KERUNDE KDTE150X2

Twin-screw Extruder

Operation Manual

Note: Prior to operation, please read over this operation manual carefully and keep it properly for future reference.



YANGZHOU KERUNDE MACHINERY CO., LTD.

FOREWORD

1. Congratulations, you have selected Kerunde KDTE 150x2 Extruder.

2. The operating instruction is specially compiled for the safe operation of the extruder, technical parameters of equipment running included; It serves for the whole series of the dryer, please cooperate with the specific model of the extruder you purchased while reading through the operation manual. Do not hesitate to contact with us once there is any question.

3. Prior to operation, please read over this operation manual carefully, well know attention items for safety, different performances, requirements to installation and operation etc. of this extruder so that you are able to adroitly operate and use this machine, and create more benefits.

4. Such as improper operation or failure to comply with our operation regulation will result in significant losses.

5. Prior to operation, please read over the marks of matters needing attention, especially those safety cautions.

6. The operator and maintenance personnel of the equipment shall read over this operation manual carefully.

7. Please put the operation manual nearby the equipment for read it at any time when necessary.

8. Please fully comprehend the operation manual for the operation and maintenance of the equipment.

9. Please contact with us to buy a new operation manual if this one is lost or damaged.

10. Please send this operation manual together with the equipment once the equipment is transferred.

11. Please pay attention to the following notes about equipment application, warranty scope and warranty period and so on.

1) Application: the extruder is specialized on animal feed process. Normally it is used to extrude or expand poultry & livestock feed and aqua feed.

2) Warranty scope: extruder bloc and its pipelines.

3) Warranty period: one year after purchasing the equipment, except easily worn-out parts.

Notes:

(1) The copyright of this operation manual is reserved by Yangzhou Kerunde Machinery Co., Ltd.

Without the prior written authorization of Yangzhou Kerunde Machinery Co., Ltd, this manual shall not be provided in whole or in part to a third party, nor will it be used for purposes other than originally specified.

(2) If the contents of this Operation Manual and specifications of this product are to be changed, we would not notify of them further.

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1 Safety

1.1 Personal safety protection

• The safety devices complying with modern technical standards and common safety rules have been installed in the machinery equipment manufactured by Yangzhou Kerunde Machinery Co., Ltd. before ex works, which are convenient for right use of the machines.

• The enterprise shall be responsible for implementing safety rules to ensure operators' safety.

• The guard shields for belts and chains shall be mounted and closed at any time. It is very dangerous to open or remove the guard shields, which may cause injuries or deaths; this is also applied for the protection devices of manipulators.

• The limit switches, interlinking cylinders, revolution monitors and solenoid valves or locking electromagnets of the door interlocking devices shall be kept in good function at any time. Do not lap over any limit switch or throw it away.

• The cover grates, bars or guard gratings are installed and provided with machine, which can be dismantled only by using special tools. This kind of machines can be operated only when equipped with the above said protection devices.

• Cut off the driving motor for repair, commissioning, check and maintenance, this can be realized through a whole-phase separable and lockable switch on the operating platform and control board besides machine or in workshop. It is not enough only to remove the fuses!

• If the machine needs other energy such as pneumatic energy, hydraulic energy, steam and hot water, so it is necessary to cut off their energy supply or switches and eliminate the residual pressure in the pipeline system of the machine.

• Take care when working on heated or cooled components and parts, because a burning danger exists still at this time.

• Press an emergency switch to stop one machine. If resetting the switch, it is not allowed to restart the machine by this switch, but only by closing the main switch.

• Take care if a local shutdown system is used in some machines. Read the instructions provided with the machine carefully. In the machine with a local shutdown system, pressure or vacuum will be generated and temperature will rise up after a certain time.

• If the operators are not able to read and write, the owner shall tell them the danger and remind them to pay a special attention to it.

· Cleaning, lubricating and oil filling for the machine or parts and components shall be done when the machine is

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shut down. If it is necessary to climb up the machine to do above works, so the power of motor must be cut off by force and the switch must be locked!

• Sampling inside the machine shall be done when there is no risk. Generally, it is possible to take samples in the pipes under the machine instead of in the machine directly.

• Clean deposited dust, dirt and material frequently. Keep the machine clean to improve the production safety and the clean level for the whole workshop, and this is also helpful for prevention of dust explosion.

• Clean away leaked oil if there is oil (grease) leakage and seal the leakage place well. Oil or grease leaked on the floor may cause operator's injuries.

• Guards shall be equipped on the machines during production and do not remove them or put them away or decrease their functions. Otherwise, we will not be responsible for any accidents and we reserve the right to ascertain where the responsibility lies.

· Please implement the special stipulations for accident prevention in the Operation Manual seriously.

- Only the trained personnel can operate our machine.
- Environment protection

If the machine will be not used again, environment protection and reuse measures shall be taken into consideration: drain the liquids (such as motor oil, gear box oil, brake fluid and cooling liquid) into special containers and send them to the preparation workshop. Special wastes (such as battery etc.) shall be treated as specified. The plastic parts shall be selected and reused. The metal parts shall be classified first, so as to be crushed or discarded.

1.2 Explosion protection

General cleaning

a It is an important condition for safety operation to keep the places with flammable dust clean.

b Don't stack bagged or bulk materials among the machines.

c All the conveying equipment, cyclone separators and dust collectors shall be kept in good condition to prevent dust emission to everywhere. Especially prevent the pipes and top covers from any leakage.

d Clean different kinds of dust frequently and completely to reduce risks from dust explosion.

e No deposited dust on the motors.

Regular inspection and maintenance

a Check the driving situation of all V-belts and flat belts once a week at least for preventing heat generated due to skid.

b Check the speed monitors and other safety equipment once a week at least.

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c Check and clean all the magnetic separators, stoners and sifters once a day at least.

d Regularly check all the main shafts and bearings once a week at least to avoid heat generation, and regularly add lubricating oil.

Electric apparatus

Check the electric equipment and appliances regularly, pay attention to the following:

a Do not use flashlights and other lamps without shield or explosion proof glass.

b Do not use any lengthened cables and electric furnaces.

c Repair or replace the electric devices and equipment in time if any accident happened.

d Cables without sheaths shall not be laid on the floor.

e Switch off the power supply for the machines after off duty.

f Designate an electrician to check the entire electric network for insulation status according to related regulations once a year at least.

Smoking and welding

a Smoking is forbidden. This is not only applied for staff and workers in self enterprise, but for visitors, customers, foreigners and drivers.

b Any repair and installation work by using a welder and a soldering lamp (flame soldering lamp) shall be done in special workshops or plants.

c As for occasional operation such as welding and similar operation, it is necessary to propose an application in writing to executive leaders for approval. The above operation can be done only if safety measures are taken, such as wet or special canvas and fire extinguisher are provided in the working place. Monitor the welding place and its circumference within 10 h at least after the operation is finished. The splashing metal beads during gas cutting are dangerous, because it is invisible where they are splashing. They can splash downstairs or to neighboring rooms through narrow wall seam and similar kind of slit, even flying away for more than 10 m. If the beads drop in dust, it is possible to cause fire at any time.

d Welding is not allowed on the conveying system in running. If welding is required, at first the machine shall be shut down and cleaned completely, then both sides of the welding place shall be sealed, e.g. blocked by mineral cotton to avoid any connection with other conveying equipment, silos and storage tanks; dismantle the spouts and conveying pipes or turn their lower ends when operating on them, so as to avoid the beads entering the conveying passages or silos.

