

Operation Instruction

**Production
Name**

MPF1410 Roller Coal Mill

**Drawing
Code**

KYMP0002.00 SM


**Production
Number**

NM12031

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Northern Heavy Industry Co., Ltd

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Preface

Honorific user:

Welcome to use MPF Roller Coal Mill made in ShenYang Heavy Machinery Group CO., LTD. Please read Operation Instruction and correlative files carefully before using.

This Operation Instructions includes prescriptions for function, operation, maintenance and mounting.


This Operation Instructions is not integrity instruction to whole milling system. So it can not replace comprehensive training for operators.

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Minister	Liu Wanhua	Chief Designer	Song zengwang	2010.4.20
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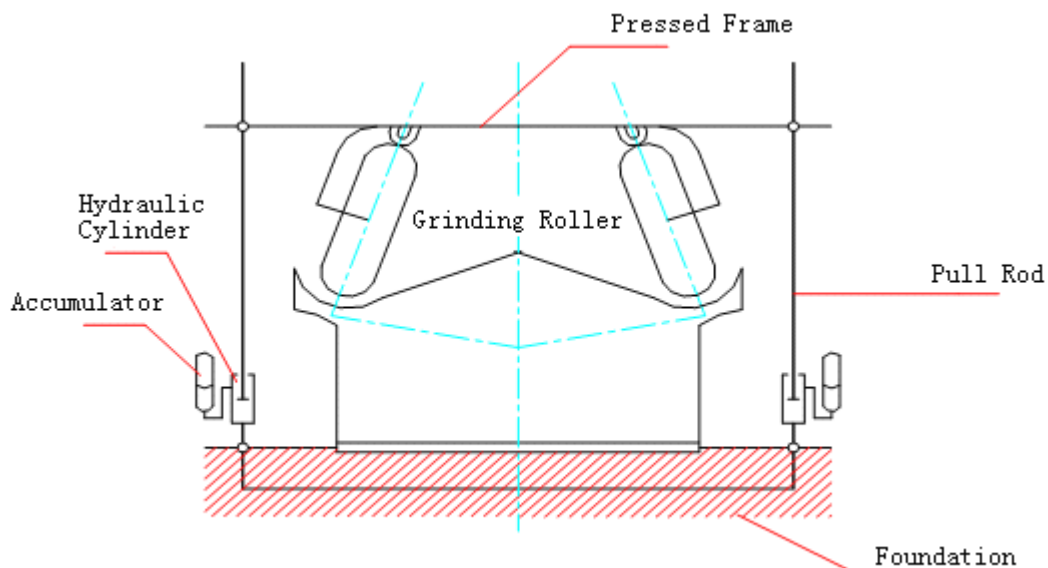
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A. Description for MPF Coal Mill function

A. 1 MPF Coal Mill

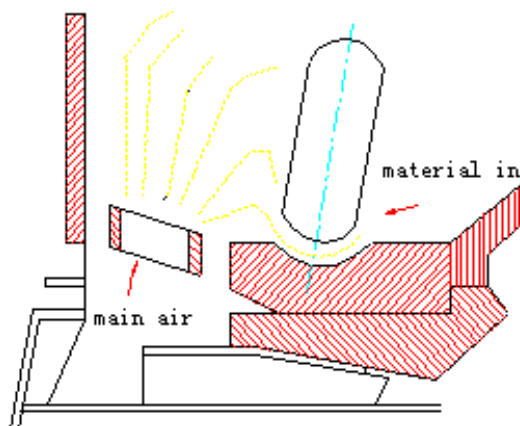
A. 1. 1 Mill operation principle

The type of MPF roller mill is an applied force mill comprising 3 stationary grinding rollers which roll on a rotating grinding track. The product centrally admitted to the rotating grinding track is carried by centrifugal force into the grinding track and rolled over there by the grinding rollers. The three grinding rollers are equally spaced on the circumference of the grinding track. The grinding pressure is produced by hydraulic cylinder. It is uniformly transmitted to each of the three rollers by a statically determined three point system. The grinding track and the grinding rollers' pressure transmitted to the foundation through bottom plate, pull rod and hydraulic cylinder. The coal's grinding and drying are in progress simultaneously. The hot gas, around the grinding track, through the nozzle ring and take charge of drying as well as transporting the pulverized fuel to classifier arranged above the mill housing. Here the oversize is separated from the fines. While the fines are discharged, the oversize returns to the grinding track to be further reduced in size.



Foreign matter and coarse material which, owing to their weight, are not discharged by the hot gas, fall through the air jets of the nozzle ring into the hot gas duct of the mill gas. They are caught by the scrapers and discharged into the waste

material box. The rejecting work can be taken during the period of mill running.




The MPF coal mill is generally driven by an asynchronous squirrel-cage motor-YMPS type.

The main reducer will transform the power from the motor to the grinding track and adjust the rotation speed accomplished with the speed of mill, at the same time, it is also called upon to accommodate the vertical and horizontal loads from the weights of the pulveriser and from the grinding forces.

In maintaining, the end of motor can be contacted with the low speed barring gear.

A. 1. 2 Scope of supply

1. Foundation (including bottom plate, foundation bolt box, foundation bolt and backing plate, etc)
2. Frame
3. Frame seal ring
4. Grinding track
5. Nozzle ring
6. Grinding rollers
7. Loading device

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8. Tension rod mechanism
9. Hydraulic system (includes hydraulic station, hydraulic pipe and relevant parts)
10. Classifier
11. Sealing air pipeline
12. Inert gas pipeline
13. Inspection platform
14. Sealing air blower installation
15. Motor
16. Reducer and its lubrication station
17. Low speed barring gear
18. Special tools for maintenance and mounting


A. 1. 3 Parts functional description

A. 1. 3. 1 Foundation

The foundation plate for mounting the reducer, tension rod and the motor carrier should be adjusted before the 2nd grouting. Haul the reducer out of the rail and adjust the reducer bottom plate to a same plane, after welding and fixing, bury the foundation in 2nd grouting.

A. 1. 3. 2 Frame

The frame is equipped with the primary hot air inlet and hot air leading device(nozzle ring). It is fixed on foundation. The columnar frame sealed the grinding parts. The wearable steel plate is lined in the inner wall. On the four sides of the mill, there are the sealing gate for inspection, observation gate for inspecting the abrasion of rollers and nozzle ring and rollers turning gate for maintenance.

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There are also tie rod sealing device, nozzle ring fixing device and caging device on the frame.

A. 1. 3. 3 Frame seal ring

This mill runs with negative pressure. Set a labyrinth sealing rings on bottom frame for preventing the hot air release.

A. 1. 3. 4 Grinding track unit

The torque transmission is accomplished by the rigid connection between the reducer and the grinding seat. In order to prevent the effect of hot air with dirt and inhaling the cold air, a sealing air line is formed between the grinding seat and bottom frame sealing ring. The scraper is mounted on the grinding seat, which discharges waste material out of mill through the groove. Wear-resisting alloy grinding cover is mounted on the grinding seat. The grinding cover is screwed up by wedge clamping bolts. There is centre cover plate on the grinding track, which distributes materials and prevents water and dusts into the grinding track bottom.

A. 1. 3. 5 Nozzle ring

The nozzle rings are around the grinding track. It includes nozzle ring and clamp plate.

A. 1. 3. 6 Grinding rollers

Grinding rollers are key part of mill. Their roller cover is made of high-chromium cast iron, and its shaping is even. Roller bearings are designed according to special requirement, because the reduction forces resulting from the dead weights, the grinding pressure and the roller guidance are accommodated by the rolling contact bearings. Since the service life of rolling contact bearings is decisively influenced by the lubricating conditions, special attention has to be paid

to a perfect lubrication. For the lubricant grade and filling volume you are referred to the lubricants list. The minimum oil level should guarantee seal ring of the bearing is immersed into the oil. In order to avoid oil leakage and the penetration of impurities into the bearing, special attention has to been paid to a good sealing effect. The free space between the rings is filled with grease “for life”. The hollow cast bracket is connected via a movable piping to the sealing air system. The sealing air flows from inside the bracket into a annular duct ahead of the shaft sealing rings. In order to compensate for the influence of different pressure conditions at varying temperatures, a ventilation filter is provided for with a connection to annular sealing air duct.

A detection hole is provided on roller shaft, which serves for checking and measuring the oil level. It is closed with a screw.

A. 1. 3. 7 Guiding device and loading frame

The guiding device is mounted at three corners of the frame. It can make loading frame and grinding rollers move vertically in a large range. It has renewable high-abrasive cast part. Replaceable supporting plates of a special steel casting alloy are screwed not only to the frame but also into the mill housing to support the loading frame, and be fixed on frame and loading frame by bolts.

Position of every grinding roller is adjusted through two roller hinges. Every roller hinge mounted on roller bracket can rotate along radial direction. The grinding rollers can adjust themselves horizontally to the grinding pad on the grinding track. If it is necessary, the slope of grinding rollers can be adjusted through this machnism.

When the grinding rollers are working and go up and down because of the grinding pad thickness's change, their working slope can be maintained through swinging hinge adjustment devicethe grinding pad thickness and the best grinding state can be attained.

A. 1. 3. 8 Tension rod mechanism

The tension rods are connected by means of a joint bar with the loading frame on

the one hand, and by means of a tension rod nut with the differential cylinder on the other hand.

The differential cylinder is fastened to the foundation by means of knuckle bearing and the tension rod base plates. For the rod passage through the mill frame there is an articulated sealing supplied with sealing air which is pressure-tight towards the outside due to a fabric expansion joint.

From a scale beside the tension rods the grinding pad thickness and the rate of wear and tear can be read from the outside during mill operation with the help of existent marking.

A . 1. 3. 9 Hydraulic system


Every mill is equipped with one set of hydraulic station, which will provide the power for the running device and 3 tension rods through the hydraulic pipes. In addition, it also can lift and down the rollers in maintenance.

A. 1. 3. 10 Dynamic classifier, sealing air pipeline

The classifier is designed as dynamic static classifier. The mixture of the air and powder from the grinding cavity will be delivered to the dynamic fan the fineness classification, the improper rough powder will be classified out and deliver to the grinding cavity through the bottom of the classifier for the secondary grinding. The proper powder will be delivered to the cabin by the hot air. In mill operation, the dynamic classifier is adjusted by frequency-control motor, which can change the characters of the classifier, so in the condition of the stable hot air and material flow, the grinding fineness can be adjusted.

The dynamic fan rotation of the classifier is driven by the frequency-control motor, the proper speed of the fan can be gotten by shift of the planet reducer and outer teeth ball bearing.

Each grinding roller is connected via a pipe with the sealing air line rigidly mounted to the classifier. The interconnecting piping is secured on the one side by the bracket and on the other side by the classifier in pivoting bearing in order to compensate the vibration produced during grinding.

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Before the main air fan and the classifier frequency conversion motor start, the sealing air fan must start first. The sealing pressure must be higher than 2000pa. only in this condition, the classifier lubricating tank can be well sealed.

A. 1. 3. 11 Inert gas pipeline

If necessary, the inert gas can be input into the mill through the pipeline to avoid spontaneous combustion of pulverized coal.

A. 1. 3. 12 Platform

The mill body is equipped with the classifier checking platform and the frame checking platform. The classifier checking platform is used for maintenance and repaire of the classifier driving mechanism and dismantlement of pulverized coal transimission pipe flange and falling coal pipe flange. The frame checking platform is used for maintenance and replacement of the grinding rollers, the grinding track, the frame liner plate and the nozzle ring.

A. 1. 3. 13 Sealing air fan

The sealing air fan can provide the air for all sealing points. The sealing points are including:

- Grinding rollers
- Classifier

A. 1. 3. 14 Main motor


Main motor is squirrel cage type three-phase asynchronous motor. It provides power for mill.

