

Cone Crusher

1. Application:

This series of crushers is widely used to crush hard and mid-hard ores and rocks in metallurgy, construction, road building, chemistry, such as iron ores, copper ore, limestone, quartz, granite, etc.

2. Specifications:

	PYD1200	PYZ1200	PYB1200
Max feeding size(mm)	170	115	60
Recommend max feeding size (mm)	145	100	50
Discharge opening(mm)	20-50	8-25	3-15
Capacity (t/h)	110-168	42-135	18-135
Power (Kw)	110	110	110
Speed of motor(r/min)	730	730	730
Voltage (V)	220/380	220/380	220/380
Swing Num of mail shaft	300	300	300
Total pressure of spring	150	150	150
Weight (motor included)	25	24.82	25.7

3. Structure and working principle

The crusher consist of main frame, transmission device, hollow eccentric shaft, crushing cone, adjustment device, adjustment cover, springs and hydraulic station for adjusting the discharge opening.

During the operation, the motor drive the eccentric cover to rotate through the horizontal axle and bevel gears. The center axle of crushing cone swings with the force of the eccentric shaft cover so that the crushing surface is close to the mortar from time to time. In this way, the materials will be crushed through continuous pressing. Diagram 1 is the cutaway view of the machine.

4. Installation and debugging

1). This instruction book only includes some special installation instructions of the machine. The rest can refer to the instructions of general machine.

2). The lifting device

In crusher installation room, there should be a lifting device which can be used when installation and maintenance. The lifting device can be chosen from the following table according its lifting ability.

Name	Weight (Kg)			Need time
	PYD1200	PYZ1200	PYB1200	
Main frame	5000	5000	5000	Installation
Transmission device	540	540	540	Installation and maintenance
Hollow eccentric shaft	883	883	883	Installation and maintenance
Bowl-shaped bearing	1004	1004	1004	Installation and maintenance
Crushing cone	3125	3125	3380	Installation and maintenance
Adjustment device	3400	3400	3751	Installation and maintenance
Adjustment cover	3751	3751	3950	Installation and maintenance

3). Installation instructions

A. check the number of the spare parts before installation. Check and make sure there are no damage to the spare parts during transportation and clean the protect painting and the dust or dirty materials on the spare parts.

B. when installation, spare some dry oil on the fixed surface of the spare parts, and spare some watery oil on the movable surface.

4). Base

A. the crusher should be installed on concrete base. The depth of the concrete is determined by the local conditions.

B. to prevent the rocks piling, there should be enough space under the base...

C. to protect the base, a protection board should be put on the base. Clients prepare these themselves.

D. we provide foundation diagram only for reference.

E. the place of lubrication system and electric controlling system can be changed according to different environment, but the sequence cannot be changed.

5). Installation of the frame

A. strictly vertical and horizontal must be ensured when installing the frame. Use the gradienter and suspender to check the central line of the bottom base. (diagram 2)

B. after adjusting the bottom base with the adjustment wedge, fasten the ground bolt and begin the second grouting.

C. when the second grouting is fixed, withdraw the wedge from the bottom of the crusher and fill the gap with concrete. Then, check under the condition of frame

installation A.

D. keep the bottom base vertical and horizontal. Make sure the machine operate properly, otherwise, the copper cover will be imbalantly touched, the eccentric cover will be fractioned and the sealing device will be out of work.

6). Installation of transmission axle

A. when installing the axle, an adjusting mat will be put between the bottom base and the flan of the transmission part.

B. after installing the device, use a template to check all the size concerned with the transmission gears.

C. the moving range of the transmission gear should be kept between 0.4-0.6mm. (that is, the gap of the two ends of B).

D. when dismantling the transmission axle, use the bolt on the flang to prop it up. The square bolt should not be fastened without dismantling the transmission device.

7). Installation of hollow eccentric shaft

A. before installation put the mat on the bottom cover. Then, use a sling to put the cover under the frame. After that, put the upper round plate and lower round plate on the bottom cover in sequence and make sure the heave place on the lower plate and the concave place in the bottom cover are locked. (Diagram 5)

B. when installing the hollow eccentric shaft, a round-end bolt can be used to put the eccentric shaft into the central hole in the frame. Be sure the gears are not stricken when installing.