Effect of static electricity

Remove the paint coating from the electric connections to ensure safety of the electric circuit and avoid any explosion due to spark discharge.

1.3 Description about safety of related control devices

The control device supplied by Kerunde is a part of the Safety Plan for preventing the accident. The control device must be checked by the expert of Kerunde before starting up and the approval (operation) certificate should be signed by him.

If the control system on the equipment of Kerunde is supplied by the third party, it must be made based on the specifications of Kerunde and checked by the expert of Kerunde before starting up and then the approval (operation) certificate should be signed by him.

1.3.1 Connection of power supply

• It should be to abide by stipulations of the local administrative department of the safety, such as, the circuit protection breaker should be mounted on power line based on local stipulations.

• It should be to check the data of the operating voltage and frequency of the machine on duty plate or in control cabinet.

• All power lines in the control system must be connected based on wiring schematic diagram, so that the proper phase wire can be switched on or off as using the single phase power supply.

1.4 Safety plan

This extruder must be operated by the trained or appointed person as required.

• All rotary parts should be provided with guard shield for preventing the touching at will. The protective device can be dismantled only with the spanner.

• A safety switch should be mounted on the driving motor for switching off each phase, and it can be locked. This switch can be mounted nearby the extruder or on control console or control panel of this equipment. This safety switch can be used for shutting down this equipment before maintaining.

• The maintainer should put on his protective gloves (maximum temperature up to 120°C), safety shoes with steel sheet, safety helmet and etc during maintaining.

1.5 Protective devices for personal safety

1.5.1 Safety switch for conditioner

The safety switch 1 is mounted on the door of conditioner. As the door is closed, all inserters on the door are inserted into the safety switch to give a signal of a door being closed to the control circuit, the conditioner can be started up by now.

As the door is opened, the inserter on door will be taken out from the safety switch to give a signal of a door

being opened to the control circuit for avoiding the starting up of the conditioner's door after the door is opened, which can take the effect for safety guard.



Fig.1.1 Safety switch on conditioner door

1.6 Safety devices for machine

1.6.1 Emergency discharge device of by-pass door

The by-pass door 2 is provided at inlet of the expanding chamber of the extruder, the by-pass door can be opened or closed by stretching of the cylinder 1, and the cylinder is controlled by the solenoid valve. If the speed of the feeds entering into the expanding chamber is too high, the feeds are accumulated too much and the motor load increases and exceeds the rated value, the control center will give a signal of opening the door to the solenoid valve, thereupon, the by-pass door is opened and the feeds will be discharged from the by-pass door. The by-pass door can be closed automatically after the motor load is normal, and the extruder will continue the normal operation.



Fig. 1.2 Emergency discharge device of by-pass door

1.7 Scope of application

For ensuring the operation safety of the machine, the altitude of the service region of this machine should be less than 1000m, temperature $5^{\circ}C \sim 40^{\circ}C$, and air relative humidity less than 90%.

KDTE150x2 extruder is mainly applicable for ripening and forming of different aquatic feeds.

1.8 Abrasion and corrosion of wearing parts

• A quite part of mechanical energy on each extruder transformed to the heat energy through the friction is determined by the Working principle.

• Because the paired wearing parts (such as screw and bush) are interdependence through an intermediate substance —— i.e. feeds intermixture, and the wearing is caused by the mutual stress effect between them.

• This means that the processed materials also cause the serious wearing other than causes of machine structure and material quality.

• The wearing caused by the material with high ash content or high constituent of fiber is serious than wearing caused by the mixing materials with high oil content.

• If using the additive (such as acid) with strong corrosiveness, the wearing/corrosion caused by it will exceed quite several times!

• The machine and its components and parts can be treated according to local laws and regulations after discarded.

1.9 Description about safety marks and symbols

(1) The equipment is equipped with safety marks to indicate the parts that are danger to human.

(2) Please read carefully and understand these safety marks.

- (3) Put these marks nearby the equipment.
- (4) Replace a new one once the marks worn or fall off.
- (5) Please contact us for chasing new safety marks.

①The safety mark for "Be careful of electric shock!": Never open the terminal box when the motor is not

power-off.



(DCarry out maintenance and repairing in accordance of the instruction manual.



Maintaining according to the operating manual.

按照说明书维修

③The safety mark for "Be careful of mechanical injury!": Never open the operating door while the machine is



机器运行及未完全停止前 禁止打开操作门 Do not contact running parts with hands when the machine is running. The inspection, repair, disassembly or replacement etc. can be carried out only after the machine is stopped.

(a) The safety mark for "Be careful to prevent from scalding": Don't touch the machine while it is in operation.



机器正常工作时,请勿 徒手触摸 Do not touch the machine with bare hands when the machine is running.

SDon't remove the guard shield while the machine is running.

机器运行时,禁止移走护罩 Do not remove the safety guard when the machine is running and not completely stopped.

⁽⁶⁾Please put on your gloves as you carry out maintenance and repairing.



维修机器时, 请按规定戴手套 Wearing gloves during maintenance.

(7) Do not climb or stand on the machine



不要攀爬或站在机器上

Do not climb or stand on the machine.

1.10 Noise

- Noise of this equipment (sound pressure level) ≤110 dB;
- The foundation for equipment should have the enough intensity and the proper damping device should be installed for reducing the noise caused by vibration.

2 Performance features and indexes

2.1 Features

The extrusion provides for production of many products with great superiority in comparison with other technologies. Because it almost integrates functions of different equipments in a single process when extruding, the procedures of mixing, extruding, cutting, cooking, forming and drying process in a certain degree can be carried out at the same time.

2.1.1 Multi-functionality of the equipment

Special assembly screw structure is applied, so that various products can be produced if only simply changing screw arrangement or changing processing parameters.

2.1.2 Uniqueness of the equipment

Other technologies are difficult or cannot produce products and products in certain shapes produced by this extruding operation.

2.1.3 High-quality of the product

This extruding operation is extremely effective for high-temperature and short-period processing, it is provided with a better nutrition improvement while effectively reducing different anti-nutritional factors in products and sterilizing.

2.1.4 Effectively using the energy

The cooking process of this extruding operation can ripen the material at a great degree, sufficiently use the steam and reduce the power consumption, thus the process cost can be saved.

2.1.5 Convenient and accurate control system

Using the auto control can accurately control the flow and flow ratio of all materials, and also the different processing parameters can be recorded in convenience for future production or providing the basis for adjusting processing parameters.