A. 1. 3. 15 Reducer and its lubrication station

The reducer is planet gear speed reducer. It can provide enough torque and fit speed.

The lubrication station is for lubricating the gears of reducer, bearings and thrust bearing.

Note: the lubrication oil must be in accordance with the regulated standard.

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A. 1. 3. 16 Low speed barring gear

Please see the description for “E. Low speed barring gear”

A. 1. 3. 17 Special tools

It is used for maintenance overhauling and mounting the mill.

Please see the detailed description in the “F.Special Tolls Instruction”


A. 1. 4 Technical parameters for Coal Mill

Type	MPF1410	
Standard Capacity（R90=13.5%， HGI=60-90， $M_t \leq 12\%$ ）		
	t/h	15
Motor power	kW	185
Rotary speed of grinding track	r/min	30.59
Rotary speed of motor	r/min	990
Rotary direction of motor（from the motor shaft direction） clockwise		
Max. Hot air volume at the mill inlet	kg/s	7.73
Max. Resistance (mill and classifier)	Pa	5370
Total weight of mill body	t	about 43.7

A. 2 Mill reducer

A. 2. 1 Reducer function

Motor speed is transferred to mill through reducer. This reducer has a bevel gear and planet gear. Inputting shaft is mounted horizontally and big bevel gear and outputting shaft is mounted perpendicularly. All shafts are supported by roller bearings. Mill parts' weight and grinding pressure bring perpendicular and horizontal loads. These static and dynamic powers are borne by reducer and transferred to foundation. The perpendicular power is borne by thrust bearing under

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reducer outputting flange mainly.

The reducer is equipped with a centralized lubrication station.

A. 2. 2 Reducer parts function

Please see Product's Instruction of manufacture for it.

A. 2. 3 Technical data for reducer and its lubrication station

Please see Product's Instruction of manufacture for it.

B. MPF Coal Mill operation description

B. 1 MPF Coal Mill

B. 1. 1 Summary

The rule and description must be implemented when MPF mill operate. Mill valve doors (in and out) must be shutting off when mill stop for preventing the coal firing and exploding. Attention when the mill is repaired and fitted, the motor must be shut off to prevent incorrect start.

When mill running, the valve door of inert gas pipeline must be shut off. Other foreign matter, such as metal material, stone or coarse material must be prevented into mill.

Operator must ensure to prevent wash cloth, rope, wiring etc into mill, because they can stop up the classifier and reduce the production. They can heap up coal and firing. When mill operate, all doors must be shut off and locked, they can not opened careless. The min. air volume must be ensured for preventing heap up coal and removed from the classifier. There is any coal on the grinding track before starting.

Attention! Mill cannot operate without coal.

*Before every starting, the operator should inspect and clear out the waste in the system.

*Inspect the electric fluent of the motor

*The operation over the alarming limit is not permitted.

The manufacturer will not take any responsibility to the damages caused by the operation over the alarming limit.

B. 1. 2 Preparation before running the Mill

- * Disassemble the low speed barring gear;
- * Assemble protecting cover for drive shaft of motor
- * Adjust the grinding pressure well
- * Each auxiliary units of mill are ready
- * Thickness of coal lay on coal feeder >minimum value
- * Reach the voltage for operation and control
- * Sealing air fan is running
- * Lubrication station and hydraulic station provide oil normally
- * The lubrication oil volume should be more than the oil storage volume of reducer's gear and slide thrust bearing. The rollers, sealing air fan bearings, hydraulic devices, classifier driving device and the upper parts of the planet reducer should be provided enough oil.

- * Please see the position without alarm and interlocking device in B.2.0
- * Pulverizing system is ready.
- * Control device for classifier outlet temperature, lubrication and hydraulic system temperature is normal.

B. 1. 3 Mill starting and running

1) Mill starting and running normally

Mill might be started with automatic order.

Manual order for starting as following:

- * prepare and start the mill according to B.1.2
- * mill starts. At this time start the coal feeder with minimum speed

Attention:

Do not start mill without coal

Start the fuel loading control device (control the feeding coal speed)

Normal operation starts.

2) Inspection during mill running

1. Waste material

The waste material must be cleared out during mill running,

2. Mill noise

Inspect there is the unusual noise or not every hour.

When there is short noise, inspect whether the foreign matters are mixed in the reject system.

3. Vibration

Inspect there is the unusual vibration or not every hour.

4. Sealing air


Inspect sealing air pressure continuously.

5. Hydraulic stations and hydraulic cylinders

Inspect oil level of hydraulic station every 500 hours. Inspect oil pressure and cylinders running situation continuously.

6. Grinding rollers

Inspect rollers temperature continuously and inspect rollers oil level every

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three months.

7. The classifier driving mechanism

Contiguously check the working status of the classifier driving mechanism's frequency conversion and check the oil level every 3 months.

8. Ruducer and its lubricating station

Contiguously check the oil temperature and pressure of Ruducer and its lubricating station and check the oil level every half a months.

B. 1. 4 Mill shutting down

The mill should shut down according to the regulation of the "Sketch drawing for the control program.

Adjust the coal feeder to "minimum" and reduce classifier outlet temperature before mill shutting down.

- * Open the cool air plate
- * Close the hot air plate
- * Shut off the coal feeder when classifier outlet temperature is lower.
- * Reduce classifier outlet temperature again
- * Mill shuts down after coal is discharged.


The material discharging time can be gotten from the actual working experience. In order to guarantee the safety, after prevailing "stop program", reduce the mill outlet temperature immediately to avoid the temperature increasing caused by heat radiation of material.

Take special concern on the driving motor current.

Inspect and clean waste material during mill shutting down.

B. 1. 5 Mill emergency shutdown

Mill emergency shutdown should be according to "Block Diagram for Control

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Program”

If meet not eliminable serious accident, you should treat it as emergency shutdown.

When system and mill parts appear the accident which need emergency shutdown, the mill should automatically emergency shutdown. Please see B.2.0 for the conditions for emergency shutdown.

The explanation about emergency shutdown is following:

- * Abnormal noise
- * Air with coal powder leaking
- * Failure of operation
- * Breaking down
- * Worsened operation condition

In emergency shutdown condition, the mill cannot be cool down slowly, so after emergency shutdown, the inert gas input system should be opened automatically. Please see the details in B.1.6

After emergency shutdown, inspect all parts of the equipment before restarting.

Clean the mill (pay attention to the safe operation regulation)

Inspect the waste material. If necessary, clean it out.

Restart the mill according to B.1.3

B. 1. 6 Inert gas inputting

Enough inert gas must be supplied into mill if the oxygen level in the mill is over than 14% when milling running.

Inputting inert gas becomes necessary when the oxygen level in mill is excessive, and this time high temperature can result in coal powder into self-ignition and suddenly burning. The risk of self-ignition increases with the gas content, degree of fineness, mill coal density, dryness and temperature increasing.

Coal powder in mill is firing or suddenly burning, which can lead to classifier outlet temperature rising. When temperature reaches allowable maximum temperature, you should adopt the measure for emergency shutdown.

In general, it is not allowable that the temperature exceeds the operation temperature of classifier (100℃). If the temperature exceeds above temperature, you

should lower the temperature immediately. If failure for lowering the temperature or the temperature is being still increasing, the mill should shut down immediately and open the inert gas input valves. (When the classifier outlet temperature reaches to 110°C, mill should emergency shut down.)

When the temperature of classifier increase again during mill shutdown, open the inert gas input system again. If the temperature is lower than the firing risk, close the inert gas input valves.

Because it is impossible to predict causation of firing in mill, you should input the inert gas into mill according to the actual conditions.

B. 1. 7 Instruction for Mill restarting

Mill might start again after eliminating trouble and having finished opening mill motor.

Adjust coal feeder to rated speed. (Start in accordance with the stop speed and run to the primary rated start speed.)

Special Attention: If the mill could not start again after emergency shutdown one hour, the coal matter must be cleared out of the mill.

Note: You could clear mill manually or open mill access door only when the classifier temperature is lower than 40°C.

B. 1. 8 Discharging waste material

Under every mill (on the side of reducer), there is a deslagging door for discharging the waste material. The discharged waste material includes the iron mine which is not grinded, impurity and coal gangue, sometimes the coal granule (for example when the mill stops). In normal conditions, the waste material will be discharged into the chute by the scraper.

Attention: When the waste material is very hot, you could be injured by hot material. You should be careful when you clear the waste material.

When the mill starts after a long time stop or be of emergency shutdown, you should clear the material in the pulverizing system. Especially when emergency shutdown, the coal and coal powder in mill can burn very easily under higher temperature if they are not discharged out of mill. At this time, the first important thing is to reduce the contact between the coal powder and hot environment and input the inert gas. Discharging the material in the grinding area is also very necessary. Lift the rollers by hydraulic system and start the motor or motor of low speed barring gear, the material will be rejected to the bottom of the grinding area, and the scraper will discharged the material out.

When there is some trouble on power or equipment protection, the mill will be clear by hands. Mill will not run, for example, under the following conditions:

--Material in mill is too much to start motor (otherwise the equipment will be suffocate)

--Mill motor stops

--Rollers cannot be lifted for the failure of hydraulic system

--Pressure lubrication system does not run

--Sealing air supply cannot be guaranteed

Manual clearing work must be taken no more than 1 hour after emergency shutdown.

Preconditions for clearing

--Temperature in mill<40⁰C

--All baffle-plate for connection are closed

--The whole mill is not connected (with other power system)

Then the following items must be completed:

1. Open inspection doors

-- Inspection door;

-- Main air observation and inspection door

Note: Whether open the rollers turning door will lie on the concrete conditions

2. Clear out the coal on the top of nozzle ring (including the whole grinding area)

3. Clear out the coal stored in the hot air inlet and bottom of nozzle ring

4. Preparation for mill starting

B. 2 Technical parameter for mill operation

B. 2. 1 Technology parameter for starting


Differential pressure of sealing air and main air	>2000Pa
Grinding roller oil volume	15L
Max main air volume (normal condition)	7.73kg/s
Classifier inlet temperature	80-100℃
Reducer lubrication oil tank temperature	>25℃
Supplying oil temperature of reducer lubrication	<50℃
Hydraulic station pressure reaches to initialization	10-11MPa
Classifier speed reaches to initialization	70-90r/min

B. 2. 2 Technology parameter for shutdown

Grinding roller oil volume	<10L
Feeding coal flow	<40% normal feeding coal flow
Reducer oil feeding pressure	<0.12MPa
Reducer thrust cover temperature	≥65℃
Temperature on bearing of reducer input shaft	≥65℃
Hydraulic station oil feeding pressure	≤5MPa
Material thickness on grinding track	<20mm
Temperature on classifier outlet	>110℃ or <55℃

B. 2. 3 Technology parameter for emergency shutdown

Differential pressure of sealing air and main air	≤1000Pa
Temperature on classifier outlet	>120℃

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main air volume (normal condition) $< 5.8\text{kg/s}$