C. after installation, the out surface of the big and small gear must be at same level and check the gap between the gears. For the model 1200, the warp is about 2.1-2.58mm.

8). Installation of bowl-shaped bearing

A. preparation

a. get rid of the sundries in the oil groove and oil hole.

b. make sure there is no damage to the dust-proof mat and oil seal mat.

c. make sure the processed surface is in good condition. If any damage, it should be repaired immediately.

B. the bowl-shaped bearing support should be close to the bottom base and check the interface of the horizontal with gap ganged. (Diagram 8)

C. after installing the bowl-shaped bearing put a cover on the bowl-shaped tile. Take it off when installing the crushing cone.

D. when installing the bowl-shaped bearing, make sure the water-in pipe, water-out pipe, oil seal ring and dust proof ring are in good condition.

9). Installation of crushing cone

A. before installation set up a firm and tall wooden support to help install the crushing cone.

B. clean the protective oil layer on the shaft and spherical surface and clear up the oil hole and oil groove with wind.

C. spare a layer of dry butter on the cone shaft and a layer of watery oil on the spherical surface.

D. when installing the crushing cone, put it lightly in to the hollow eccentric shaft to

prevent the circle ring being damaged.

10). Dust-proof device

- A. the dust proof device of this crusher adopts dry oil to seal. See diagram 9.
- B. the sealing structure of this crusher is similar to Symons in America. This structure is reliable and with low cost since a set of water-supplying is saved.
- C. when installation, fill the cavity with dry oil. Refill it when checking.

Notes:

If clients ask water to be the dust proof device, they should prepare water supplying system as

shown in Diagram 10-1.

- A. set up a mouth-type pipe near to the water box
- B. a water adjusting valve should be installed in water-in pipe.
- C. When the crusher stops, the water in the dust proof device should be discharged totally.

11). Installation of lubrication system

- A. the installation of lubrication system can refer to the installation instruction book of the factory, or refer to local conditions. But if the allocation is decided by clients, they should prepare the spare parts themselves.
- B. the installation of lubrication system should make it convenient to oil the machine.
- C. installation of lubrication system is finished before crushing cone. Because the test of lubrication system should be carried first so that it is convenient to maintain if there are problems in lubrication system.

12). No-load trial operation

After the above steps, trial operation should be taken to check whether the installation is qualified.

- A. before starting the crusher, check the connection parts.
- B. Before starting, rotate the transmission part with hand, and make sure the hollow eccentric shaft rotate at least 2-3 circles. If it is flexible, start the crusher.
- C. Start the oil pump before starting the crusher until all the lubrication points are oiled. After seeing the oil return the oil tank, start the crusher.
- D. The no-load trial operation should be at least 2 hours.
- E. The no-load trial operation should reach the following requirement.
 - a. self rotation of crushing cone should be at most 15 rounds per minute.
 - b. The cone gear should have no periodical noise.
 - c. The lubrication system should meet the following requirement:
 - the pressure of the oil should be within $0.8-1.5\text{kgf/cm}^2$.
 - The temperature of the returned oil should be below 50°C
 - d. after trial operation, there should be no burning and damage in every friction part.
 - e. If the rotation speed of the crushing cone is too quick, stop the crusher immediately and maintain it on time. Check the oil quantity and retrial again.
 - f. If there is periodical noise to the cone gear, check whether the gear is installed correctly and check the gap between the gears.

13). Installation of adjustment device, adjustment cover and springs (diagram 11)

- A. clean the supporting cover and the adjusting ring. Spare mixer of dry and watery oil on the toothed whorl. Install locking oil tank on the supporting cover. Connect locking oil tank with the hydraulic station.
- B. install the supporting cover to the main frame.
- C. put the adjustment ring into the supporting cover.
- D. screw the latch on the supporting cover. Strike four tags into four corresponding keyhole.
- E. install funnel stand and funnel.
- F. install dust proof cover. Make sure the four keys of the adjusting ring are in the groove of dust proof cover.
- G. adjust the height of spring according to the diagram.
- H. install the energy accumulator of the pusher tank. First install the pusher tank according to diagram 13. Interface M and N of the pusher tank is connected with M and N on the hydraulic station. Hold the energy accumulator on the feeding support with a folder. The energy accumulator is connected with the locking oil tank through 补心软管 and cross joint.

