray dryer’s transportation and storage, Installation and commissioning, use and maintenance, ignore these instructions, may cause personal injury or property (equipment / materials / property) losses.

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Please pay attention to the complementary safety instructions in each chapter in this manual.

1.0 Outline

Equipment runtime: live parts, moving parts, heating parts;

Equipment downtime: live parts.

The non-trained professionals cannot do the following:

— Transport

— Storage

— Installation / assembly

— Use

— Maintenance

Before these operations, please read the following documents carefully:

— The diagrams in this manual

— Other random files

— Signs of equipment

— Special requirements concerning equipment

— State/ Local regulations on safety and accident prevention

The following scenarios can cause serious personal injury and material damage:

— Incorrect handling

— Incorrect installation

— Incorrect use or operation

— To arbitrarily demolish necessary safety protection devices

1.1 Transport and storage

— Confirm product protection during transport, please immediately check box is intact after receipt, if damaged, please immediately notify the transport unit and the company which is the premise of this product's claim during transport.

— Strict compliance with the instructions of the relevant product transport, otherwise it could lead to personal injury or damage to the equipment.

— Equipment stored for a long-term storage in accordance with this manual "long-term storage" requirement. .

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1.2 Installation and Commissioning

— Please read the installation instructions in this manual.

— Installation and commissioning of the equipment should be carried out by the agent of the Company or the Company professionals, above officers arrived at the scene before, do not disassemble the box, this is one of the prerequisites of the product claims.

— Any abnormal phenomena (such as vibration, sharp noise, ultra-range temperature rise) in the commissioning process, you should immediately stop check until you find out why and to exclude.

1.3 Use and maintenance

— There are live parts, rotating parts, linear reciprocating parts, and the under negative pressure parts during use of equipment, please endeavor to comply the provisions of this manual, avoid the use of the process caused by electric shock injury or mechanical damage.

— Any abnormal phenomena (such as vibration, sharp noise, ultra-range temperature rise) During operation, you should immediately stop check until you find out why and to exclude, if necessary, please contact the company.

— Equipment cleaning process may involve live parts, chemical liquids or high temperature liquid, please endeavor to comply the provisions of this manual, in order to avoid an electric shock, touch (hit) hurt or fall injuries.

2 Equipment overview

2.0 Outline

LPG series high-speed centrifugal spray dryer is a new efficient dry process equipment. After spray drying, it could make solution, emulsion, suspension, paste liquid, and other materials to become the products of a dry powder, fine particles or medium particles. It has the advantage of fast, high efficiency, less process, the provincial human. Especially for heat-sensitive materials, the equipment can keep the material's color, smell and taste. Dried products will keep good quality, liquidity, good solubility, high purity and sanitation. It also help to improve yields and get good economic benefits. In the chemical industry, light industry, building materials, food, forest chemical products, drug, biochemistry industries, it has a bright future.

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2.1 Product characteristics

2.1.1 Structural features

——Product structure

1、Fast drying. After centrifugal spray, the surface area greatly of the materials increases, 95% ~ 98% of the water is evaporated in a high temperature gas stream instantaneously, and the completion of the drying time just need a few seconds.

2、By co-current spray-dried form, it make the flow of the droplet and the hot air in the same direction, although the high temperature of the hot air, hot air entering the drying chamber immediately after contact with the droplets, temperature inside the tower decreased rapidly, does not result in the excessive heat of the dry material, thus particularly suitable for drying heat sensitive materials.

3、Widely using. According to the characteristics of the material, can be used hot air drying, granulation can also be used cold air. A large number of very different characteristics also can be used for this equipment. Commonly used are: Polymers and resins, dyes, pigments, ceramics, glass, herbicides, insecticides class, carbohydrates, the milk egg products, tannins, the slaughterhouse by-products, blood and blood products, detergents and fertilizers, organic compounds, inorganic compounds, instant food, medicines, and the like.