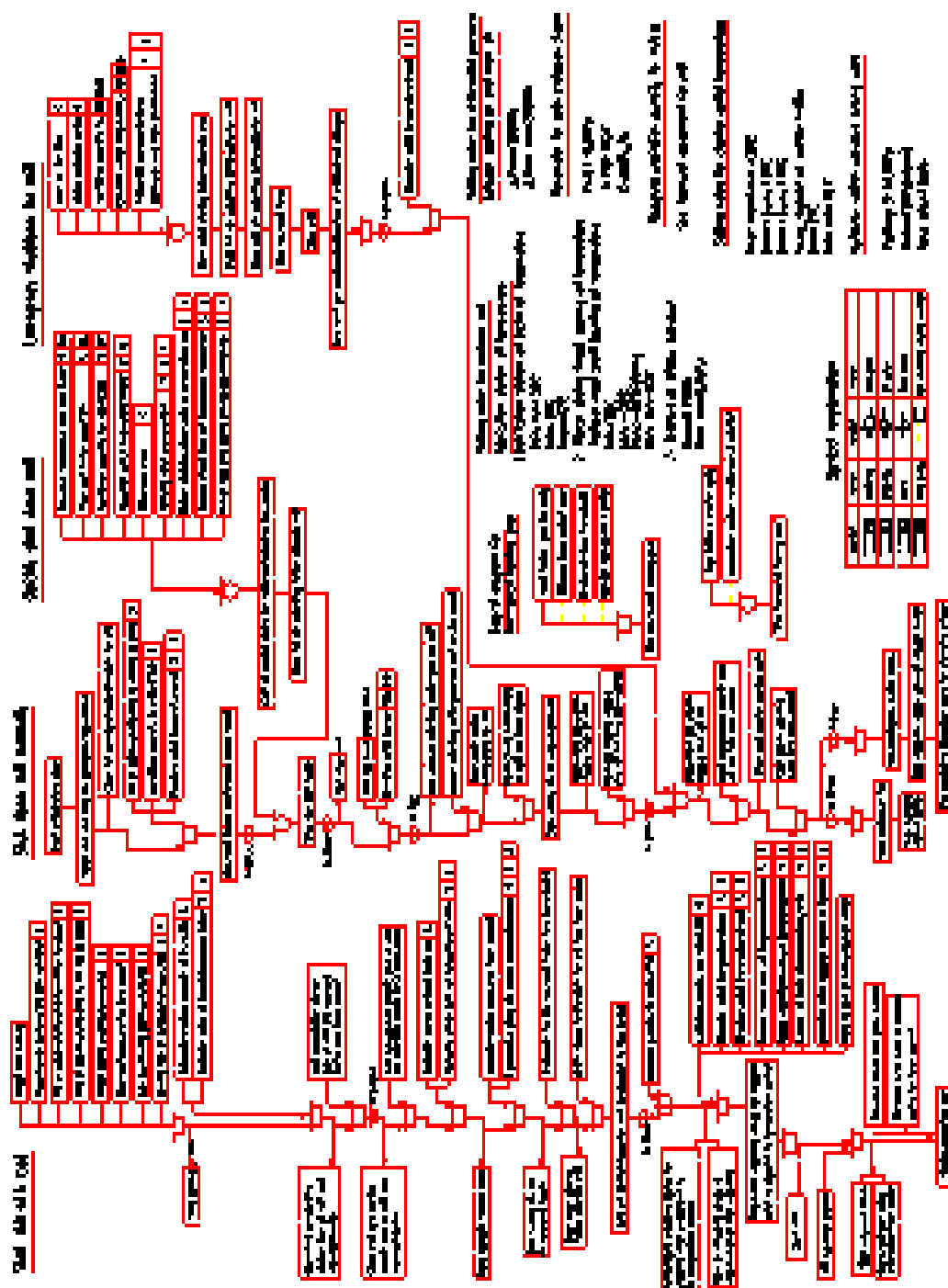
B. 2. 4 Data for inert gas inputting mill

Nitrogen 1000kg/h

Nitrogen (or steam) pressure $0.3\sim 0.4\text{MPa}$


inputting time $8\sim 12\text{min}$

B. 3 Control program block diagram for mills



B. 4 MPF coal mill reducer

B. 4. 1 Preparation before running

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1. Dryer bag

Clear out the dryer bag in the reducer and the adhesive tape on the drive shaft.

2. Oiling

The lubrication station must be filled with lubrication oil accordance with the regulation. When oiling, inspect the oil level scale on the side of oil tank. Please see the “Instruction for reducer and lubrication station” provided by the manufacturer.

B. 4. 2 Preparation before restarting after the mill stops

The preconditions of reducer starting are that the reducer is filled with oil and all lubrication points have enough oil to supply. Therefore, the equipment should maintain the running station constantly. The oil temperature will not be lower than the lowest one and not higher than the highest one.


The following data is for reference for the first adjusting:

lubrication oil temperature of the reducer oil tank	min.35℃
lubrication oil temperature of the reducer oil tank	max.50℃
Temperature on reducer inputting shaft	max.50℃
Oil temperature of sliding thrust bearing	max.50℃

Before starting, inspect all elements of mechanical, electric, order control and measurement. Operation must be taken by the specialized operator.

B. 4. 3 Reducer operation when using the low speed barring gear

When using the low speed barring gear, reducer must be filled with enough lubrication oil. The oil pump should run continuously. In order to reduce the load on

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slide thrust bearing, the grinding pressure should be unloaded. Before first starting, it is not necessary and not permitted to use the low speed barring gear.

Because the rolling bearing and slide thrust bearing can not get the enough liquid lubrication oil film and easily be destroyed, the low speed barring gear is permitted to be used for a short period or in the permitted condition of this instruction.


B. 4. 4 Reducer operation

After the first running of the reducer, operator should inspect the operation condition in time. Pay attention to the noise, temperature increase, oil pressure and sealing.

The gears in reducer will be wore and tore even though in the fine manufacture and lubrication conditions, the metal scraps will be stored in the filters. In the test run stage, the filters should be inspected and cleared regularly. From this work, operators will see the wearing, at the same time, can measure and record the metal scraps weight in the filters. Before 1st changing oil, inspect the filters in every 50 hours. After that, inspect the filtering pressure difference only, the permitted pressure difference is 0.1MPa (1.0 bar).

B. 4. 5 Inspection when stopping

When mill stops for a long time, you should stop the reducer lubrication station and make an inspection. Inspect the inner conditions of reducer when changing oil. Take special concern on the wearing and tearing of bearing and tooth surface. The

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maintenance for reducer must be taken by the experts or specialized technicians.

B. 4. 6 Technology parameter

Please see “Instructions of reducer and lubrication station” provided by manufacturers.

C. MPF Coal Mill examination & maintenance instruction

C. 1 Accident preventing description in maintenance, examination and repair

When operating, maintenance and examination, the corresponding safety regulations have to be complied.

It is not permitted to disconnect safe protection device, electric interlocking installation and approved apparatus to make them lose function partly or completely.

For repairing mill, the following has to be noticed:

- * Drive motors cannot be switched on
- *The baffle-plate of hot air pipeline in front of mill is closed
- *The valves for the dust-collecting bag are closed.
- *The hand-operated valves on inert gas pipeline are closed.
- *The coal feeder cannot be switched on.
- *Adopt equipotential protective measure when welding in order to prevent damage the rolling bearing and gear because of current passing.
- * Switch off the power of classifier frequency control motor
- * Switch off the power of hydraulic system.
- * The above-mentioned work is recorded

C. 1. 1 Maintenance when Coal Mill stops

Summary:

To gain a high reliability and a good availability, it is necessary to service the mill at standstill according to schedule and to maintain its operability by repair

and/or renewal of parts according to schedule. Therefore, it is basically recommended for maintenance to execute repairs or replacements not only if they are absolutely necessary, but to perform a preventative maintenance to achieve a high reliability and to avoid involuntary mill standstills.

Change oil of the grinding rollers

The oil change is made with mill being put out of operation and according to the enclosed list of lubricants (see C.1.9). The oil changing periods started in the list of lubricants are approximate values. It is recommended to observe changes of the oil quantity during the first operating period by successive oil analyses, by checking the viscosity, by measuring the neutralization index, and by checking the lubricant for impurities to choose shorter intervals between the oil changes, if required.

Drain the used oil:

The draining of the used oil is made through one of three screw plugs attached to the grinding roller hub towards the internal mill space; Do not remove the closed bearing cover to drain the grinding roller hub in any case! Prior to draining, set the grinding drain screw plug by means of the barring gear to its lowermost position. Collect the used oil used oil in suitable tanks. After draining, retighten drain screw plug and secure it by a sheet metal detent against loosening.

Fill the fresh oil:

Fill fresh oil for the grinding roller according to the following order:

Open inspection door on middle frame.

Remove protecting cover on roller support.

Remove screw plug in screw hole at measurement oil level of grinding roller

In order to increase the flow properties of the fresh oil, heat it to 50°C (according to the recommendations from oil supplier).

The fresh oil is filled into screw hole of roller shaft from outside by means of a corresponding device (funnel, hand pump). Take care of good ventilation (change ventilation filter plug if necessary)

The filled oil volume is monitored by the aid of the oil leveler. Stop oiling when oil reaches the max oil level

Screw up plug screw after taking out oil leveler.


Repeat above-mentioned operation to oil the two other grinding rollers.

Inspecting grinding parts

The grinding surface of the grinding roller covers and the grinding track covers are wearied out due to the grinding operation. This wearing produces a change of the profile at the grinding roller covers and at the track covers. For this reason, periodic inspections are necessary when mill stopping. The net wearing can be quantitatively determined by these inspections and thus an interdependence between wearing and throughput of material can be shown. We recommend that you can use profile templates to test wearing and tearing of the grinding parts on the equal three points. In measuring, clear the measuring point, close the templates and get the measuring value from the templates signing position.

The grinding roller cover is measured at two opposite points of the circumference.

Perform measurements every 500 to 1000 hours. The result serves the user for

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the forecast of service life, for efficiency comparisons, and for planning of maintenance and spare part stock keeping. Therefore, it is absolutely necessary to write test number according to the enclosed form in order to get a reliable record.

Due to the imponderable factor, the wearing and tearing of grinding parts cannot be calculated neither qualitatively nor quantitatively in advance. Neither can it be exactly interpreted and explained according to the state of research. Therefore, a forecast of service life of grinding parts is only possible based on empirically determined versions and on the present priorities in respect of wearing capacity, grinding fineness, throughput, operational reliability, availability, risk of accidents, cost and expenditure of time.

For the limit of the material hardness, the grinding material service life is limited. We recommended to rejecting the grinding parts as the remaining thickness lower than 15mm.

The wearproof alloy (Cr20) used for this mill is a very hard material and is suitable for applications up to temperature of approx. 500°C. This material is, however, sensitive to thermal shocks. Thus do not cool the grinding rollers of a mill just shut-off by water or compressed air after opening in order to be able to start with repair work as soon as possible.


Besides, any immature technological methods cannot be applied to this material because the material Cr20 is very sensitive to this point.

Generally, welding method is not recommended on this alloy casting because welding can reduce the material Cr20's temperature resistance capability and be feather checking.

Attention:

New or reversed roller covers must be put into operation with new grinding track covers!

Date	Running time		Wearing	Wearing value at measurement point (mm)								
				1	2	3	4	5	6	7	8	9
		Roller I	Min									
			Max									
			Ave									
		Roller II	Min									
			Max									
			Ave									
		Roller III	Min									
			Max									
			Ave									
		Roller Cover	Min									
			Max									
			Ave									
			Min									
			Max									
			Ave									
		Remaining weight										
			RollerI	kg								
			RollerII	kg								
			RollerIII	kg								
			RollerCover	kg								

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With the increasing of runtime, the clearance between loading frame and spacing plate of the casing may increase. This can result in an unbalanced running of the mill. Therefore, the clearance has to be measured and recorded at each mill inspection. When the clearance doubled to the dimensions of the drawing, the lining sheets are to be designed in a way that they can be pushed from one side under the spacing plate (Made of steel).

If a stepped wearing condition occurs at spacing plate, which could restrict the free movement of the loading frame, spacing plate must be replaced.

It is of utmost importance to check the roller sealing air supplies for wear, tightness and easy movement of pivoting bearings at each mill inspection.

Inner structure of classifier should be of good fitting state and its action is flexible. Hanging foreign matters like wool can be discharged through the classifier manhole opening. There should be enough oil level in the classifier oil tank and check whether the oil is clean. If the oil is dirty, it should be replaced.