14). Installation of feeding device

- A. incorrect installation will lead to following troubles.
 - a. capacity is lowered.
 - b. the size of final product is uneven, big size cover a large percentage.
 - c. the abrasability of the wear parts is not even or they wear too quickly.
- B. the height between feed opening and distributor is very important to the crusher. If it is too high, the raw materials cannot easily enter the crushing chamber. Therefore, the height should be based on the instructions.
- C. arcuate steel plate is used to protect the feeding box from damaging and protect the materials from being stuck in the feeding box. When installation, keep the arc steel plate in good shape and pay attention to the space between the arc steel plate and the edge of the feed opening to protect materials from being stuck. (see diagram 14)

15). Installation of hydraulic station and debugging

- A. the hydraulic station of the crusher is installed on a proper position on the base to make operation convenient. The connecting spare parts between the hydraulic station and main unit can be installed according to the local conditions.
- B. the interface M, N, P of hydraulic station is connected with interface P of locking tank.
- C. after installing the hydraulic station takes the pressure test. The temperamental pressure is 140kgf/cm^2 .
- D. take locking test.
 - a. fill $75\text{-}80\text{ kgf/cm}^2$ nitrogen gas to the energy accumulator before press air into the locking tank.
 - b. only after the pushing tank discharges air can locking tank is filled with air.
 - c. during the test, the left air in the locking tank and its pipes can be let out through 螺堵 at bottom of the pipes or the energy accumulator.
- E. debugging test: After locking tank discharges air, use pushing tank to take the test of adjusting the discharge opening.

F. make sure the spare parts of the hydraulic station are in good condition. (see diagram 16)

16). Load test

A. if the no-load test is ok, the load test can be taken.

B. the load test should last 48 hours.

C. at the beginning of the test, put small quantity of rocks into the crusher, then, gradually, add the quantity.

D. the load test should reach the following requirement:

a. there is no acute vibration and no big noise

b. both the feeding and discharging are in good condition. The capacity is similar to stipulated capacity.

c. the hydraulic station operates well

d. the lubrication system should meet the following requirement:

- the pressure of the oil should be within $0.8-1.5\text{kgf/cm}^2$.

- temperature of returned oil should be lower than 60°C

e. there is no damage to the wear parts.

f. the electric system is in good condition

5. Maintenance

17). Notes

A. the materials must be in the middle of the distributor, see diagram 14. it is not allowed to put the materials into the crushing chamber directly, because it will make the crusher overloaded and the liner plate will be abraded unevenly.

Correct feeding conditions:

a. the materials are distributed equally to the crushing chamber.

b. The quantity of materials should not higher than the mortar.

B. the max feeding size should not equal to the feed opening, (the max feeding size $\leq 85\%$ of the feed opening) otherwise, it will lead to:

a. the capacity is low

b. some spare parts will be damaged.

C. crusher is not allowed to start in overload condition in case of accident.

D. when stop the crusher, stop the feeder first. After the materials are all discharged out, stop the crusher.

E. the locking system and hydraulic station should be checked often to avoid problems.

18). Capacity of the crusher

Capacity is subject to feeding method, material size, size of final product, material nature, temperature, etc. the range is wide. The capacity is under certain conditions.

19). Change of mortar

There are u-shaped bolts on the adjusting ring. Fill zinc alloy into the space. When installing or changing the mortar, after 6-8 hours' operation, check the fastening conditions and screw the U-shaped bolts again.

20). Change of the crusher inner wall

The cone crusher inner wall is fixed to the cone crusher body through a cone end. There is zinc alloy between them. When installing or changing the inner wall, after

6-8 hours' operation, check the fastening conditions. If there is loose, fasten it.

21). Mesh of gears

The friction of round plate changes the gap between gears. To make the gears properly meshed, clients are required to put a mat on the bottom cover. The thickness of the mat should equal to the friction of the round plate.

22). Bowl-shaped bearing and sealing device

When installing the bowl-shaped bearing, make sure the oil seal is not damaged by the steel cable.