2.1.6 Minimum industrial wastewater

This extruding can effectively avoid the industrial wastewater; this is an outstanding advantage for the feed manufacturers to bear the increasing pressure for reducing the influences of production activities on surrounding

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environment.

2.2 Main technical parameters and performance indexes

2.2.1 Description of model

The model of the extruder is as follows:



2.2.2 Main technical parameters:

For main technical parameters of the extruder, see Table 1.

No.	ltem	Unit	Parameters
1	Screw diameter	mm	150
2	Power of main motor	kW	315
3	Length-diameter ratio	L/Ds	20
4	Power of Feeder	kW	5.5(frequency conversion)
8	Power of anchor feeding bin	kW	4

Table 1 Main technical parameters

2.2.3 Performance indexes

Throughput (t/h):	6-10 (by using Φ3.0-Φ5.0 die plate)
Pellet floating rate (sinking rate):	100%
Pellet expansion coefficient:	1.2~1.8

3 Instruction to structure

3.1 Overall structure

The extruder is mainly composed of bridge-breaking feeding bin, feeder, DDC. hygenizer, conditioner extruder, pipe system and auto control system. See Fig. 3.1 Overall structure.



1. Bridge-breaking feeding bin 2. Feeder 3.DDC 4. Hygenizer 5. Conditioner 6. Extruder Fig. 3.1 View of overall structure

3.1.1 Bridge-breaking feeding bin

It is used for extruding the raw material of products (especially extruding the products in small particle size), the bridging can be easily formed in the bin because the ground particle size is smaller and the flowability is bad, which may cause the unstable feeding and cut-off feeding easily, so that extruding operation is unstable or the machine may be blocked and the quality of extruding products is not even. Therefore, when the extruder is running, the bridge-breaking feeding bin can ensure material to be fed continuously and stably.

The main structure of bridge-braking feeding bin is shown as Fig. 3.2.

The bin body is like a barrel and there is an agitator at the bottom, so that material can be continuously and stably fed to the next procedure. The bin has a certain capacity, when the material cannot be fed in the latest procedure, it can provide the enough time to the operating personnel for troubleshooting.

Parameters of bridge-breaking feeding bin are as follows:



3.1.2 Feeder

The feeder is mainly used for feeding the material to conditioner in a certain amount, the equipped motor is of the frequency conversion speed control motor, and the rotation speed can be adjusted based on actual production situation and the barrel is equipped with a cleaning door at its upper part.

The structure is shown in Fig. 3.3.



1.Bearing seal 2. Barrel 3.Main shaft 4.Cleaning door 5. Frequency conversion speed control motor Fig. 3.3 Feeder

The parameters are showed as follows:

Designation	Туре	Motor power	Conveying capacity	Center distance between inlet and outlet
Feeder	KDWL25	2.2kW	$0.5{\sim}15$ TPH	1200mm

3.1.3 Different diameter cylinder conditioner(DDC)

TZSC39A type different diameter cylinder conditioner is applied to this system.

The overall structure of the DDC is shown as follows:



1. Motor 2. Bearing 3. Long paddle 4. Slow shaft 5. Short paddle 6. Fast shaft 7. Air inlet pipe Fig. 3.4 DDC

The parameters of the different diameter cylinder conditioner are showed as follows:

Designation	Туре	Motor power	Conditioning period	Conditioner body length
Different diameter	T790304	22k\//	1 \sim 2min	3320mm
cylinder conditioner	1200007		1 211111	5520mm

3.1.4 Hygeinizer

KDBZ80IIJ Hygenizer is applied to this system.

The overall structure of the hygenizer is shown as follows:



1Reducer 2Main shaft 3Paddle 4 Inner shell 5 Outer shell 6 Steam addition port 7 Water discharging

Fig. 3.5 Hygenizer

The parameters of the hygenizer are showed as follows:

Designation	Туре	Motor power	Conditioning period	Conditioner body length
Hygenizer	KDBZ80IIJ	7.5kW	2 \sim 4min	2950mm

3.1.5 Conditioner

KDTZZ550J conditioner is applied to this system.

The overall structure of the conditioner is shown as follows:



1Motor 2Main shaft 3Paddle 4Inner shell 5Outer shell 6 Steam addition port 7 Water discharging Fig. 3.6 Conditioner The parameters of the conditioner are showed as follows:

Designation	Туре	Motor power	Conditioning period	Conditioner body length
Conditioner	KDTZZ550J	11kW	1 \sim 2min	2950mm

Advantages of conditioning:

a. The production capacity can be improved.

The partially cooking material with steam needs a very less mechanical energy for heating products to the maximum temperature, therefore, as for a device with designated power, and the production capacity is greater than dry extruder with the same power.

b. The forming capability is greater.

The use of steam and water can make the water content of material be improved, and this will greatly improve the forming performance and final quality of the products.

c. The abrasion of extruding parts is reduced.

The cooked material has the corresponding temperature and ripeness, therefore, too much higher pressure and abrasion in the machine chamber are not required, and also the water can be used for lubricating, these can greatly reduce abrasion, so that service life of machine chamber and screw can be increased.

d. The gelatinization of product can be improved.

The steam cooking can improve gelatinization of produce, make it more taste and easier for absorption.

3.1.6 Extruding machine

The Extruding machine is a main component of the extruder.

The main structure is shown in Fig. 3.6.

1.Main motor 2.Base 3.Reducing gear box 4.Bypass 5.Support 6. Extruding chamber 7.Discharging device 8.Cutting device



3.1.6.1 Cutting device

The detailed structures are shown in Fig. Fig. 3.7 (Structural diagram of cutting device a), Fig. 3.8(Structural diagram of cutting device b) and Fig. 3.9(Cutting rotor component structure):



[Description]

① Cutting device is hoisted on frame body through two hoisting connection components, its height can be adjusted through rotating the hoisting connection components;

② Cutting device can be moved forward and backward alongside rail on the frame body through roller on the hoisting connection components;

③Cutting device is positioned on the extruder through four positioning pins in production, and locked by four corresponding knock grabs;

④ When adjusting the blade forward and backward, rotate the adjusting hand wheel, adjusting screw fixed with the adjusting hand wheel drives the sliding sleeve to slide forward and backward, so that the blade can be adjusted forward and backward;

(5) Cutting device is composed of cutting knife and variable-speed drive. Length of material to be cut will be controlled through adjusting rotation speed of the cutting knife. A variable frequency speed control motor is applied for variable-speed driving, the cutting knife bar drives the cutting knives to rotate. Kerunde KDTE150x2 extruder provides a kind of cutting knife, which is used for cutting expanding material (thickness is more than 0.3 mm).

[Features]

 It can adjust rotation speed of the cutting knife and can adjust the distance between the cutting knife and end face of the die plate when the extruder is running;

② It is easy for installation, as well as can reduce working strength and working time.





1.Screw 2.Cutting knife tray 3.Fastening screw 4.Cutting knife shaft 5.Motor Fig. 3.9 Structure of cutting rotor component

3.1.6.2 Discharging assembly

Material extruded and ripened in extruder chamber must be formed through a discharging device; the discharging device is mainly used for limiting the flow of material to form required pressure for expanding material at the end of expanding chamber. Structure of discharging device and selection of mould can directly influence the quality of material.