There is a roller bearing on the classifier driving mechanism upper cover plate, which uses general lithium soap base grease No.2 (GB5903-86). This position should be checked and supplied with grease regularly.

Welding work on site :

Adopt equipotential protective measure nearby welding point in order to avoid damages by current passage, especially at the various rolling bearings.

C. 1. 1. 1 Inspecting the internal mill (grinding cavity)

Mill driving motor:

Prior to opening the mill door, perform a visible separation of the current lead to the mill driving motor.

Raw coal feeder:

It has to be ensured that the coal feeder be switched off.

Low speed barring gear:

Disconnect the low speed barring gear from main motor

Hot air pipeline:

Inspect whether the block on hot air line is closed before opening the mill door

Inert gas system:

Close the manual valves on the inert gas line

Open mill door

Attention:

Pay attention to the safety rules. Pay attention to the risk of deflagration at hot mill!

Clearance work for mill inner:

Inspect internal mill space (grinding cavity, hot gas guide part, classifier) for mounting tools, foreign matters, coarse impurities, cloths, cleaning wool or other rubbish; remove, if required.

Nozzle ring:

Clear up the gap between nozzle ring and grinding rollers. Foreign matters within this gap can cause noise with running mill and result in unnecessary concern.

Grinding rollers

Check oil level of grinding roller by means of dip rod and refill, if required. Inspect oil drain screw plugs. Close all openings for oil level control. Oil quantity should be in accordance with the standard.

Loading frame

Inspect and ensure the guide frame and tensioning frame are freely moving in vertical direction, i.e. inspect gap between guide frame and tangential support and gap between tensioning frame and guide pieces according to drawing specification.

Mill door

Close mill door tightly

Mill driving motor

Connect driving motor electrically. Check sense of motor rotation by means of phase controller.

Attention:

Do not switch on mill driving motor without material to be grounded.

Pay attention to the admissible starting frequency of the mill driving motor.

Inert gas system:

Open manual valves on inert gas pipeline of the mill.

Discharging waste material:

In the beginning, frequent inspection should be at least one time every 2 hours, but more frequently, if necessary. The inspection period depends on the resulting reject volume and on the storage volume of the reject box. The reject volume depends on the characteristics of the material to be ground, the mill throughput and the type of operation.

In addition, the waste volume can be slightly affected by the outlet velocity of nozzle ring. A reduction of the reject volume can be obtained by increasing the outlet velocity of the nozzle ring; on the other hand, the increased outlet velocity at the nozzle ring can cause an increased wear at the mill. The nozzle ring outlet velocity can be controlled by changing the nozzle cross sections.

Subsequent to corresponding observations of operation, well balanced conditions in respect of throughput, wearing, and reject volume can be achieved by partly covering the nozzle ring cross section. During any initiation and any putting out of operation, an increased reject volume is to be expected.

Because main air room could not store waste material, it is not permitted to operate the mill with closing reject system for a long time.

C. 1. 1. 2 Inspection of the external mill

Mill sealing air:

Check operation of sealing air fan

It has to ensure that the three grinding rollers and the base bottom are sufficiently supplied with clean, filtered sealing air. For this purpose, the sealing air volume supplied by the sealing air fan has to be distributed. This is made by the butterfly valve arranged in the sealing air feed pipe to the base bottom.

Attention: the clearance between the knuckle bearings and classifier sealing rings should be adjusted in accordance with the drawing. If the clearance is larger

than the drawing notes, the sealing air will be discharged through this place and the sealing differential pressure cannot be built.

The differential pressure between sealing air and main air must be higher a definite value, and does not lower than required differential pressure, generally, 2000Pa.

Hydraulic station:

Inspection and maintenance for the hydraulic system can be according to the operation instructions supplied by manufacturer.

The grinding pressure may be adjusted with the proportioning valves. It is not needed to adjust the pressure after the grinding parts worn. The grinding pressure may be adjusted with the mill operation. Adjust the grinding pressure slowly and the grinding pressure cannot exceed the max grinding force.

Measuring device

The measuring device can only be adjusted at mill standstill and without any coal between grinding rollers and grinding track. By means of the measuring device, the following can be judged from outside the mill by reading two scales:

The total wearing weight of grinding roller covers and grinding track covers.

Coal pad thickness change

Adjust the measuring device to a proper position before using. Adjustment program: position the sharp point of the tension rod measuring ring on the zero point of the scale, then fasten it. When mill on operation, the raw coal between grinding track and rollers will lift the tension rod, the measuring ring also will be lifted together, central scale of the “coal thickness” block level at sharp angle of the ring, then the thickness of the coal pad and changing will be shown, the wear and tear volume can be evaluated. When there is no material on the track, the approximation of total wear and tear will be shown.

Classifier:

Adjust the classifier motor's frequency by converter.

When starting, the classifier speed should be transmitted from the lower to the higher. Check oil leve of the classifier oil tank constantly. The oil leve of the classifier oil tank can be seen from the oil level rod fastened on the oil tank upper plate by bolts. The oil leve should be in the middle of maximum oil remark and minimum oil remark.

Inert gas inputting device:

The inert gas pipeline should be in a good situation.

Check the air pressure of the motor stop valve input. When the mill is running, the handle stop valve should be opened.

C. 1. 1. 3 Operating low speed barring gear

This device is used for maintenance and replacing the consumable parts. It is not permitted to operate the mill by it.

In emergency shutdown, the low speed barring gear can be used for clearing the waste in the main air room.

Not permit to use this device during 200 hours of the mill primary operation.


In order to avoid destroying related parts, before using this device, the following work should be done: unloading the loading force, open the lubrication oil pump. This device is only used in short time.

In order to avoid the harmful point shock, the main motor must be switched off in using the low speed barring gear.

C. 1. 2 Assembly and disassembly for grinding parts and inner parts of mill

In general, the assembly and disassembly for grinding parts and mill inner parts is on vertical direction.

Thereby, move out the powder outlet pipe on extension node, lift up or move out the classifier. For the cause, assembly and disassembly grinding track, loading frame and rollers, the end user may prepare various kinds of slings such as lifting

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chains and other lifting tools.

C. 1. 2. 1 Reducer

Disassemble reducer by the special tools. In general, disassembling direction is opposite side of motor. Operating order is as following:

1. Loose the pulling force of tension rod.
2. Dismantle 4 cover plates of bottom frame. Turn the arm of the grinding seat to position of 4 cover holes by low speed barring gear.
- 3 . After dismantling the cover plate of grinding track, dismantle the connection screw bolts between grinding track and reducer flange.
- 4 . Release the oil in reducer and slide thrust bearing, and dismantle oil pipeline and electric wire.
5. Dismantle the protecting cover of coupling.
6. Dismantle the coupling.
7. Dismantle the motor.
8. Put the device for jacking grinding track on the foundation bottom plate.
9. Lift up the rollers
10. Put the hydraulic cylinder into device for jacking grinding track.
11. Lift up the grinding track in even velocity until the fixed pin reeves the device for jacking grinding track, and then put the safety pin into the device.
12. Jack the reducer by hydraulic cylinder, then put it down after smearing the grease on reducer. Get rolling guide ready and move the reducer out from bottom frame by the manual lift.
13. The dismantled reducer should be conveyed on the trailer.
14. Assemble reduce

Pull the reducer back to the original position in the mill. Assemble the reducer in accordance with the opposite dismantling procedure.

C. 1. 2. 2 Dismantling and mounting the classifier

The trolley hoist and other lifting devices can be used to lift the classifier for its dismantlement.

1. Use rigging to hanging the pulverized coal outlet pipes.

2. Dismantle joint bolts between the classifier flange and pulverized coal pipe flange.
3. Lift expansion joints (top of the classifier) until the classifier can be shifted out
4. Dismantle joint bolts between the classifier and the middle frame
5. Dismantle the checking platform's connecting cat ladder of the middle frame and the classifier.
6. Dismantle the connection of the sealing air pipes. Dismantle the middle connecting pipes if necessary.
7. Dismantle vertical sealing air pipes from the classifier to the grinding rollers.
8. Shift out the classifier until it separates from the grinding cavity completely.
9. Carry out mounting in reverse order.

C. 1. 2. 3 Dismantling and mounting the loading frame

1. Mark guide frame in order to remount.
2. Mount holding device to prevent the rollers turning over.
3. Remove the bolts on the lifting device of loading frame.
4. Make steel wire ropes or steel chain through on the lifting device.
5. Remove the connection plates between loading frame and roller bracket.
6. Lift the tension rod to the position(about 30-35mm) where connecting crossbeam and steel balls can be spared by hydraulic cylinder or electric lifting device.

7. Open the small door on the middle frame. Take the connection crossbeam connecting tie rod and pressure frame and steel ball out.
8. Lift the loading frame by the lifting tools and locate it in a proper position.
9. Carry out mounting in reverse order. Pay attention to the admissible clearance between limit plate of middle frame and loading frame.

C. 1. 2. 4 Dismantling and mounting grinding rollers


C. 1. 2. 4. 1 Lift the rollers part directly from middle frame

1. Remove the roller from knuckle bearing
2. Fit the lifting tool for grinding roller
3. Suspend grinding roller under slight tension
4. Remove the connection bolts on the roller fixed device (only for connection bolts joining grinding roller)
5. Lift, move and lower grinding roller out of mill
6. Dismantle the remaining grinding rollers in the same manner and carry out mounting in reverse order

C. 1. 2. 4. 2 Turn the grinding rollers part from the turning gate on the middle frame

You need not dismantle the classifier and loading frame when dismantle grinding rollers by this way.

1. Open the roller turning gate on the middle frame
2. Remove the knuckle bearing on the upper of rollers
3. Mount the roller fixed device for preventing roller fall down
4. Remove all connections between rollers and loading frame
5. Lift the loading frame not less than 200mm by means of hydraulic system

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and fix it

6. Mount the roller turning auxiliary device and connect it with rollers
7. By means of electric oil pump of the auxiliary device, lift the rollers to the position where can be put in the fixed pin and mount the safety pin.
8. Drag out the rollers by manual lifting device
9. Mount the lifting tools for grinding roller
10. Lift, move and lower grinding roller
11. Dismantle the remaining rollers in the same manner. But when dismantling them, they have to turn to the position of former one using low speed barring gear.
12. The order for mounting is reversed.

Notes: The above is the simple steps of turning the grinding rollers. Please see the instruction of auxiliary device for more details

C. 1. 2. 5 Dismantling and mounting the grinding track

1. Mark grinding track cover, then dismantle the bolts and lift them
2. Dismantle the connection bolts between the grinding track and reducer and mark them.
3. Lift the lug on grinding track by steel wire cable
4. Lift out grinding track(including nozzle moving ring) and put it down a proper position
5. Mounting is carried out in reverse order


C. 1. 3 Maintain and repair the mill parts

Maintaining and repairing the mill parts should be taken by the specialized workers, in the proper workshop, by the relative tools.

C. 1. 3. 1 Reducer

The reducer only can be taken a partial repair in accordance with the instructions provided by supplier, if necessary, the technicians from the manufacture should be invited to attend.

Replacing gear and bearing in the reducer should be taken by the manufacture.

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C. 1. 3. 2 Grinding rollers

1. General

Dismantling and assembling the grinding roller should be carried out in a clean workshop.

The grinding roller cover and the grinding track cover cannot be welded, because welding progress can make parts damage and scrap.

Have the complete grinding roller removed from the mill cooler down until the temperature inside and outside are identical. This is to be observed in any case. Since the heat is preserved inside the roller for the longest period, the cooling process may take 24 hours or more. The roller covers must not be cooled down with increased speed by compressed air, since the rolling bearings could be damaged.

2. Draining oil before repairing grinding rollers

The oil with operating temperature should be drained when the grinding rollers is dismantled for repairing. Turn the grinding rollers attached to the hanging tool until the oil drain plug selected has reached its deepest position. Oil samples shall be kept ready for analyses of grinding roller type.