4、Because the drying process is completed in an instant, the particles of the product remains substantially the droplet nearly spherical, and has a good dispersibility, flow-ability and solubility.

5、The production process is simplified operation and convenient control. The spray-drying is generally applicable to a moisture content of 40 to 60% solution, even if the special materials which content of solution up to 90% also can be dried into a powdery product. After drying, most of the product is not necessary to further crushing and screening to reduce the production processes, simplifying the production process and improve the quality of the product. For the particle size of the product, the bulk density, moisture, within a certain range can change the operating conditions to adjust the control. Management is very convenient

6、The material is not contaminated and to extend the life of equipment. Where material

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contact parts are all made of stainless steel. For the ease of operation, the control system take the integrated operation.

—Working Principle

After the air passes through the filter and the heating device, into the top of the hot air distributor of the drying chamber, the hot air through the hot air distributor spirally evenly into the drying chamber, while the feed liquid conveyed by the feed pump is mounted at the top of the drying chamber of the centrifugal atomizer. The feed solution is dispersed into tiny spray of droplets, the liquid material, and hot-air contact surface area greatly increased. In a very short period of time the rapid evaporation of water is dried for powdered or granular products, and small droplets and hot air flows sinking, from the base of the tower by trapping a two - stage Cyclone Separator, exhaust gas by the fan exhaust to the outside world.

2.1.2 Control mode：

—Common control (button control) or PLC man-machine interface control;

—Temperature control;

—Work program and process parameter storage memory and with print function (according to customer requirements);

2.1.3 Feeding methods:

—Peristaltic pump Morrow pump, screw pump;

2.1.4 Cleaning methods:

—Manual cleaning or CIP cleaning (according to customer requirements);

2.2 Product main use and field of application:

—Pharmacy

—Chemical

—Electronic

—Food

2.3 Product specifications and its significance

LPG Series Centrifugal Spray Dryer of the Company is the general term for the product, it has different kinds of specifications according to the productivity. And the product model is prepared from Chinese Language, its meaning is as follows:

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2.4 Applicable environmental and working conditions

2.4.1 Work environment

a) Ambient temperature: normal work environment air temperature at 5 ° C-40 ° C;

b) Humidity: When the ambient temperature is 40 ℃, the relative humidity of the work environment does not exceed 50%, to allow greater humidity lower temperature (such as the ambient temperature is 20 ℃, the relative humidity of the work environment does not exceed 90%).

c) Atmospheric pressure: 86kpa ~ 106kpa.

2.4.2 Working condition

a) Power conditions: AC 380V/60Hz , according to QGP condition

b) Electric heating: voltage 220V electric heating tube 2 ~ 3kw / piece

2.5 Environmental Impact

2.5.1 Machine running noise is less than 78dB (A), meet the requirements of GMP equipment;

2.5.2 For cleaning dirty liquid emissions, please observe the relevant provisions of national and local government ;

2.5.3 Equipment scrapping

Equipment after years of use will be scrapped, scrap materials processing to comply with local laws. Some part of the equipment can be recycled its residual value, such as:

—— The carbon steel such as Frame, motor housing, reducer shell, gear, shaft and bearing can be used as scrap iron;

——Stainless steel parts of equipment can be used as scrap stainless steel;

——Motor coils can be used as scrap copper;

——Other plastic shell can be used as waste plastic.

3 Structural characteristics and working principle

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The showing pictures bellow are only for refference, not the exact model.

As 3-1a, the centrifugal atomizer sketch,3-1b for LPG centrifugal spray dryer system, the filter unit, the blower unit, the heating unit, the spray drying tower, cyclone unit, and the air cooling unit, exhaust unit, wet scrubber unit (meet environmental requirements), and electrical control unit.