1. Screw M14X40 2Screw M14X140 3.Die plate 4.Die plate support 5.Pore plate 6. Spreading cone

7. Confluence device 8. Pressure-regulating ring 9. Hook 10. Handle 11. Cutting device support 12. Fixing bracket

Fig. 3.10 Structure of discharging assembly

The discharging assembly of this machine is equipped with spreading cone, confluence device and pressure-regulating ring, it can increase restraining force at the end of expanding chamber in one aspect, that is to say, increasing pressure of material in expanding chamber; in other aspect, it can rectify material flow extruded from expanding chamber that unevenly spread on the whole end face, to make it evenly distribute on the die plate connected with venture, so that material can be evenly extruded from numerous holes of the die plate.

See Fig. 3.10 for the structure of discharging assembly.

3.1.5.3 Extruding assembly

Extruding assembly, the key part of the whole system, is mainly composed of expanding chamber and extruding screw. Classified based on its function, the whole extruding assembly is mainly composed of feeding section, kneading section and final ripening section.



1 Discharging extruding chamber 2 Mid-chamber component(1) 3 Pressure-relief extruding chamber 4Temperature sensor 5 Globe valve 6 Water valve 7 Mid-chamber component(1) 8 Feeding extruding chamber 9 Connection chamber assembly

Fig. 3.11 Structure of extruding chamber

Sectional integrated structure is applied for the extruding chamber. Each section of chamber body has an individual external jacket chamber, which can be used for heating or cooling of the chamber body. In addition, filling hole and filling device are equipped for each section of chamber body, which can directly add water, steam and other liquid into the extruding chamber.

The extruding screw is a sectional assembly with hollow screw and positioned to the main shaft with spline, and screw combination can be done based on material varieties and formula because the structural screw is universal and exchangeable. See Fig. 3.12 for the structure of extruding screw.



Fig. 3.12 Structure of extruding screw

3.1.5.4 Bypass

Bypass is located between outlet of different diameter cylinder conditioner and the inlet of extruding assembly. Flow direction of material from the conditioner can be selected through bypass: flow into inlet of extruding assembly for extrusion or flow out through chute of the bypass in convenience for checking conditioning efficiency of material.



Fig. 3.13 Bypass

There are two methods for controlling the bypass: manual control and auto control; see Fig. 3.13 for details.

Turnover plate of the bypass is driven by a cylinder, solenoid valve mated the cylinder is controlled by the touch-screen electrical control system.

Functions for preparing a bypass:

(1) Discharge material that not conditioned or not stably conditioned in conditioner through the chute when

starting up the machine to prevent the system from unstable operation arising from uneven material entering extruding assembly;

(2) When unstable load is caused and current of the main motor exceeds that for normal operation arising from abnormality, it can be treated through operating the bypass to avoid over current and blockage of the machine.

3.2 Working principle

3.2.1 Introduction to working course and extruding principle

Firstly, the materials prepared, blended and pulverized enter the feeding bin for bridge-breaking and are to be processed. When running, the feeder continuously feeds the material in bridge-breaking feeding bin to the different diameter cylinder conditioner for conditioning, adds even, continuous and metered steam, water and other liquids into conditioner while material is entering into it.

Material being conditioned for a certain period enters feeding section of the extruding assembly for extruding, material is conveyed from the feeding section, and the feeding section is mainly used to convey material to kneading section and primarily compress the material; in the kneading section, material will be gradually cured or dissolved through strong stirring, mixing and cutting; pressure and temperature will rise gradually after entering the final curing section, and material will be cured further, starch will be gelatinized further, fat and protein will be denaturalized and homogenized to form a non-crystal texture; finally, material will be extruded and cut into shapes through the discharging assembly.

Three sections of extruding assembly can be adjusted as required by production. The screw conveys material to the whole extruding chamber, mechanical energy of rotating screw will be transformed as heat energy through abrasion between material and parts of the extruding machine as well as internal abrasion of material. The rotating speed of the extruding screw is adjustable, therefore, it is possible to adjust the extruding intensity during the process according to processing requirement, so as to control the product density and cure degree.

When material is extruded to pass through the die holes in the end of the machine chamber, doughy material will be processed to a certain shape. Because of the great push and mix of screw in the machine chamber, a certain pressure and temperature will be formed in material, so that the material will expand greatly when extruded from the die holes or when most of water is evaporated momentarily or lightly expanded because less water is lost. This can be realized through strictly control each operation parameter as required.

When producing products with low density, material will be greatly expanded and kept in a corresponding shape and dimension depending on structural features of material and various conditions in extruding operating.

When producing products with high density, material will not expanded greatly depending on pressure relief opening set on the extruding chamber as well as conditions in extruding operating (including increasing water content, reducing extruding strength and temperature).

3.2.3 Principle for adding water, steam and other liquids

Adding of water, steam and other liquids is controlled by computer. The computer directly controls "Flow Control" unit, and then the "Flow Detect" unit feeds back the information to the computer, so that a closed loop controlled is formed. The principle is shown in Fig. 3.14:



流向 Flow detect 水 Water 蒸气 Steam 物料 Material 其他添加 Other additives 反馈 Feedback 计算机 Computer 设定流量 Preset flow rate 流量控制 Flow rate control 流量检测 Flow rate detect Fig. 3.14 Liquid adding principle

4 Installation of equipment

4.1 Installation of bridge-breaking feeding bin and feeder

One of basic reference data for the control system of the extruder is the material flow rate, and the addition level of water, steam and other liquids in the system shall refer to the material flow rate, therefore the stability of material flow will directly affect that of the whole extruder producing. To ensure stable materials flow, weighing feeding is used in this system, namely, put the whole feeding bin and feeder onto the weighing sensor, so as to form a closed-loop control among weighing sensor, frequency-converted feeder and computer, and then realize feeding.

It is necessary to pay attention to the position of access door during installation of bridge-breaking feeding bin, and the maintenance platform should be mounted at the lower part of access door while ensuring that the access door can be opened.

4.2 Installation of conditioner

Since the supporting frame body for conditioner is of the welded assembly, deformation may be inevitable during transportation, when the frame is deformed, direct installation without adjusting will cause misalignment of

conditioner main shaft and output shaft of gear box, the roller chain coupling will produce noise when equipment is running, and abrasion of coupling gear and chains will be caused, therefore it is necessary to adjust the supporting frame during installation, so as to ensure alignment between conditioner main shaft and output shaft of gear box.

There are also certain requirements to the relative position of two main shafts of conditioner during its installation. Installation can be carried out according to marks at the shaft end, and can also be carried out by self-choosing corresponding position.

4.3 Installation of extruding machine

The principal machine of extruder is the heaviest equipment in the whole system, and it is demanded highly to the bearing capacity of foundation considering the main motor. Some forehead and tail waste materials, steam leakage, waste water and even dust leakage maybe occur due to startup and stoppage, or by cleaning during extruding operation, these will affect the sanitation of working environment and even cause pollution to the products. Therefore, these problems must be rationally solved.