3. Dismantling grinding roller cover

Dismantle terminal surface tension ring's guard board of the grinding rollers. Dismantle joint bolts of tension ring. Dismantle tension ring using lifting bolts by uniformed holed steel sheet and jackscrew. Dismantle the grinding roller surface using the grinding roller lifting device.

4. Dismantling roller bracket

Dismantling can be performed as the following order:

Set grinding roller with bracket down onto wood trestles

Dismantle the protection cover

Dismantle the exhaust plug screw

Dismantle the cover of shaft end

Dismantle protection bolt outside roller bracket

Pull off the roller bracket by detaching device for grinding roller, if necessary, by the means of heating

Lifting, moving and lower roller bracket by lifting bolt

Attention: Before dismantling, inspect the distance between fixed sealing ring and rotary sealing ring of the roller. If the radius is greater than 1mm, you should replace the new sealing ring.

5. Dismantling grinding roller bearings

Dismantle rotating sealing ring and see the fixed bolts of the opening bearing cover.

Remove sealing ring with corresponding steel ring and O-ring.

Dismantle the opening bearing cover.

Dismantle the closed bearing cover and O-ring

Dismantle shaft end clamp plate of bearing inner race.

At this time, the roller shaft and the inner race of cylindrical roller bearing should be dismantled by detaching device for grinding roller.


Pull the inner race of cylindrical roller bearing from the grinding roller shaft.

Remove plug screw from grinding roller hub and connect oil pump to input high pressure oil

Dismantle the spherical cylindrical roller bearing

Dismantle the outer race of cylindrical roller bearing

Now all important parts of the grinding roller bearing are dismantled, and the

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cleaning work should be done.

6. Inspection for grinding roller bearings

In general, wearing occurs at the parts which slide on each other. Naturally, this applies to rolling bearings too. Normally, the life of rolling bearing is limited by material loosening from rolling elements due to fatigue by the continuous stress in the zones rolled over.

To cylindrical roller bearing and at the spherical cylindrical roller bearing, their inner and outer race, roller bodies, as well as the protecting should be inspected for wearing, abrasion, striation, pitting, cracking, plastic deformation and dimensional accuracy. Through this work you can judge whether the rolling bearings can be used any longer or whether they will have to be replaced.

Replace the O-ring at the two bearing covers and the grinding roller shaft, radial sealing ring, plug screw and gasket according to concrete conditions.

A suitable contact pressure at the sealing lips is required to achieve a perfect sealing.

Scratches, pressure marks, rust, or other damages at the sealing ring surface in the running area of the rotary shaft will positively result in leaks. But an insignificant loss of oil is better than dry running of the sealing lip, for the dry running can result in a failure of the seal due to additional frictional heat and the hardening of the sealing lips produced by it.

The inspection item should include the admissible tolerances for diameter,

roundness, cylindricity and surface smoothness. It is a prerequisite for the proper sealing function.

7. Mounting grinding roller bearings

The correct treatment for rolling bearings before mounting, cleanliness during mounting, and the inspection for the mounting precision due to connecting parts have to be guaranteed! Since the service ability and the operational reliability largely depend on a proper mounting for the grinding rollers, this work should, in general, be performed by experienced fitters only.

Fix the opening bearing cover on the bearing seat. O sealing ring and radial axial sealing ring are not included.

Heat the bearing seat and the bearing cover up to approx. 110°C

Press outer race of cylindrical roller bearing into the bearing seat until it touches the opening bearing cover.

Press bearing cage into the bearing seat until it touches outer race of cylindrical roller bearing.

Press the bearing into the bearing seat.

Heat inner race of cylindrical roller bearing in the oil bath to 80°C (max. 90°C), then slip it into the grinding roller shaft.

Once the bearing seat temperature is same to the surrounding temperature, dismantle the bearing cover immediately.

Put inner bearing cage into the bearing seat and holds spherical roller bearing.

Press the shaft into the bearing seat until inner race of cylindrical roller bearing holds inner bearing cage.

Mount axle head apron besides the closed bearing cover.

Mount O sealing ring and closed bearing cover. Notes: seal up the high pressure oil opening by gasket and plug screws.

Mount O sealing ring and related parts onto the closed bearing cover.

Mount O sealing ring and the opening bearing cover(including radial sealing ring) onto the bearing seat.

Seal up the high pressure oil opening beside cylindrical roller bearing using gasket and plug screw.

Mount rotating sealing ring.

Check whether bearing turns flexibly.

Detail instruction of sealing ring installation:

Operational reliability and economy of the bearings largely depend on the efficiency the sealing against penetration of moisture and impurities as well as against leaking of lubricants. The quality of the sealing may have an essential effect on the life of grinding roller bearings. The inner of the two rotary shaft seals sealing the bearing space has the task to prevent lubricating oil from escaping and the outer ring shall prevent sealing air, moisture and dust from penetrating. Thus take care of the installation according to the drawings. Seal lip must face to the side which need sealing.

Inner sealing ring: Seal lip is towards roller.

Outer sealing ring: Seal lip is towards roller bracket.


Inset supporting ring and mount outer sealing ring according to above mentioned, and fix them on open cover by flange ring and socket head cap screw in order to prevent moving against axial direction. The supporting ring could support sealing ring and seal lip.

Mounting ring used to mount open cap (including radial sealing ring) is mounted onto roller shaft, its taper outsides.

Grease mounting ring and liner.

Slip the open bearing cover mounted onto the mounting ring and liner and fix it onto the bearing seat. Do not damage the seal lips of sealing ring. Pull mounting ring off.

After the grinding roller assembly, check whether all parts are mounted and

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whether all needed locking positions are locked. Then close all opening and check sealing capability by compressed air. The compressed air must be clean and dry.

The air pipeline with stopping valve, reducing valve and pressure gauge must be fitted on oil level hole when test pressure. Full air into bearing space pressure is 0.2 MPa, then shut off stopping valve. The pressure can not reduce to 0.1MPa in 30 minutes.

8. Mounting the grinding roller cover

Pay attention to the difference of the grinding roller cover thickness when mounting.

Put one side of the grinding rollers' spherical cylindrical roller bearing up.

Lift the grinding roller cover by the grinding roller lifting device. The thicker surface of the grinding roller cover is down (beside the roller support).

When it is confirmed that the grinding roller cover is horizontally positioned, slip it into the grinding roller support rapidly.

When the grinding roller cover flange shoulder is flushed with the bearing seat, remove lifting devices.

Mount tension ring and adjust the mutual alignment of tension ring and bearing seat connecting screws.

Fasten tension ring.

Mount guard board.

9. Mounting of the roller bracket

Exchange the roller position, and make the shaft be upwards.。

Remove the three filling screws for the transport at the outside of the roller bracket.

Screw suitable eye bolts into screw holes.

Lift the roller bracket to horizontal position.

Heat the roller bracket to approx. 100°C.

Fit feather key into groove of grinding roller shaft

Slide the roller bracket to roller shaft rapidly until the salient of roller bracket keeps on shaft sleeve.

Mount the shaft end cover.

Remove lifting tools and mount bolts into screw holes again.

Attention: Do not transport the roller bracket with the eye bolts.

Mount air filter onto roller shaft after cleaning it.

Mount protecting cover.

Check whether the grinding roller runs flexibly and steadily.

Mount wearing liner onto roller bracket.

Store the mounted grinding rollers in a dry room. An internal and external preservation is required in case of extended storage periods. Pay attention to the compatibility of the preservation agent for the internal preservation with the operating lube oil.

C. 1. 3. 3 Grinding track covers

Dismantling the grinding track covers:

Loosen clamping screws and remove nuts, washers, butterfly spring and O-ring.

Dismantle the guard ring at the upside of grinding track

Dismantle the bolts located in three screw holes on the grinding track bottom.

Screw jackscrews into three screw holes and jack the grinding track cover.

Lift the grinding track cover using specific lifting tool.

Clear up and check the grinding track.

Mounting grinding track covers:

Insert the grinding track cover into grinding track, and make it touch stop pin against counterclockwise.

Fix grinding track covers by clamping bolts.

Assembling nuts, washers, butterfly springs and O-rings should be accordance with drawing demand.

Pay attention to the right position for grinding track during assembling and fixing in order to prevent loosening phenomenon.

Mount the guard ring at the upside of grinding track

Insert screws into three jackscrew holes at bottom of grinding track bottom.

C. 1. 4 Spare parts

In order to ensure a high availability of the mills with standstill periods at operating interruptions as short as possible, it is imperative to keep a sufficient stock of important mill parts. Moreover, the spare parts for the scheduled maintenance work shall be procured in time so that they are available when needed.

The spare parts lists are as follows when running one year (each machine)

3 sets of grinding roller covers

A set of grinding track covers

Ever prepared spare parts(each machine):

A set of guard board of roller bracket(three sorts)

A set of wear-resisting plate between middle frame and loading frame (4 sorts)

A set of nozzle ring

A set of nozzle ring liners

2 scrapers

3 liner sleeves in sealing air pipeline

A set of sealing parts for grinding roller bearing

A set of sealing parts for every hydraulic system

3 sets of sealing parts for every hydraulic cylinder

2 self-seal packings for classifier

Commended spare parts(each machine):

A set of rolling bearing for grinding roller(2 sorts)

3 sets of sealing air pipeline(including knuckle bearings)

3 sets of knuckle bearings for tension rod

A set of mill hydraulic cylinder

1 outside ring gear boller bearing for classifier driving mechanism

1 classifier frequency control motor

1 pinion gear of classifier diving mechanism

C. 1. 5 Instruction for the auxiliary tools operation

Lifting tool for grinding roller

Lifting tool for grinding track covers

Detaching device for grinding roller

Fixing and turning device for the grinding rollers

Jacking device for grinding track

Anchor slab

handle

Oil leveller for grinding roller

Mounting and adjusting rod for grinding track

Sample plate

Alignment lever of the grinding roller

1. Lifting device of the grinding roller (Drawing number: K7278.1.00)


The lifting device is used for lifting the whole grinding roller and roller frame.

Please see the installation sketch map of the erection drawing.

2. Lifting device of the grinding track cover (Drawing number: K7278.2.00)

The lifting device is used to lift the grinding track cover. Please fix the hoisting ring into four screwed holes of the grinding track cover and connect the grinding track cover and the lifting device using steel wire rope. After that, you can lift the grinding track cover.

When dismantle the wore grinding track cover, firstly release the taper clamp

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bolts of the grinding track inner ring. Then dismantle nuts, washers, O-type ring and outer ring of the grinding track. Lastly you can lift the grinding track.

3. The dismantle device of the grinding roller (Drawing number: K7278.3.00)

This device is used for dismantling the grinding roller shaft and bearings. It consists of parts as following:

One upper plate for variable conditions

Three 8.8 grade bolts, M42×495

Three 8.8 grade bolts, M30×450

One set of single acting hydraulic cylinder DG-63/55;

The diameter of cylinder $\phi 100\text{mm}$

The diameter of piston $\phi 55\text{mm}$

Nominal pressure 63MPa

Nominal tons 30t

Working stroke 200mm

Overall dimension $234 \times \phi 100\text{mm}$

One set of hand-operated oil pump SYB-2 (with a two meters long high pressure pipe)

Pressure: High pressure 63MPa

Low pressure 1MPa

Discharge capacity: High pressure 2.3ml once

Low pressure 12.5ml once

Maximal hand-operated force

500N

When dismantling, assemble parts in accordance with the assembly diagram.

When dismantling the outer cover of the rolling bearing using this device ,
dismantle the screw plug of the grinding roller spoke, connect the pipe of
hand-operated oil pump and inject pressure oil. Therefore protect the fitting surface
and be beneficial for dismantling.