When assembly, scrape the spherical surface to ensure the space between crushing cone and the spherical surface is kept within 0.35-0.5mm.

The bowl-shaped tile is fixed to the bowl-shaped bearing support through lock pins to prevent the tile rotate in circle.

The bowl-shaped bearing support and the frame are fixed together by lock. If there is space between the support and the frame, deal with it immediately.

23). The cylinder liner and the frame is the third transient assembly. To avoid the liner rotating, the upper part of liner is filled with zinc alloy. When changing new liner, make sure it is according to the practical size because the after long time's operation and assembly, some changes may happen to the crusher. If the space is too large, the liner will be broken.

24). Conic liner

The cone cover and the eccentric shaft should wring each other. Fill in some zinc alloy to stop the cover rotating. The space should be full of zinc alloy. The cover may change its shape due to the hot zinc alloy, so check the size of d_1 , d_2 and B of a new cover. If it is incorrect, correct it. When making spare parts, make sure it is fit for the practical size of the inner diameter of eccentric shell.

25). Springs

A. The function of springs is: when some uncrushed materials enter the crusher, they will prevent crusher from damaging. Therefore, the pressure of the springs and the crusher is corresponding to each other. If the crusher is in good condition, the spring is stable; only when uncrushed materials enter the machine will the springs be pressed.

B. if the upper part of crusher vibrates, clients are required to check the machine carefully and solve the problem. If pressing the springs incorrectly, some parts may be damaged, because pressing the spring will increase the pressure of the crusher.

The reason why the upper parts of crusher vibrate is:

- a. feeding unevenly or overfeeding
- b. there are many small lump materials in the raw materials or the humidity is too high
- c. the discharge opening is too small.

26). The outer rotation parts of the crusher should be protected with cover which is prepared by clients.

6. Lubrication system

27). Since the friction surface receives much pressure, lubrication is very important to the crusher. The crusher is centrally lubricated with watery oil.

Oil route

There are two routes for the oil to enter the machine; one is through the oil hole at the bottom of the crusher, then to the hollow eccentric shaft surface, bowl-shaped bearing and the big and small gears through 3 separate ways. The other is through the hole in the transmission shaft support, then to the transmission bearing. The return route is a spill hole at the bottom of the small bevel gear and another spill hole in the dust-proof cover.

28) lubricating oil

In winter, steam turbine oil should be adopted; in normal circumstances, diesel oil should be adopted; in summer, No. 11 gas oil is suitable. To ensure normal operation of the crusher, if there is no heating system in the workshop, an ohmic heater should be set in the oil tank to increase the temperature. In summer, the oil temperature is high, so the oil should first go through a heat exchanger.

29). The hydrostatic pressure of heat exchanger is 2—3kgf/cm², and the water temperature must be lower than 28°C. The water should be clean.

30). The oil pressure of the machine should be up to 0.8—1.5kgf/cm².

31) if the pressure is lower than 0.8—1.5kgf/cm², the electric system will send out signal. At this moment, stop the feeder and check the reason.

32). Due to long term operation, the temperature of lubricating oil may be very high, but it should not higher than 60°C, otherwise, stop the crusher and check the reason.

33). In winter, if the machine stays out of work for long time, clients should adopt some measures to stop the oil from frozen. The best way to do this is operate it in no-load condition periodically. If necessary, use the ohmic heater.

34). Newly-installed crusher should be changed lubricating oil every 1-1.5 months in the first 3-4 months. After that, change the oil every 3-4 months and add to the lubricating oil periodically.

35). Make sure the filter is clean. If the oil quantity is reduced during operation, it is possible that the cylinder is blocked. Stop the crusher and check it.

36). Check, clean and maintenance of the machine should at least once a year.

37). When cleaning the catheter of the lubrication system, choose the place where may be residua deposition, for example, the turning point. According to the conditions, check the whole catheter or part of it.

38). After using the new oil, the filter should be cleaned after 1-5 days and nights. Also, the filter should be repaired every time checking the machine.

39). The oil pump should be checked at least once a year.

40). When the lubrication system is broken, the oil level in the oil tank should reach the highest level. When the lubrication system is at work, the oil level should not lower than the lowest level.