An aspirating device can be set up in a corresponding position to carry away the escaped steam and dust (the aspirating piping should insulated thermally to prevent recontamination);

The ground in extruding operation area should be gradient to a certain extent, so as to collect and discharge the waste water. The inner diameter of the waste water discharge piping should be more than 100mm;

The waste materials should be disposed with special tools, equipment and <u>special location</u>, so as to prevent cross contamination.

The ground should be flat and have a gradient of 1:200, so as to empty all water from the expanding chamber. The bearing capacity of foundation should be considered according to a total equipment weight of 18 tons.

Since belt driving is used between main motor and principal machine, it is required to ensure, in order to reduce vibration and protect belt and belt pulley, that end faces of the big and small belt pulley are on the same plane, and adjust the tension of triangular driving belt. It will be slipped if the triangular driving belt is over loose, and the pulling force of counter shafts will be over large if it is too tight, and the service life of belt will be reduced. Put the tightness of triangular belt in proper state through adjusting tension bolts on the motor guide rail, i.e. use 27kg force on the middle point of straight edge of the belt; properly set the deflection offset as 21mm, and cautions must be exercised on parallel of motor shaft and main shaft.

See Fig. 4.1 for the installation dimensions of extruder base.

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4.4 Installation of pipeline support

The installation position of pipeline support should be determined on site, but it cannot be too far away from

the principal machine, too far distance will cause waste of materials during connection of pipelines, and will cause delay of control system. Allowed by the field installation position, the optimum position for pipeline support is over against back of the principal machine and conditioner, parallel with principal machine, 1m or so away from the principal machine (with certain space for maintenance), and ensure that the interface of conditioner steam line on the pipeline support is at conditioner side.

For the sake of floor cleaning and waste water discharge in the future, pipeline support should be blocked up by 10cm or so during installation. The installation position of pipeline valves should meet the needs of operation. See Fig. 4.4 for the installation of the pipeline support.



A. Steam port of conditioner B. Steam port of extruding chamber C. Steam port of extruding chamber jacket

D. Steam port of conditioner's coil E. Water port of water addition system F. Water port of conditioner

G. Water port of extruding chamber

Fig.4.4 Installation of pipeline support

4.5 Installation of water pipeline for expanding chamber and cooler

 建料膨化腔
 Feeding expanding chamber

 Stop valve DN15

 截止阀DN15

 黄针管

 Galvanized pipe

 Discharge
 Stop valve DN20

 排水

 通過冷却器
 Oil cooler

 進油や却器

 近時

 進山風DN20

 出版DN20

 出版DN20

 出版DN20

 北山口の

 北山口の

See water pipeline for expanding chamber and cooler in Fig 4.2.



[Note]

- The water inlet pipe of feeding expanding chamber can be connected with water inlet pipe of cooler;
- The water inlet pipe can be connected with common tap water;
- It can be used in a short term (less than 4h) under non-high temperature weather (above 25℃), and the cooler may not be cooled with water.

4.6 Installation of local control box

For the sake of operation, the installation position of site control box should be close to the bypass, a certain space should be reserved between bypass and control box for temporarily storing wastes discharged from bypass.

The cycling temperature display instrument on the site control box is used for displaying the real-time temperature at each end of expansion chamber, and it has a certain requirements to the display order of temperature; the temperature "0" to "4" on the instrument are respectively corresponding to the feeding expansion chamber, 2nd section expansion chamber...and to the outlet expansion chamber, this order should be considered during electric control wiring.

4.7 Installation of auxiliary facilities

a. Since it is inevitable to produce 100kg or so wastes at the conditioner bypass outlet and extruder outlet during starting up, therefore it is necessary to equip with wastes receiving device here for recycling;

b. There will be small amount of residues in expansion chamber after shutting down, which should be cleaned with water, therefore it is required to equip with sewage or waste water discharge device at the extruder outlet for the sake of field operation.

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5 Operation flow of startup and shutdown

5.1 Operation flow of startup

1. Preparation before starting up (water, steam, power, raw materials; equipment cleaning, installation of formwork, and installation and adjustment of cutting device);

2. Operation:

Preheating of extruder principal machine;

- Confirm: switch feeding into "manual" state;
- Confirm: switch water-steam of "conditioner" and water-steam of "expansion chamber" into "manual" state;

Preset parameter: throughput (preset starting frequency (Hz) of feeder); CV value of DDC water (opening

of adjusting valve); CV value of DDC steam (opening of adjusting valve);

◆Switch to "production condition" on touch button, switch "automatic, manual and commissioning" into "automatic"; press "start" touch button.

Action (with time order):

- Confirm the DDC outlet is at the bypass side;
- DDC motor begins to run and starting up of the delta is over;

Pneumatic gate on the feeding bin automatically opens and the feeds are fed to the bin, when materials weight reaches to the upper limit as given, pneumatic gate will be automatically closed (if material weight in the bin has reached to the upper limit as given, this step will be skipped over);

- Feeder is operated automatically;
- Motor for bridge breaking in feeding bin is operated automatically.

3. When there are materials discharged from conditioner outlet, start the water pump motor (two water pumps in production condition and the actually-operated water pumps), turn on four spray head switches and one steam pipeline switch in the "conditioner";

Note: For the water-steam addition method, manually set the opening corresponding to the adjusting value (opening value is 0%~100%).

- 4. Conditioning material;
- 5. Start up oil pump motor, the alarm apparatus will give an alarm —— "start early warning";
- 6. Start up cutting knife;
- 7. Start up main motor;

Note: In order to increase the service life of equipment, it is necessary to reduce idle operation of the principal machine as much as possible.

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8. Start up for 10s until the principal machine is started completely, switch on bypass, add the prepared materials into the expansion chamber, and add with little amount of water for lubrication, so as to increase the service life of equipment;

9. Pay close attention to the current of principal machine, if the current is too heavy, exceeding the set upper limit, the bypass will automatically knock out the materials, and strike into materials until the load is reduced;

10. Adjust the rotary speed of cutting knife as per the material shape;

11. Adjust actual throughput (feeding frequency Hz), water (openness CV value of adjusting valve) and steam (openness CV value of adjusting valve) according to practical situations;

Note: when the throughput increase is required during production, the operator is required to adjust the openness of adjusting valve for water-steam in the DDC and expansion chamber, so as to realize proper conditioning;

12. Regularly check the material shape, and pay attention to the main motor load.

5.2 Operation flow of shutdown

When the material weight in feeding bin reaches to the lower limit (such as 120kg, settable) during production, the pneumatic gate will be opened; if the materials are not added to the upper limit (such as 400kg, settable) in certain period of time, the "bridging" will give an alarm, and knocking the bin is required; if the material weight still does not reach to the upper limit (300s, settable), the pneumatic gate will automatically be closed and an alarm will be given for indicating that there is no material.