See C.1.3.2 when dismantle the grinding roller parts.

4. The fix and turn device for the grinding roller (Drawing number: K7278.4.00)

The dismantling grinding roller program is following:

1) Open the grinding roller frame turning door and turn to other side.

2) Dismantle the sealing pipeline from the upper grinding roller.

3) Install the grinding roller fix device inside the grind mill.


4) Fix the grinding roller and support using wooden plug to avoid turning.

5) Dismantle the connection of the grind roller and pressure device.

6)Lift the pressure device using the hydraulic system, cushion the wood and fix
the pressure device.

7) Dismantle parts between the grinding roller and the pressure device which
can be dismantled.

8) Assemble the lifting shaft (K7278.4.10) , the lifting frame (K7278.4.110)
and the bracket (K7278.4.30) and the hydraulic device. Then fix them on the
middle frame. Next drive the grinding mill and adjust the grinding roller and

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bracket.

9) fasten the connection between the bracket (K7278.4.30) and lifting shaft. (K7278.4.10) and the grinding roller. Dismantle the connection pin between the grinding roller and fix device.

10) In accordance with the drawing (K7278.4.00) , start hydraulic device , lift the grinding roller and install the safety pin

11) Use auxiliary driving device and rope to roll out the turn device. Lift the grinding roller by the lifting device.

12) After lifting the grind roller, dismantle the connection between the bracket and lifting shaft. Lift the grind roller.

Notes: The installation order is reverse to the dismantlement order.

5. The jacking device of the grind track support seat(Drawing number: K7278.5.00)

In order to haul out the reducer when the grinding mill is working, jack the grinding track about 30mm using the jacking device. The grinding track support seat is break away from the reducer to make the reducer haul out. This device consists of parts as following:

4 pillar for transform the hydraulic cylinder jacking force.

4 underbed for positioning the support.

4 flanges for middle supporting

4 backing flame for positioning between support and underbed.

4 single acting hydraulic cylinder DG63/55

The cylinder diameter ϕ 100mm

The piston rod diameter ϕ 55mm

Nominal pressure 63MPa

Nominal tons 30T

Working stroke 200mm

Overall dimension $234 \times \phi$ 100mm

4 hand-operated oil pump SYB-2(see 2.3 for parameters);

Before using, remove four round cover of the frame's top plate and position the eccentric flange, upper pillar and underplate in accordance with the assembly diagram. Make marks in the proper position of the eccentric flange, upper pillar and underplate. Dismantle this device and weld the round steel rod to the reducer underplate based on the drawing.

When using, turn the grinding track to the position the drawing shows using the barring gear and make four support claw(without scraper blade) aim at four round holes of the frame upper plate. Then dismantle all of the connection parts between the grind track support seat and the reducer outlet flange. By this time, install and position this device, operate four hydraulic cylinder and jack the grinding track support seat. When jacking to a proper place, orientate using the backing shelf or cotter pin and lock them by shackle. By this time, the grind track is jacked about 30mm.

6. anchor slab(drawing number: K7278.7.00)

The part is used to fix the guy cable when hauling out the reducer. In using, dismantle eight sunk screws of the track end and install this device. Then fix one end of the hand-operated hoist QY3 to this device and fix the other end to the reducer. Pull the reducer uniformly from both sides and haul out the reducer.

7. handle (drawing number: K7278.10)

It is used to install the foundation bolts. Screw up the handle to the end of the foundation bolts when using.

8. oil leveler gauge (drawing number: K7278.10)


It is used to measure the grinding roller oil level. MAX in oil leveler gauge shows the maximal oil level and MIN in oil leveler gauge shows the minimal oil level. When replacing oil, the oil level should be reach the maximal oil level (the grinding roller is working).

9. the grinding track installation guide bar (drawing number: K7278.1)

In order to make the grinding track easily installation and prevent damage the frame annular ring, this device is used being a guide part when installing the grinding track.

Before installing the grinding track, screw the guide bars into the screw holes of the reducer outlet end flange separated by 120° . Then install the grinding track. when the grinding track descend into the connection position, dismantle the guide bar and install the connecting bolts.


10. sample plate (drawing number: K7278.2)

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It is used to measure the wore condition of the grinding track cover regularly.

11. the grinding roller position bar (drawing number: K7278.3)


It is used for installing and positioning the grinding roller. Insert the position bar into the grinding roller cover plate's center hole, adjust the grinding roller fix position and make the position bar top point opposite. Then the grinding roller is fixed.

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C. 1. 6 List of maintenance work for mil

No.	Construction element	Interval	Type of maintenance	Remarks
1	Total plant	Daily	During operation 1. quiet running 2. visual inspection for leakage 3. damage to plant components 4. temperature, pressures (locally)oil bath level 5. filter elements hydraulic lubrication	In the event Irregularities they have to be reported and measures for their elimination have to be started
2	Reject box	2Xper shift	Clean reject box	
3	Screwed connections	After 500 hrs then every 2000hrs	Check torque Eventually retighten	Valid in general for all screwed connection
4	Grinding rollers	After 500hrs then every 1000hrs	1. oil level by means of oil drop rod check for comparison with probe 2. oil leakage 3. rate of wear and tear as well as surface finish	Only permitted on shutdown period
5	Grinding track	After 500hrs then every 1000hrs	1. fastening of grinding track cover 2. rate of wear and tear as well as surface finish 3. foreign matter	
6	Sealing system a) external lines b) internal lines	After 500hrs then every 1000hrs	1. tightness and set value adjustment 2. rate of wear and tear of internal lines as well as smooth functions of the hinge joints	Replaced if the thickness of lines is lower than 1.5mm
7	Nozzle ring	2000hrs	Check for foreign matter and wear at upper part	
8	Scraper	2000hrs	Check for deformation, wear and tear, smooth running and fastening	
9	the wear lining of the mill	2000hrs	Check for wear and tear	At a residual wall thickness of about

	housing			1mm the wear lining has to be renewed
10	Thrust wear plates at guide frame and mill housing	2000hrs	1. state of wear and tear 2. formation of steps 3. gap	
11	Tie rod, fork head, yoke, ball sockets, expansion joint	2000hrs 500hrs	1. position of installation 2. wear and tear 3. yoke securing 4. tightness	
12	tie rod pivot bearing	2000hrs	Smooth running/wear and tear	
13	Tie rod sealing Tension joint	500hrs	Sealing situation	Repair or replace when leakage
14	Hydraulic station	1. on first start up 2. daily up to 100hrs operating hrs 3. then every 500hrs	1. check for tightness 2. filter check/clearing 3. oil level visual check 4. oil contamination 5. temperature	,
15	Nitrogen filling of hydraulic unit and grinding force cylinder	1. after first start-up 2. after 100 hrs 3. then every 500hrs	Check for set value/leakage	
16	Protection unit	Before putting into operation	Functional check	
17	Hydraulic oil	Every year	Replacement rinse equipment in case of every dirty oil; remove residues in the tank, in the ventilation filter and in return filter	

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18	Total plant	2000hrs	Check of switch function of all electric transmitters and interlocking criteria	
19	SLS-type revolving classifier	After 500hrs then every 2000hrs	1. unbalanced/quiet running 2. rate of wear and tear 3. visual oil level inspection and classifier tank oil level 4. frequency conversion motor 5. lubricating grease of roller bearing 6. clearness of oil	

Note: Please see the specification supplied by manufacturer for maintaining main motor and reducer and its lubrication station

C. 1. 7 Reason and treatment for mill malfunction

No.	Failure and/or signal	Cause	Remedy
1	Differential pressure mill sealing air<min	1. filters in suction fouled 2. sealing air adjustment not carried out 3. sealing air pressure line system leaky/damage 4. sealing on the grinding roll, SLS-type classifier, tie rod or bottom housing floor damaged 5. failure sealing air fan (capacity etc.)	Shut off mill, clean filters Carry out adjustment via dampers in eliminate leakage and renew line system to the grinding rolls if necessary replacement/renewal Localize and eliminate source of failure
2	classifier temperature too low too high	Temperature control Primary air defective	Set control system to manual and control temperature manually localize and eliminate source of failure
3	Classifier temperature too high increasing tendency	1. temperature control primary air defective 2. mill fire 3. classifier temp.>100°C	Set control system to manual and control temperature manually shut down mill via emergency off Activate inert gas valve

			repeatedly until the tendency decreasing
4	Oil level grinding roll<min. (oil level control by means of dip rod)	Leakage sealing	Shutdown the mill, repair or replace sealing elements, fill in the oil to regulated level
5	Unstable running of the mill (rumbling noise)	1. foreign matters in the partially ground coal layer 2. grinding elements worn 3. wear and tear of thrust plate or the clearance is too large 4. nitrogen pad of the hydraulic cylinders for grinding pressure adjustment not filled or defective 5. no coal in the grinding track	Shut down mill and remove foreign matter. Clean partially ground coal layer and check for damage Attention: when foreign matter with high hardness, e.g. iron parts, are not removed the grinding elements can be damaged. Replacement of the amour plates or adjustment of clearance Shut down mill and hydraulic system Check and initiate filling operation Coal gravity pipe clogged.
6	Grinding fineness too coarse	1. primary air flow too large 2. grinding pressure too low 3. slat worn 4. wear ring in classifier worn 5. hydraulic oil too hot 6. trouble of classifier driving mechanism	Set value correction Set value correction Replace it Renew it Open oil temperature controller Increasing the supply of cooling water volumes check
7	Double filter, differential pressure greater than permitted	Filter element unduly work	Clear
8	Oil pressure before oil distribution less min.	1. oil pump does not work properly 2. valve before pump slightly open 3. filter element of the double filter fouled 4. oil supply flow line clogged 5. valve after oil pump slightly open	For measuring see operation instruction Open valve completely Clean filter element Remove clogging Open valve completely
9	Oil distribution no or only little oil	Clogging within the gearing	Clear the pipe

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	flow in the 4 sliding bearing overflows(upper part of housing and/or on the inspection glass below the drive shaft		
10	Oil temperature is too low.	Standstill monitoring “off”:	Check of the heating device, repair, if required. But do not close the cooler
11	Oil temperature is too high	1.oil cooler not switch on 2.cooling water supply not sufficient	Switch on cooler Inspect cooling water pipe
12	Unduly operating noise in reducer	1. foreign matter in gearing 2. bearing damages 3. undue wear on gear wheels 4. coupling drive motor gearing defectives 5. coupling not aligned correctly	Call for personnel of manufacture Call for personnel of manufacture Call for personnel of manufacture Replace couplings Align coupling
13	Oil leakage	1. damaged flange sealing 2. screw coupling loose	Replace sealing Tighten screw coupling
14	Unstable running of classifier	1. unbalanced slat down 2. input or output pinion defective 3. irregular running of motor 4. 4-point bearing defective	Localized source of failure during standstill and remove it Proceed to exchange Proceed to exchange
15	Failure hydraulic unit		See operating and maintenance instruction of manufacture
16	High power consumption of motor drive for classifier	Large material in the mill -due to high throughput, poor grinding ability, too fine grinding -classifier frequency too much	Reduce rotating speed by frequency controller

C. 1. 8 The grind mill hydraulic system

C. 1. 8. 1 Preface

The hydraulic system is specially designed for the MPF grind mill. It has many functions, such like providing proper pressure for grinding roller, lifting and dropping the grinding roller.

The grinding pressure is provided by the hydraulic system. There are three hydraulic cylinders and accumulator. The accumulator has rubber gasbag full of nitrogen. The inlet side of the accumulator is fitted directly to the piston rod side of the hydraulic cylinder and the relief valve is connected to the feed line. Three hydraulic cylinders is connected to the public feed line. The top of the hydraulic cylinder has oil leakage collector chamber and the leak oil returns to the oil tank from the leakage pipeline.