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Figure 3-1a centrifugal spray atomizer

1、 Drive motor 2.Feed imports 3.gearbox 4.cooling oil pump 5.housing 6.shaft 7.atomizing disk

4 Dimensions and main technical parameters:

4.1 Dimensions sketch and major size (Only for reference. Please read your attached drawing for find the correct dimensions)

\

Figure 4-1 Dimensions sketch

i	Figure 4-1 is Dimensions of LPG-25 centrifugal spray dryer

4.2 Main technical parameters (Table 4.1)

Table 4.1 Main technical parameters

Model \Parameter / Items	LPG							
	5	25	50	100	150	200	500	1000
Inlet temperature (℃)	140-350							

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Outlet temperature (℃)	70-90							
Spray form	High-speed centrifugal atomizer (mechanical or inverter control)							
Water evaporation (kg / h)	3-7	18-25	35-50	75-100	120-150	170-210	400-500	800-1000
Atomizer drive mode	Compressed air	Electric Drive	Electric Drive	Electric Drive	Electric Drive	Electric Drive	Electric Drive	Electric Drive
Speed (r / min)	25000	18000-27000	18000-27000	18000-27000	15000-18000	15000-18000	12000-15000	12000-15000
Heat source	Electricity	Electricity	Steam + electricity	Steam + electricity	Steam + electricity	Steam + electricity	Steam + electricity	Steam + electricity
Drive power (kw)	4.2	14	18	23	29	43	76	109
Heating power (kw)	18	36	48	72	84	96	144	
Tower diameter (m)	1.2	1.9	2.2	2.56	2.96	3.36	5.2	7.6
Height (m)	2.2	3.6	4.6	5.4	6.3	7	9.2	12.4
Compressed air consumption (m^3 / min)	0.6～0.9							
Covering length (m)	1.6	4	4.5	5.2	7	7.5	12.5	14.5
Covering width(m)	1.1	2.7	2.8	3.5	5.5	6	8	14
Note: The above data is for reference only. The water evaporation is related to temperature, product ,water content ETC.								

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5 Installation and Commissioning

Installation and commissioning should be careful, and must avoid:

①Fall from height! ②Electric shock! ③Using incomplete and not matching tools!

5.1 Equipment installation

5.1.1 Equipment foundation

LPG centrifugal spray drier base support must be based on Solid, smooth concrete ground or floor, or steel platform / steel frame. The degree of the base level to require no more than 2/1000.

5.1.2 Installation plans diagram

i	Figure 5-1 shows the scene of the actual installation of LPG Centrifugal spray drier layout, other product specifications please read your attached drawing of purchasing machine.

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5.1.3 Installation technical requirements:

a) Install according to the direction of drawing design.

b) All of anchor should be steady with the ground, after adjust the balance degree should be 2/1000;

c) Anchor bolts and host connection should be stable and reliable, and Ground part should be stable.

d) Provide some waste water channels around the equipment, for equipment cleaning.

5.1.4 Installation

5.1.4.1 The main machine Installation

5.1.4.1.1 The place where Install the host should be smooth, the surface flatness requirements error is ± 2mm; wide space, space height should be easy for installation.

5.1.4.1.2 The machine should be installed away from the wall space as 1mx1m, easy for maintenance, other place should be same.

1	Before the machine arrive, customers should prepare the ground according for easy equipment installation and fixed.

5.1.5 Installation procedures and installation of quality requirements

— According to layout diagram, first drying machine is in place, then connect machine and pipes of the heating unit, and put the heater in place;

— According to Equipment layout diagram, place the and wet scrubber in the pre-set position of the factory, and connect pipeline between them.

— Connect the pipelines with blower and air filter. While connecting the piping between wet scrubber and draft fan;

— Correct the vertical of drying machine and the ground..

— The feeder is in place, and connected with the drying machine.

— Each pipe connected and with gasket.