When no material indication is given, the computer will begin timing from when the material in the feeding bin reaches to the lower limit (such as 120kg, settable), and automatic shutting down will be automatically executed after a certain period of time (such as 60sec, settable).

Procedure for automatic shutdown:

- Stop the motors for bridge breaking and feeding motor;
- Bypass will be automatically opened after a certain period of time (such as 60sec, settable);
- Conditioner will be automatically stopped after a certain period of time (such as 300sec, settable);

◆ The procedure for automatic shutdown is only feasible for the above-mentioned equipment, other equipments and water-steam stop valve should be shut down by the operator according to corresponding requirements;

◆ When the system executes the procedure for automatic shutdown, switch the "automatic" for starting and shutting down in the "production condition" menu to the "manual", which can realize equipment shut down by

hand.

Attention points for shutting down:

Generally the shutting down should be carried out from top to the bottom;

It is necessary to open the bypass before shutting down principal machine, so as to enable materials flow out from the bypass;

When the materials in the expansion chamber are emptied, and the extruder is non-loaded, shut down the main motor. When the materials in the expansion chamber are emptied, it is advisable to add the water in the expansion chamber for soaking, until the die plate is removed, clean the expansion chamber.

6 Technological requirements

To produce the floating and sinking expansion feeds for aquatic animals based on processing technique of the extruder, it is required firstly to ensure the mixing uniformity of powder material and to meet requirements to mash particle size. As for processing feeds for aquatic animals of different die hole diameters, the minimum requirements to the particle size of ground mash are different. Minimum requirements to the mash particle size of raw materials are shown as following table:

Die plate hole for production (mm)	Maximum mash particle size (mm)
1.0	0.3
1.5	0.5
2.0	0.65
2.5	0.8
3.0	1.0
4.0	1.2
5.0	1.5
Above 5.0	1.5

The particle size of ground material will directly affect the quality of expanded pellet products. Generally, the particle size of ground material for aquatic feed should be controlled such that 100% material passes through 20 meshes (0.85mm); when processing product with die hole diameter less than 1.5mm, and the mash particle size is generally controlled such that 95% passes through 60 meshes (0.25mm).

There is one point to be emphasized to ensure success of extruding operation, and when particle size of raw materials meets requirement. In fact, forced stopping will mainly be caused by the following reasons: during extruding, impurities in raw materials, such as flexible fiber, little stones and welding slag, as well as technological flow and equipments are not cleaned in time, especially for the production of small pellet products.

7 Maintenance and Attention points

7.1 Equipment should be cleaned for both inside and outside after each shift of operation, clean the expansion chamber and screw with clean water after each stopping, so as to avoid difficult cleaning after the materials cool down and agglomerate.

7.2 After each stop, each matching surface of the discharge assembly and cutting knife part should be cleaned, and evenly daubed with vegetable oil before getting off work.

7.3 The standby discharge die plate should be cleaned immediately, and daubed or soaked with vegetable oil.

7.4 The big belt pulley of extruder main shaft should be usually cleaned, prevent dust accumulation; otherwise, unbalance of the belt pulley will cause extruder vibration.

7.5 Lubricate bearing box with lubricating oil: L-HM46 antiwear hydraulic oil, Great Wall brand. (Ambient temperature≥0°C)

7.6 Lubricate with lubricating grease the feeding conditioner and its driving device bearing, as well as other bearing parts.

The name and code of lubricating grease: Special No. 220 lubricating grease

7.7 New oil must be replaced regularly for the bearing box. New oil must be replaced for the main machine for the first time after it operates one month later. Empty all old oil and use compressed air to empty the remaining oil in the box, and then inject new oil (calculated by working 10 hours per day), oil level shall be subject to the oil standard, too high or too low oil level will affect the normal work of the bearing box.

7.8 Add lubricating grease one time for each 48hr operation of other bearing parts.

7.9 Machine oil in the reduction gear of conditioner should be controlled within defined oil level, replace 1/2 used oil after every 200hr operation, and totally replace with new oil after 384hr operation.

7.10 Remove screw head, do not knock heavily.

7.11 Clean the pneumatic gate at upper part of bridge-breaking feeding bin once a week, so as to prevent feeding delay caused by blocking of this part; clean residues on the feeder wall once a week; clean away the residual materials at flexible connection part between feeder outlet and conditioner inlet once a week; clean the conditioner water addition nozzle and steam nozzle once a week, keep smooth addition of liquid; dismantle the bypass for cleaning once a week, and clean the residual materials at the extruding assembly inlet.

Note: Power should be turned off when cleaning all the equipment, and switch off the air switch and cut off power supply.

7.12 Keep extruder and ambient environment clean.

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8 Malfunction and troubleshooting:

Trouble	Cause	Solution	
Temperature of expansion	Jacked steam line is blocked	Clean the jacked steam line	
chamber cannot reach to rated	The inlet steam line of expansion	Clean the inlet steam line of	
temperature	chamber is blocked	expansion chamber	
	<u></u>	Check steam pressure, adjust it	
Conditioning temperature cannot	Steam pressure is not sufficient	normally to 4bar	
reach to requirement	Steam line is blocked	Clean the steam line	
	Poor conditioning	Condition the materials	
Materials surface is coarse with	Part of die plate boles blocked	Stop to clean the die plate	
different length after expansion	Insufficient particle size	Increase particle size	
	Die plate is in bad quality	Use die plates manufactured from	
	Die plate is in bad quality	qualified works	
Throughput reduced	Shearing block is worn	Replace shearing block	
	Sever wearing to screw head	Replace screw head	
Do not discharge after normal	Excessive short-time feeding or		
operation	material cut-off;	Stop the machine and check.	
	Die holes are blocked.		
Wave type intermittent discharge	The fullness of expansion	Increase throughput	
	chamber is insufficient.		
		Increase throughput;	
	Ripeness of materials is	Raise conditioning temperature;	
Insufficient expansion	insufficient	Raise jacket heating temperature;	
		Increase rotating speed of	
		principal machine.	
	Over-high temperature;	Reduce temperature:	
	Over-high rotating speed of	Reduce rotating speed:	
Excessive expansion	principal machine;	Change the die plate hole area or	
	Die plate hole area is not	adjust throughput.	
	matched with the throughput.	, , , , , , , , , , , , , , , , , , , ,	
Over long or over short expanded	Over high or over low cutting	Adjust rotating speed of the cutting	
pellet	speed.	drive.	
	Improper formula of raw	Change formula of raw materials;	
	materials;	Recombine the components in	
	Over high or over low processing	machine barrel;	
	temperature;	Adjust to even feeding;	
Poor product forming	Unstable feeding;	Reduce or increase moisture or	
	Over high or over low moisture	steam addition volume;	
	content in product;	Adjust to a proper rotating speed;	
	Improper cutting speed;	Replace blade;	
	Blade is worn;	Grind the raw materials further to	
	Too large grinding particle size.	reach a finer particle size	

Malfunction and troubleshooting

9 Transport and storage

9.1 Transport

The extruder is adapted for transportation by land and water, cautions must be exercised for the package indicative marks on packing case during transportation. Any reversion and heavy press is not allowed, the front end of expansion chamber must be supported for package.