C. 1. 8. 2 Structure specification

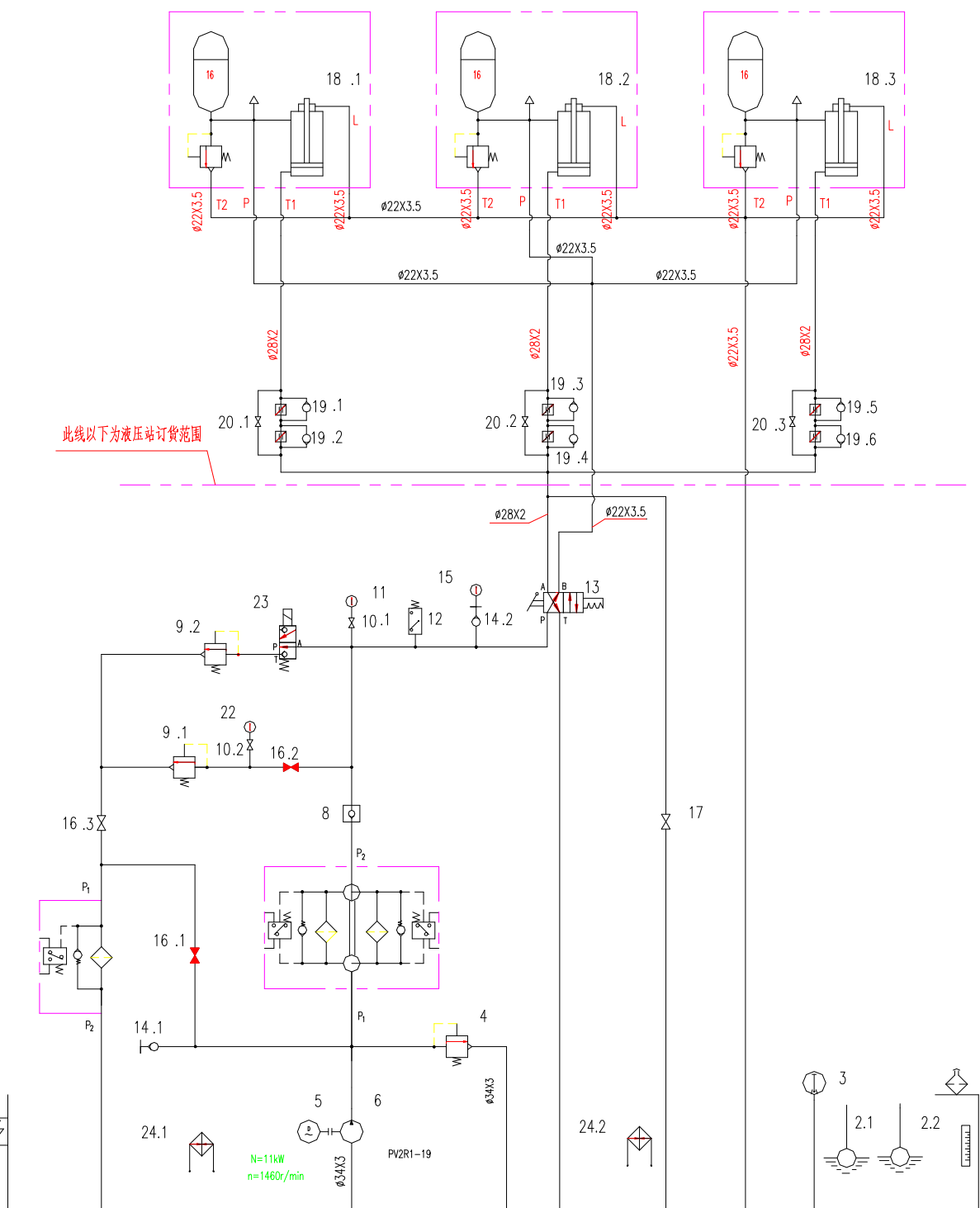
The hydraulic system is directly mounted on the foundations near the grinding mill. The hydraulic cylinder for pressuring the grinding roller is directly mounted on the grinding mill. There hydraulic cylinder with accumulator gain power from the hydraulic system.

The feed device of the hydraulic system is connected to the actuator using pipeline. There are different kinds of control valves and stop valves. The connecting pipeline is made of cold-drawing seamless steel tube. The connection between the pipelines uses welding pipe joint.

C. 1. 8. 3 Operation instruction

C. 1. 8. 3. 1 hydraulic equipments instruction


See the hydraulic system principle diagram.



Hydraulic system principle diagram

1、Air filter

Feed oil to the oil tank through the air filter. The air filter can be ventilated and

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filter air during running.

2、Liquid level signal generator

When the liquid level reaches the minimum or the maximum level, signal generator sends out warning signal.

3、Electrical joint thermometer

The thermometer is used to measure and control the oil temperature. When the oil temperature is below 20℃, the electricity heater opens. When the oil temperature is above 20℃, the electricity heater closes.

4、Relief valve

The valve is used for control the pressure. The adjustment pressure is 15MPa.

5、Motor


Provide power for the oil pump. N=7.5kW.

6、Oil pump

The oil pump provides pressure oil during the grinding mill running or lifting the roller. The working pressure is about 10-11MPa. The start and stop of the oil pump is controlled by the pressure transducer. The pressure would be about 4.5MPa when lifting the roller.

7、Oil cleaner

The oil from the oil pump flows through one filters by a switch valve. The filter is equipped with a differential manometer to monitor the cleanness of the filter. When the difference of the filter equipment exceeds the predetermined value

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(generally 0.1MPa) , the differential manometer sends out signals. On this condition, start another filter and clean the blocked filter equipment.

8、Non-return valve

Prevent the oil from returning when oil pump is working.

9、Relief valve

9.1 The valve is pressure control valve when lifting the roller. When the mechanical device stops, the valve has safety action. The valve has adjustment pressure 5MPa.

9.2 The valve is pressure control valve when starting with light load.

10、Manometer switch

10.1 control the system manometer.

10.2 control lifting system manometer.

11、Manometer

Display the pressure on the spot.

12、Pressure sensor

The equipment is the sensor of the grinding roller pressure system pressure control and pressure oil making and breaking control. It transforms the measured system pressure number into electrical signal (4~20mA) to control the start , stop and main control display of the motor.

13、Manual reversal valve

The valve is used to operate the hydraulics to press the grinding roller or lift

and drop it.

14、 Pressure joint

15、 Pressure instruments

16、 Stop valve

Open 16.2 valve when lifting the roller.

17、 Stop valve

Close the valve when lifting the roller and dropping the roller.

18、 A set of Hydraulic cylinder

Connect with the hydraulic pulling rod and provide power for the roller press and lifting.

19、 20、 Combination valve (stop valve and return orifice check valve)

Lifting the roller, close the stop valve. Control the roller lifting speed through the return orifice check valve and insure that three rollers are lifted synchronous through three throttling valve.

Two return orifice check valves separately assure operate steadily when lifting the roller or dropping it.


Open the stop valve when hydraulics runs.

21、 Return line filter

22、 Manometer

Display the pressure when lifting the roller.

23、 Solenoid reversing valve

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Open this valve, then the system can start with light load.

24、Electrical heater

When the oil temperature in the oil tank cannot meet the work need, heat the oil. There are two heaters with 2kW. It is controlled by the Electrical joint thermometer.

<hydraulic cylinder、accumulator、relief valve>


Hydraulic cylinder is actuator for the grinding roller pressing, lifting and dropping.

The accumulator is mounted on the hydraulic cylinder and protects the hydraulic cylinder from overload. Also it is an auxiliary power device.

The relief valve can control the maximum pressure of the accumulator. When foreign matter goes through the mill, the hydraulic cylinder pressure can reach 33MPa. The oil in the accumulator can discharge from the relief valve. When the relief valve is using, the pressure should be adjusted between 20~25MPa.

C. 1. 8. 3. 2 Apply of the mill grinding pressure

The pressure needed for grinding is provided by the hydraulic system. When the mill is running normally, the pressure oil produced by the oil pump (No.2) comes into the piston end of the cylinder with accumulator (top chamber) through control devices and pipeline and produces grinding pressure. As the hydraulic system pressure reaches the maximum working pressure, the oil pump stops working. When the hydraulic system pressure reaches the minimum working pressure because of leakage, the oil pump starts working again. All the above mentioned process is

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automatically controlled by the pressure transducer (No.21) .

When the hydraulic system need drop on the mill grinding, you can start the electrical reversing valve (No.12) for automatically pressure-relief or operate the manual reversing valve (No.8) for manual pressure-relief. At this moment, the oil can returns the oil tank through throttle valve until the control system sets up new pressure. You must strictly comply with the system maximum pressure value limitation. The maximum pressure is 13MPa. The value cannot be exceeded.

Before operating normally, some equipment of the hydraulic system must be on the following condition:

Oil pump (No.2)	Stop
Manual reversing valve (No.8)	Left
Stop valve (No.14)	Open
Stop valve (No.22)	Open
Solenoid reversal valve (No.12)	Right

The mill roller should be on the lowest point.

When the equipment electrical switch is open, the motor starts and the oil pump starts to feed oil for hydraulic system until the pressure reaches the maximum pressure which is controlled by the pressure transducer 21. As the hydraulic system pressure reaches the maximum working pressure, the oil pump stops working. When the hydraulic system pressure reaches the minimum working pressure because of leakage, the oil pump starts working again.

When the oil is losing because of the leakage in operating time, you should observe the oil level gauge on the oil tank and feed oil based on actual need. When the oil loss is so great that the oil level is lower than the minimum level, the oil level gauge sends out alarm signal. At this moment, feed the oil tank again.

When the mill is on normal running, bulk foreign impurity (约 130mm) is not allowed to enter the mill. But on specific case, some foreign impurity enters the mill. The piston of the cylinder move upwards and the oil is pressed into the accumulator. After foreign impurity go through the mill, the hydraulic system can resume the normal running. When the oil volume discharged from the cylinder exceeds the volume of the accumulator, surplus oil will be discharged from the relief valve to assure the safety of hydraulic equipment.

Absolutely forbid foreign impurity beyond 130mm to enter the mill. If not, the inner parts of the mill will be damaged.


When the mill stop running, you can start the electrical reversing valve (No.12) for automatically pressure-relief or operate the manual reversing valve (No.8) for manual pressure-relief.

The gasbag pressure on the accumulator is 0.5~0.7 time of the system working pressure.

C. 1. 8. 3. 3 The lift and drop of the mill roller

Sometimes lift or drop the mill roller for work need.

Before lift the mill roller, some equipment of the hydraulic system must be on

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the following condition:

Oil pump (No.2)	Stop
Manual reversing valve (No.8)	Right
Stop valve (No.14)	Close
Stop valve (No.22)	Close
Solenoid reversal valve (No.12)	Right

When you start the oil pump manually, the hydraulic system should be on pressure and lift the mill roller. When you lift the mill roller, you should cut down automatic control device of the hydraulic system. The height of lifting is controlled by the proximity switch of three pull rod.

Relief valve 13 protects the pressure of the hydraulic system when lifting the mill roller. It can be set to 5.0MPa highest to avoid the damage of the equipment.

When you drop the mill roller, just reverse the direction of the manual reversal valve 8 and the mill roller can drop slowly by itself weight. The speed of dropping is adjusted by the throttle valve (7.3) .