— Fix every connecting fasteners, until the no loose;

— Connect electric cabinet lines, (the wires should wear a tube or with box)

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5.2 Installation Notes

5.2.1 Installation and commissioning of the equipment should be supervised by KODI engineers.

5.2.2 Installation site is the equipment work site, please check the rules of 2.4.1

5.2.3 Before installing the equipment, please make sure on-site public services (water, electricity, gas, vacuum, etc.) to meet the technical requirements (see Table 4.1) and 2.4.2 requirements

5.2.4 Handling during the installation, please refer to Chapter 9 “Handling and storage”

5.3 Commissioning

	During commissioning period, all safety devices are stopped, So please be careful handling.

5.3.1 Checks before commissioning

Table 5.1 Checking items before commissioning

Check items	Requirements	Methods
System grounding	Grounding and protection grounding resistance less than 4Ω	Ohmmeter test
All the installation and connection	Stable and reliable	Tools to test
Gearbox oil	Added	Visual
Power on	380±10V/60Hz	By certified electrician
Natural gas on	Comply with the requirements of 2.4.2 and Table 4.1	Visual barometer value
Equipment work area	No dangerous	

5.3.2 Electrical system commissioning (PLC touch screen control, for example)

5.3.2.1 The reliability of the emergency stop switch

a) Release the emergency stop switch, and turn the power switch (key switch) in the ON position, the touch screen shows (Emergency stop). it means that effective emergency stop switch is working correctly. otherwise, should be corrected.

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Figure 5-9

b) Sensor commissioning (temperature Sensor)

The system set up the three temperature sensors respectively to detect the temperature of the inlet air, outlet air temperature and drying temperature of chamber.

5.3.2.2 System commissioning

➢ Fan turning commissioning

The fan is normally working that fan axial direction of rotation and fan rotary direction. Commissioning in the manual operation screen (PLC touch screen) click "blower fan start" or "induced draft fan start" to observe the fan turning.

➢ Screw pump, atomizer, rotary motor commissioning

—— Screw pump feeding motor direction of rotation is clockwise rotation, If the reverse rotation, it should be swapping any two fan power cord;

—— Atomizer motor direction of rotation is clockwise rotation, If the reverse rotation, it also swap any two fan power cord through the inverter regulation;

—— Rotary valve direction clockwise rotation, If the reverse rotation, it should be swapping any two fan power cord.

➢ shaking air-hammer commissioning

—— Connect compressed air supply, turn the total valve

—— Set number of times per minute shaking,

—— The normal working should be after shaking ,stop automatically. And repeat.

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5.4 No-load test run

After the completion of system commissioning, No-load test run should be done, no-load running time should not be less than 30 minutes.

The no-load test run is divided into manual test and automatic test run, please read Chapter 6《equipment operation instructions》 of this manual.

5.5 Acceptance test item, method and criteria after Installation and commissioning

Table 5.2 Acceptance test project, method and criteria

Items	Requirements	Test methods	Remarks
General situation	Meet the engineering design requirements	check engineering design charts	
Flatness	≤2/1000	frame level gauge	
Foot	Reliable connection, no loose	Sense	
Three-phase power	Access the correct phase sequence	Visual motor direction	
Electrical system	The connected electrical resistance ≤ 4Ω	Testing with a multi meter	
	Emergency stop switch effective and reliable	Manual, visual	
	The sensor effective, reliable	Manual, visual	
System Commissioning	See 5.3.2.2c description	Manual, visual	
No-load test	The spray dryer running without problem	Sense	
	Noise	≤75dB	
Workshop	On-site clean	Visual	

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6 Operation of the equipment

The chapter list of all functions of the operation of LPG centrifugal spray dryer, Every user will have some difference. In order to maintain the efficiency and service life of the equipment, it is recommended by frequency of use of equipment in 8hours each working trun.

The instructions in this manual can be used as a reference document preparation equipment operating procedures.