9.1.1 Transport weight

Model	KDTE150X2
Principal machine of extruder	10700kg
Main motor and motor base	4200kg(315kW)
Feeder	200kg
Feeding bin	660kg
DDC	3800kg
Hygeinizer	2300kg
Conditioner	1100kg
Total	22960kg

9.1.2 Requirements to transportation

The crane must be used for unloading and handling the extruder.

The proper hoisting cable must be used for lifting the equipment as required.

See lifting diagram Fig 9.1 Lifting of principal machine;

Fig 9.2 Lifting of conditioner;

Fig 9.3 Lifting of Hygienizer;

Fig 9.4 Lifting of DDC;

Fig 9.5 Lifting of feeding bin

Fig 9.6 Lifting of feeder



Fig 9.1 Lifting of principal machine



Fig 9.2 Lifting of conditioner



Fig 9.3 Lifting of Hygienizer



Fig 9.4 Lifting of DDC



Fig 9.5 Lifting of feeding bin





9.2 Storage

9.2.1 The facilities for prevention of rain, sunshine and water accumulation should be available for exposed storage. The equipment should be placed on wood and must not be put on ground.

9.2.2 The extruder should be put in ventilated, dry and cool place for long-time storage, and put carefully in the safe place without vibration, the damp proof measures should be taken, and the exposed surface without painting should be painted with rust-proof oil. The normal storing temperature should be $-25\sim55^{\circ}$ C.

10 List of wearing parts

No.	Code	Designation	Qty	Remarks
1	2323432	Double spoke handwheel (keyway)	1	
2	61903-2Z	Bearing	2	
3	6206-2RZ	Deep groove ball bearing	4	
4	HV3	Stop valve DN15	4	
5	HV3	Stop valve DN20	4	
6	HV3	Stop valve DN25	1	
7	JB/T6626	Ptfe braided packing Code:SFW260 Specification 3	7	
8	JB/T7940.1	Oil cup M10X1	6	
9	MA32X80-S	EMA	1	
10	F-M10X125Y	Y-shaped joint	1	
11	Y2VP355L2-4-315	Variable frequency motor	1	
12	1323400	Tightening handle	4	
13	2511101	Handle (Silver)	4	
14	2501200	Handle 2501	2	
15	APC8-01	APC APC8-01	2	
16	HMSA10 V	Sealing ring 70x95x10	4	
17	99276	Wear bushing	2	
18	2000-DN15	Pneumatic Angle Seat Valve	8	
19	Y2VP-112M-4P-4-B8-T-0°	Frequency conversion motor for cutting device	1	
20	PT100	Temperature sensor assembly M12X1.5	5	
21	BPT13S	Trap DN15	4	
22	KDTE150X2.01.03.02-02	Cutting knife tray (18positions)	1	
23	KDTE150X2.01.03.02-02-A	Cutting knife tray (10positions)	1	
24	KDTE150X2.01.03.02-02-B	Cutting knife tray (14positions)	1	
25	KDTE150X2.01.03.02-02-C	Cutting knife tray (12positions)	1	
26	KDTE150X2.01.03.02-02-D	Knife support	16	
27	KDTE150X2.01.03.02-03	Pressure plate	16	
28	KDTE150X2.01.03.02-04	Blade 0.5mm	16	
29	KDTE150X2.01.03.02-05	Bush for discharge chamber	1	
30	KDTE150X2.03.01-01	Connection ring	1	
31	KDTE150X2.03.01-03	Bush locating sleeve	22	
32	KDTE150X2.03.01-04	Steam valve components	7	
33	KDTE150X2.03.02.02	Valve body	7	
34	KDTE150X2.03.02.02-01	Spacer I	7	
35	KDTE120X2.03.02.02-02	Valve rod	7	
36	KDTE150X2.03.02.02-03	Spacer II	7	
37	KDTE120X2.03.02.02-04	Spacer III	7	
38	KDTE150X2.03.02.02-05	Valve element	7	
39	KDTE150X2.03.02.02-06	Valve bonnet	7	
40	KDTE150X2.03.02.02-07	Reducing joint	7	
41	KDTE120X2.03.02.02-08	Valve handle	7	
42	KDTE120X2.03.02.02-09	Bush for expanding chamber of middle section	3	

43	KDTE150X2.03.02-01	Bush for pressure relief expanding chamber	1	
44	KDTE150X2.03.03-01	Wear resistant block	1	
45	KDTE150X2.03.03.02-03	Bush for feeding chamber	1	
46	KDTE150X2.03.06-01	Pin	1	
47	KDTE150X2.03.06-02	Copper bush	2	
48	KDTE150X2.03.07-02	Seal ring baffle	1	
49	KDTE150X2.03.07-03	Main shaft	2	
50	KDTE150X2.03.08-01	Striker plate	2	
51	KDTE150X2.03.08-02	Single-screw 219-146	8	
52	KDTE150X2.03.08-03	Twin-screw 146-210	8	
53	KDTE150X2.03.08-04	Twin-screw 146-180	8	
54	KDTE150X2.03.08-06	Spacer	12	
55	KDTE150X2.03.08-07	Twin-screw 146-50	4	
56	KDTE150X2.03.08-09	Clamping cap	2	
57	KDTE150X2.03.08-12	Backward spinning shearing block 79.5-3-45	6	
58	KDTE150X2.03.08-15	Forward rotating shearing block 79.5-3-45	4	
59	KDTE150X2.03.08-16	Spline housing	2	
60	KDTE150X2.03.09-01	Compression nut	4	
61	KDTE150X2.03.09-03	Locking nut M90x2	4	
62	KDTE150X2.03.09-04	Half round collar	8	
63	KDTE150X2.03.09-07	Collection device	1	
64	KDTE150X2.05-03	Steady flow plate	1	
65	KDTE150X2.05-04	Form plate support	1	
66	KDTE150X2.05-05	Distribution cone	1	
67	KDTE150X2.05-06	Form plate	1	

11 Appended documents

a. Packing list	1 copy
b. Operation manual of the product	1 сору
c. Quality certificate of the product	1 copy

12 Operational manual of pipeline system

The pipeline system of Kerunde KDTE 120x2 is divided into water piping part and steam piping part. The key components of the system are imported. PLC system is adopted to control the whole system. Please read the manual carefully and use it correctly to ensure safe production. Otherwise, you are responsible for the consequences

12.1 Water piping part

1 Water supply for extruding chamber and conditioner (See Fig. 12.1)



金属软管 DN15×600 Metal hose DN15×600 11. 电磁截止阀 Electromagnetic stop valve
 金属软管 DN15×600 Metal hose DN15×600 13. 截止阀 Stop valve

Fig. 12.1 Water supply for extruding chamber and conditioner

2. Cooling water piping for oil tank of machine and site installation of water incoming pipe before first section of expanding chamber (as showed in Fig. 12.2).



不锈钢钢管 DN15 2. 球阀 DN15 (三个) Ball valve DN15 (3 pieces) 3. 油冷却器 Oil coole Fig. 12.2 Water piping for oil cooling

3. Incoming water for jacket (for cooling jacket): direct connection with tap water (as showed in Fig. 12.3).



图三(夹套进水)

自来水 Tap water 1. 黄铜截止阀 DN20 Brass stop valve DN20

2. 金属软管 DN20x600 Metal hose DN20x600 3. 无缝钢管 DN25 Seamless steel pipe DN25

Fig.12.3 Incoming water for jacket

[Operating instruction]

- (1) It is required to provide clean tap water for the water box;
- It is required to provide dry and filtered compressed air with a stable pressure of 0.5 MP for the adjusting valve;
- (3) The bypass when carrying out a trial of the water piping for expanding chamber and conditioner, i.e. turn on all valves in the water piping (close the ball valves at both sides of the flow meter and adjusting valve);
- (4) After the water pump is started, the pressure of pressure reducing valve (6) is to be adjusted, so that the reading on the manometer is stabilized at a certain value between 0.4~0.6 MP after the pressure is reduced;
- (5) Close the bypass, turn on the ball valves at both sides of the flow meter and adjusting valve, so as to allow water pass through the flow meter (8) and adjusting valve (9), and carry out adjustment on the operating screen;
- (6) In case of normal work, the water in conditioner should be ejected out steadily in mist spray state, otherwise, check the pipeline for blocking;
- (7) According to water quality, the filter (3) shall be opened once a month or a half month, to remove impurities from the filter screen;
- (8) In case of normal work, the brass stop valve (1) in Fig 12.3, 12.4 and 12.2 is normally opened, while the stop valve at the side of main part of extruder in Fig. 12.2 shall be opened each time when the machine is shut down.



Fig.12.4 Discharging water for jacket and extruding chamber

Attention points:

- The piping support shall be horizontally installed, and each pipe shall be connected firmly with beautiful outlook, no water leakage, convenient for maintenance. For the installation, it is to refer to Fig. (12.1~12.4). The dotted line in the figures represents the part of site installation and the water pipe shall be stainless steel pipe;
- ※ If the opening of adjusting valve (9) is controlled on the operating screen during working, so the control faceplate of the adjusting valve must be is in automatic status, but not in manual status, otherwise, the control will be ineffective;
- * The water discharging pipes in Fig. 12.2 (water pipeline for oil cooling) and Fig 12.4 (water discharge pipeline for jacket cooling and steam of expanding chamber) may not be connected together, and the water here can be utilized again according to concrete situations;
- * The water box (rust proof) or water pond prepared by the customer shall have a volume not less than 1 m³, and the water pump (4) prepared by the customer shall have a lift between 70~105 m and its flow rate can be 2t/h. It is suggested that the customer can select a "peripheral water pump for boiler", type: 25GDL2-12X6.

12.2 Steam piping part

Attention points for installation:

- * The dotted line in each pipeline represents the part of site installation, and its length shall be determined according to practical situations on site and the pipes shall be seamless steel pipes;
- * The connecting parts of each pipeline shall be made according to the principle of "horizontal in transverse direction and straight in vertical direction", and may not be bended or drooped. The condensate discharge pipe (DN15) shall be mounted at low point every 8~10 m to ground and at the same time shall be equipped with a ball valve. In case of connection in short distance, no discharge pipe can be mounted;
- ※ Each pipeline should be connected firmly with beautiful outlook, without steam leakage, and it is required to bear a steam pressure of 0.5MPa at least;

※ After installation, each steam pipeline must be bund up with asbestos or other heat insulating material, so as to protect instrument and reduce heat loss (for steam flow meter, the binding thickness shall not exceed 5mm).

[Operating instruction]

- 1. The pressure of steam supplied for the steam pocket by the boiler shall be about 1.0MPa, the pressure of safety valve (1) in Fig.12. 9 can be 1.0~1.1MPa;
- 2. It is required to provide dry and filtered compressed air with a stable pressure of 0.4~0.6 MP for the adjusting valve;
- 3. It is necessary to empty the condensate from the steam pocket and every pipeline before and after startup each time. In case of normal work, the ball valve (3) and (5) in the drain pipe of the steam pocket (Fig.12. 8) shall be closed, but two ball valves at both sides of the drain valve shall normally opened;
- 4. Adjust the pressure reducing valves in each pipeline, so that all the pressure after pressure reduction is 0.4MPa;
- 5. The switch of the electromagnetic stop valve and the opening of the adjusting valve in the steam pipelines to the conditioner and the expanding chamber (Fig. 12.5 and 12.6) shall be controlled on the operating screen according to practical requirement;



1.疏水球阀 Drainage ball valve 2.减压阀 Pressure reducing valve 3.流量计 Flowmeter 4.进汽管 5. 压力表 Manometer
 6. 调节阀 Adjusting valve 7. 无缝钢管 DN38 8. 金属软管 DN50 Metal hose DN50
 9. 截止阀 DN50 Stop valve DN50 10. 截止阀 DN20 (12 个) Stop valve DN20 (12 pics)

Fig. 12.5 Steam to Conditioner

- 6. Regularly open the filter in each pipeline once every month or two months, to remove impurities from the filtering screen;
- 7. The operation shall be carried out according to requirement and the valves may not be closed or opened at will during work, so as to ensure safety in production.



无缝钢管 DN25 Seamless steel pipe DN25 2. 金属软管 DN40×400 Metal hose 40×400
 截止阀 DN40 Stop valve DN40 4.进汽管 5. 减压阀 Pressure reducing valve
 流量计 Flowmeter 7. 压力表 Manometer 8.电磁截止阀 Electromagnetic stop valve
 9.调节阀 Adjusting valve 10.疏水球阀 Drainage ball valve

Fig. 12.6 Steam to expanding chamber





截止阀 DN20 Stop valve DN20 2. 金属软管 DN20×600 Metal hose DN20×600
 无缝钢管 DN15 Seamless steel pipe DN25 4. 减压阀 Pressure reducing valve
 5. 压力表 Manometer

Fig. 12.7 Steam to jacket





至排水沟 To drain ditch 1. 汽包进汽管道 DN65 Incoming steam piping of steam pocket DN65 2. 截止阀 DN100 Stop valve DN100 3. 排污球阀 DN20 Blow-down ball valve DN20 4. 疏水阀 DN15 Drain valve DN15 5. 球阀 DN15 Ball valve DN15

6. 无缝钢管 DN20 Seamless steel pipe DN20





 安全阀 Safety valve 2. 压力表 Manometer 3. 无缝钢管 DN40 Seamless steel pipe DN40 至排水沟 To drain ditch Fig.12.9 Steam pipe of safety valve

Packing list

Date:

I. Appended documents

No.	Designation	Qty	Remarks	
1	Packing list	1		
2	Quality certificate of product	1		
3	Operation Manual	1		
4				
5				

II. Attached accessories

No.	Designation	Code	specifications	Qty	Remarks
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					

Consigner (signature):

Date:

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