6.1 Equipment inspection and preparation before starting

Table 6.1 Equipment inspection and preparation before starting

Items	Requirements	Remarks
Power on	According to power conditions	Reset the emergency stop switch
Natural gas on	Gas source to comply with 2.4.2 and Table 4.1 requirements	
Liquid product prepared	Table 4.1 requires ready	Screw pump or Morrow pump,
The work site	Neat and orderly	

6.2 Equipment start-up and operating procedures, methods

—— Before the no-load test, it should add the butter on the Lubrication system, lubrication part of the main machine should increase resistance to high temperature butter(The high-temperature butter brands is ZFG-4 composite calcium-based grease)

—— No-load test 30min, and then check the pipe flange joints fastening no loose seal without leakage, air leakage;

—— Transmission system no jamming, no abnormal sound;

—— Fan running smoothly, no abnormal vibration, safety protection device is firmly installed.

6.3 Centrifugal spray dryer actual operating procedures (example for gas heating)

1. The boot steps (Ordinary control, for example)

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1-1.Set temperature of inlet air at the temperature meter, light the gas burner;

1-2.Switch on the draft fan button, and turn on the blower same time;

1-3.Warm up for about 30-60 minutes, reaching the setting inlet temperature

1-4.Turn on the atomizer (Generally the highest Hertz our company set is 50HZ), Meanwhile turn on cooling pump and the cooling water valve ,the interlock control;

1-5.Turn on the rotary valve;

1-6.Turn on the wet scrubber;

1-7.Prepare the liquid product

1-8.Turn on the Morrow pump or screw pumps (frequency control), and set in good feeding speed;

1-9.Turn on air hammer, set parameters

1-10.Turn on the powder collecting system.

1-11.Start feeding the liquid product

1-12.Start collecting the powder

2. Shutdown steps

2-1. Shut the burner

2-2.Prepare water, and pump it into the atomizer to clean atomizer and spray dryer;

2-3.Cleaning the main tower of dryer

2-4.Wait until the machine cooled to about 50 ~ 60 ℃, turn off blower and draft fan.

2-5.Turn off the rotary valve.

2-6.Turn off the wet scrubber.

2-7.Turn off the powder collecting system.

2-8.Work complete

3. Equipment cleaning (User need to prepare waste water channels besides)

3-1.Prepare pressure water nozzle to clean.

3-2.Clean the main tower and cyclone

3-3.Each equipment have man holes for easy cleaning.

3-4.Cleaning is complete, you can turn on draft fan to dry moisture quickly, also you can wait it dry itself.

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7 Fault Analysis and Troubleshooting

The majority of the equipment failure will be displayed on touch screen, which is easy for the operation and maintenance .When a fault occurs, run all the system will stop immediately, staff should do the failure analysis and troubleshooting.

Table 7.1 Common failure analysis and troubleshooting

Failure	Cause Analysis	Trouble shootings
1. Wet powder	1.Outlet temperature setting is too low	1.Reduce the feed rate to raise the exhaust temperature
2.Drying chamber wall have wet powder everywhere	1.Feed amount is too much, cannot be evaporated 2.Machine is wet before working 3.When you start to spray, material flow control is too large 4.Feeding liquid is not uniform or stable	1.Reduce the feed rate 2. increase the inlet and outlet temperature 3.Flow rate need to be smaller at beginning, and slowly increase. 4.Check if the pipeline is blocked 5.Low down the solid content, to ensure the fluidity of the feed solution
3.Low evaporation	1.Air volume is too small 2.inlet temperature is too low 3.Equipment has a leakage	1.Check if fan speed is normal 2.Check if fan butterfly valve is correctly opened. 3.Check if air filter and the heater pipe is blocked 4.Check if the Natural gas supply is normal 5.Check if furnace is working correctly 6.Check that the device is connection is sealed
4.Have lot of dirty	1.Air filters not working	1.Check the air filter stainless steel

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things in powder	2.Accumulated powder mixed with the finished product 3. liquid quality is not high 4.Equipment cleaning is not good	mesh 2. Change the filter mesh 3.Check the hot air at the entrance to clean the burned products. 4. Filter the liquid 5 Clean the machine.
5.Powder is too fine	1 Solid content is too low 2 Feeding rate is too small	1 Increase the solid content 2.Increase the feeding rate
6. Low yield	1.Cyclone not working	1.Check the cyclone
7.Atomizer slow	1 Atomizer disc have problems	1.Check and clean
8.Atomizer shaking	1 Disc have dirt 2 Shaft is bending	1.Clean the disc 2 Replace the shaft and use lubrication

	Maintenance of all equipment failure should be made by professionals, troubleshooting for confirmation!

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8 The maintenance

	Before the maintenance of the equipment, you must ensure that the compressed air, natural gas, and power all disconnected

8.0 Outline

	This part is for preventive maintenance program for efficient operation.
	Only qualified engineering and technical personnel do this work.
	Before equipment maintenance, must ensure that electricity is disconnect

* Table 8.1 the listed maintenance schedule, if not applicable, please ignore

Table 8.1 Equipment maintenance schedule

Daily maintenance: Maintenance before using the equipment every day	
No.	Process
DM1	Visual check
DM2	Equipment connection check
DM3	Emergency stop button check
DM4	Air pressure check
DM5	Operation check
Temporary maintenance or after running 120 hours maintenance	
OM1	Main tower atomizer feeding pumps, furnace, seal check
OM2	Filter check
OM3	Fan and motor lubricant check
Monthly maintenance or after running 400 hours maintenance	
MM1	Safety check
MM2	Motor bearing inspection
MM3	Fasteners and connection check
Annual maintenance or after running 5000 hours maintenance	
1A1	Painting check. Spare parts purchasing
Every 2 years maintenance or after running 10000 hours maintenance	
2A1	Replace the grease reducer
2A2	Replace the filter

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8.1 Daily maintenance: Check before using

8.1.1 DM1 Visual check

a) Before the start, Check the machine for external damage or deformation, and Check all the ground wire is properly connected;

b) Check the air filter for foreign objects, if any, clean it in time

8.1.2 DM2 Equipment connection check

a) Check the connections is loose;

8.1.3 DM3 Emergency stop button check

a) Before the operation, need to check all the emergency stop button for correct operation;

b) After determine whether the equipment can operate, each emergency stop button is pressed in turn and then try to start the machine, the emergency stop button reset after each test;

c) After Initial start the machine, press the emergency stop button in turns, ensure that the equipment to be able to correct stopped. Each emergency stop button should be reset after test

8.1.4 DM5 Operation check.

Start the machine, perform the following operation checks:

a) Check all equipment and control is whether abnormal or vibration;

b) The verification fan start-up current is not overloaded.

8.2 Temporary maintenance

Detailed examination: the following maintenance should be carried out when equipment run every 120 hours.

8.2.1 OM1 Main tower atomizer feeding pumps, gas burner, hot air distributor, and other

8.2.2 OM2 Filter mesh

Check the Ventilation mesh without deformation

8.2.3 OM3 Lubricants check

Check oil level line of reducer, as too low and insufficient to supplement.

8.3 Monthly maintenance or after running 400 hours maintenance

Besides temporary maintenance, Monthly or every 400 hours of operation (the later usually less than the former), perform the following tasks:

8.3.1 MM1 Security chain clean and check

Clean sensors and mechanical parts, check whether the operation completed correctly;

8.3.2 MM2 Motor bearing inspection

Check all motor bearings no unusual noise, vibration or overheating. If necessary, replace the bearing.

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8.3.2 MM3 Fasteners and connection check

Check all fasteners tightness and circuit connections. The fasteners loose should be tightened again; Check and replace the wiring damage, deterioration and overheating.

8.4 Annual maintenance or after running 5000 hours maintenance

1A1 Every year or every 5000 hours of operation (the later usually less than the former), the painting should be checked and contact KODI company to purchase necessary spare parts.

8.5 Every 2 years maintenance or after running 10000 hours maintenance

Besides annual maintenance, every 2 years or every 10000 hours of operation (Usually the latter time is shorter), to carry out the following maintenance tasks:

8.5.1 2A1 Replace the gearbox lubrication oil

a) Every 2 years or every 5000 hours of operation (the latter is usually faster), emptying the gearbox, and dispose of the contents in accordance with local regulations;

b) Thoroughly clean the gearbox internal, clean gear unit and check for damage or wear, replacement of badly worn and damaged parts;

c) Injected recommended lubricants into the reassembled gearbox to the required level.

The lubricant recommended industrial-grade gear oil, parameters are as follows:

ISO viscosity grades: 150;

Running viscosity (40 ℃): 142;

Running viscosity (100 ℃): 14.3;

Pour Point ℃: ≤ -9.2;

Flash point ℃: ≥ 204;

Viscosity Index: ≥ 96

8.5.2 2A2 Replace the hoses and seals

In order to avoid the use of the fault, the aging of the hoses and seals should be removed and replaced, replacement hoses and seals with the same specifications as the removed

8.6 The maintenance of the long-term parking

8.6.1 Long-time parking: should cut off the electricity, gas source;

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8.6.2 Pack equipment with wooden boxes or other packaging, the lubricant meet the requirements should be injected to reducer before packing the equipment.

8.6.3 The equipment should be stored in a ventilated, dry, non-corrosive media, vibration-free environment;

8.6.4 In the case of regularly checking the packaging, humidity, stores up to 3 years;

8.6.5 After long-time storage, before you install or turn on equipment, the performance should be confirmed again

8.7 Maintenance and servicing of other supporting components refer to the device manual

9 List of wearing parts

Table 9-1 List of wearing parts

No.	Name	Specifications, models	Supply company
1	Drive bearing		KODI
2	Sight glass	DN150	KODI
3	Asbestos rope / silicone mat	Φ5mm	KODI
4	Filter mesh		KODI
5	Temperature sensor	PT100 Series	KODI
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10 Handling and storage of equipment

	Before starting the installation should ensure that lifting equipment is appropriate, and these devices should have a valid certificate; Do not use glue lines, damaged cables or knotted rope for lifting operation Prohibit the use of incomplete and not matching tools

10.1 Packing

Before the shipping, some parts are dis-assembled or packed.

Main parts of the machine will be marked with Number for easily recogonized.

10.2 Handling

The spray dryer body handling should use a crane and forklift handling, some parts due to the need for the installation can be lifted. Air handling unit, fan, silencer, cyclone and wet scrubber, larger parts such as short-distance transportation should use the forklift handling, and the forklift fork shelf mat cork. Electrical control boxes and other small pieces of short distance transportation adopt human handling method. Cables and equipment contact area (In addition to rings) soft material such as rubber, cotton should be separated to avoid damage to equipment.

10.3 Transport

The equipment is suitable for land and sea transportation

When land transport, you should pay attention to the sign on the box during truck loading, Besides the base, Other box cannot be inverted, side and tilted too much. Appropriate protective measures should also be taken when loading equipment, in order to avoid moisture, vibration and impact in transit.

By sea, in compliance with the relevant norms of the maritime.

10.4 Storage

The equipment should be stored in a dry, ventilated, non-corrosive, vibration-free indoor place. If problems caused by bad storage. The product will be out of valid for warranty

11 Unpacking and checking

11.1 Unpacking notes

a) KODI engineer or local agent of KODI company will be at the unpacking site;

b) Before opening the packing, you should carefully check the packaging is undamaged, waybill is correct.

c) Should first remove the box top cover, and then open the four sides.

11.2 The contents of check

a) Files attached to the equipment (generally including: packing list, certificate of

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compliance, manual, inspection reports, attachments list of equipment, etc.);

b) Please collect all the files and hand to KODI installation people for installation work.

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