C. 1. 9 List for lubrication oil and grease

Lubrication oil list

Lubrication position	Name and type	density t/m³	pour point ℃	flash point ℃	viscosity 40℃ (100℃) mm²/s	Oiling volume (L)
Roller bearing	MobilSHC634 industrial gear oil	0.87	-42	262	436.4 (44.9)	15/one roller

Classifier reducer	N220 Ep industrial gear oil	-	-15	200	198-242 (-)	400
Reducer and its lubrication station	N320 sulfur-phosphorous type heavy-duty industrial gear oil	-	-15	200	288-352 (-)	1500
Hydraulic station	N46 antiwear hydraulic oil	-	-9	180	41.4-50.6 (-)	500
Low-speed barring gear reducer	N100 industrial gear oil	-	-8	180	90-110	15


Explanation: 1. The oil for grinding rollers is high temperature bearing gear oil, which could not be used with other oil.

2. The oil for Reducer and its lubrication station is recommended. Please see the specification for reducer when oiling.

Lubrication grease list

Lubrication position	Name and type	needle penetration 0.1mm,25℃	drop point t≤℃	application temperature ℃	greasing volume (kg)
Grinding roller sealing ring	synthetic complex aluminium base grease NO.3	220-250	200	<120	0.6/one roller
Classifier bearing	general lithium soap base grease No.2	265-295	175	-20--120	0.2
Hinge and pin	general lithium soap base grease No.2	265-295	175	-20--120	2
The lower speed barring gear universal coupling	general lithium soap base grease No.2	265-295	175	-20--120	0.2

Explanation: Please see the specification for reducer for details when greasing motor and sealing air fan.

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D. Assembly instruction for MPF coal mill

D. 1 Preface

This instruction is usual description for mill assembly. Assembling mill must be considered with the assembly of pulverizing system. Mill must be assembled in according with the drawing and order supplied by supplier. As a matter of principle, the mill must be installed by well organized and qualified personnel with the proper tools

D. 2 Leveling


Determine centre line of mill, longitudinal and lateral axes as well as the relative elevation in accordance with the drawing. The corresponding reference points are to be fixed together with the site management, so that variations in dimension in the course of designing the building and/or supporting structure in comparison with the dimensions indicated in the drawings are allowed for from the very beginning of the erection work.

Then determine the centre position of the tension rod and motor. According to every centre position, determine the locating position and elevation of fundamental bolts and correct an error. Clear up and remove rust before bury fundamental bolts. Painting is never allowed. The pour of concrete shall proceed continuously and leave places for lubrication station, secondary grouting layer and some fundamental holes according to the drawing. Before pouring, regulate the position and elevation of fundamental screws and holes.

D. 3 Reducer bottom plate

Adjust heights by four adjusting bolts on bottom plate when mounting and aligning the reducer bottom plate. The aligning level is the machined gearing plate.

For measuring a machine ruler (approx. 2m) is placed in longitudinal,

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transverse and diagonal direction and measurement is made by means of a machined bubble level replaced on.

Maximum admissible deviation 0.1mm/m. this is very important as the reducer must not be shimmed.

Assemble and align both foundation plates for motor frame together by means of the motor frame. Align as per upper way, place the ruler onto the machined seating surfaces of the foundation plates. Maximum admissible deviation 0.2mm/m

Mount and align tension rod base plate. Align as per upper way, place the ruler onto the machined seating surface. Maximum admissible deviation 0.2mm/m. The alignment point of tension device anchor slab is the center of pinhole of the anchor slab's hydraulic cylinder. The dimension from uniformly three points to the grinding mill center is vital.

The reducer bottom plate, the motor bottom plat and the tension rod anchor slab are according to design specifications, to be anchored in a non-positive manner and to be grouted according to instructions. Care is to be taken to ensure careful sealing of the anchor boxes (by means of rubber plugs and erection form). The height of the rubber ring should have proper surplus and after adjusting the height, cut the rubber ring partially.

D. 4 Reducer

Carefully clean the reducer bottom plate and the underside support surface of the reducer; treat the gearing plate with MoS₂ paste (put on thinly and rub in)

The reducer must only be transported and pulled using claws provided on the housing. Position the reducer using prepared slings and align preliminarily by means of the pressure bolts provided and hydraulic presses in both axial directions and insert retaining bolts. Final aligning: the reducer is aligned with the equipment

mentioned under above, so that the punch marks on the gear box flange and on the gearing plate will coincide, admissible deviation $\pm 0.4\text{mm}$ from the mill centre line.

The reducer must not be shimmed.

Then the reducer is to be locked by means of the in accordance with the drawing and to be screw-connected to the gearing plate.

Fix the reducer by the jackscrew. Check the clearance of contact plane by the clearance gauge. The maximum clearance cannot be beyond 0.1mm. After that, install the fitting pin and screw up the T bolts by the moment limit spanner.

The reducer must not only run in the rotational direction indicated by arrow. Check that the drive motor turns in the right direction while the low speed barring gear must not be connected.

D. 5 Bottom frame

Refer to D.12 before install housing.

Position the bottom frame on the channel sections in accordance with the drawing and align bottom frame floor roughly with the reducer.

Insert the foundation bolts into the base holes, pour cement mortar and fix the foundation bolts.

After placing on the bottom frame floor seal(see D.6), carry out final alignment of the bottom frame.

After height adjustment of shim plates and channel sections to one another, weld the shim plates on the channel steel. Then weld the shim plates on the frame.

Have bottom frame case planked and under poured by the building company.

Tighten stone bolts, observe the setting time of the pouring compound!

In order to avoid the erosion, must take off one of the four covers on the bottom frame during assembling or after assembling. Before putting in production, assembling and fixing it up.

D. 6 Frame sealing ring

Put housing sealing ring assembled according to the drawing on the housing upper surface. Align the mill centre through radial machined surface of sealing ring. Don't weld after adjustment.

Install the grinding track seat (Notes: first dismantle scraper blade on the bottom of the grinding track seat and back plates and cover plates. Clear the machined surface). After the grinding track seat closely contacts with reducer output flange, adjust the sealing ring right accurately. Adjust leveling bolts and adjust the radial clearance between sealing ring and the grinding track seat. If qualified, dismantle leveling bolts and weld sealing ring shell on the upper surface of housing.

D. 7 Grinding track

Clean off surface protection coat from the contact surface of the grinding track carrier. Check wedge bolts of grinding track and spray surface with MoS2 grease.

Carefully clean the seating surface of the grinding track carrier and output flange of the reducer. The holes in the reducer output flange should be absolutely free from dirt. Check whether the bolts can be in easily

Screw the protection covering on the grinding seat and scraper blade.

Screw in 3 centre pins into the output flange.

Place grinding seat guided by the centre pins, onto the gearing output flange

Remove the centre pins and tighten the connection bolts in accordance with the torque indicated in drawings.

Check the clearance between grinding trace seat face and output shaft flange face. The value of the clearance should be smaller than 0.05mm.

Check weather back plate and the sealing ring of bottom housing intervene.

According to the drawing, adjust the distance between scraper blade and top surface or inner surface of shell.

D. 8 Nozzle ring

Mount the nozzle ring, not tightening and fixing.

Check whether nozzle ring is exactly aligned at the level, using the supplied shims.

Mount the grinding track with covers, and adjust the clearance between static ring and rotating ring well. Measure the clearance by clearance gauge and record it.

Mount sealing rope between nozzle ring and frame. After adjusting the gap, seal the nozzle ring and frame using LETAI glue and screw up the bolts of the clamp plate of nozzle ring. Weld the lower shim plate on the frame.

D. 9 Grinding rollers

Install fixing support in the mill center. The fixing support is in the mill specific purpose tool.

Attach lifting device to the roller bracket.

Hoist and mount the roller assembly on the grinding track and adjust position angle.

Fix the rollers on the grinding track support using bolts. Joint bolts should be fixed firmly to avoid accidents because of falling of rollers. Do your best to adjust the rollers position and angel to assure the correct installation of loading frame.


Attention:

Turn grinding roller to an extent that a plug for drainage of the oil from the grinding roller hub is at the bottom.

Dismantle lifting device and screw on protecting plate.

D. 10 Loading frame

Insert rollers with pans into the pockets of the thrust piece; threat the surface of

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the joint with MoS2 paste.

Mount the guide plate on the middle frame. But not tighten the bolts.

Put three rollers on the six moving rolling pillar. At this moment, dismantle roller fixed frame in the centre.

Adjust three pin-connected joint of installing rod of loading frame to the centre of the mill right. At the same time, centre three rollers. Such steps should be following: install alignment rod of rollers on the center hole of the cover. Three rollers should be adjusted so right until that the ends of the alignment rods coincide and in centre line of the mill. Centre line can be measured by plumb.

After alignment, add adjusting shim behind the guide plate of intermediate housing to assure that loading side is without clearance (wide guide plate side) and the clearance of no loading side is between (narrow guide plate side) 3-5mm.

Fix connecting rod supporting seat of loading frame and suspension linkage of rollers on the roller support with bolts.


D. 11 Sealing air pipeline

Mount sealing air pipeline onto roller frame. Weld three pipelines on classifier input after adjusting. There should be sealed well between pipeline and roller frame.

Attention: Grease Supramoly onto upper knuckle bearing. Check allowance between knuckle bearing and sleeve. The value of allowance should be smaller than 1mm.

D. 12 Tension device

Secure hydraulic cylinders with hydro-storage and pivoting bearing to the tie rod,

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base plates. Ensure the fitting position is in accordance with the drawing.

Pass tension rod and sealing sleeve through intermediate housing holes.

Install loading ring on tension rod and lock it according to the drawing.

Connect tension rod and piston rod with connecting nuts. Don't rotate piston rod of hydraulic cylinder when install tension rod.

Lock it with check plate when the length of fit of screw reaches the drawing notes.

Lift loading ring and tension rod. Open the small gate on intermediate housing. Install the crossbeam and balls. Fix the crossbeam on the loading frame using bolts. Close the small gate on intermediate housing.

Adjust the tension rod sealing sleeve right and weld it on intermediate housing. Before welding, check weather the knuckle bearing rotates flexibly.

Install the tension rod sealing device on the sleeve of intermediate housing.


D. 13 Measuring device

Weld measuring device on middle frame according to drawing demand. Mount the other parts well.

D. 14 Classifier

Put asbestos rope used for sealing onto middle frame flange. Put classifier on middle frame, and join them by bolts.

Check function of the classifier drive and rotating part. Check weather the classifier drive device oil tank is clean. According to the drawing, install drive device with pinion and frequency conversion motor. Feed lubrication oil and grease.

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D. 15 Deslagging hole

Install discharge groove on the opening of bottom housing. Check weather there is clearance on the waste material door. Turning on or off the waste material door should be particularly flexible.

D. 16 Sealing air fan

Mount it according to the instruction provided by supplier

D. 17 Sealing air pipeline outside the mill

Install the sealing air pipeline from the main flange interface outside the grinding mill to the grinding rollers and the classifier drive gear. Install the sealing air pipeline from the sealing fan to the main flange interface (the pipeline provided by user). Notice the installation direction of back valve.

Fix the sealing air line on the mill with plates or rods.

Attention: Clean pipelines carefully before assembling. There should not be foreign matter such as skin, gravel, dust, and so on.

D. 18 Pressure lubrication system

Fix lubrication station according to drawing.


Mount them according to drawing after clean each pipeline carefully. The sealing of pipe is well, not leaking oil.

Please see the instruction provided by supplier for details.

D. 19 Hydraulic system

Mount and fix hydraulic system according to drawing. Mount pipeline between hydraulic station and tension hydraulic cylinder.

Weather the pipeline is clean concerns the normal working of the hydraulic valves. Therefore, clean the pipeline very carefully. Notice that the connecting

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pipeline of the oil tank and oil station cannot be connected wrongly.

You should consult instruction for hydraulic station before mounting.

D. 20 Monitoring device

Mount pressure, temperature and differential pressure monitors at classifier, reducer and sealing air pipeline.

D. 21 Inert gas system

Mount inert gas pipeline and valve according to drawing.

D. 22 Platforms

Install the classifier platform and ladder according to the drawing.

D. 23 Motor

Mount the half couplings on inputting shaft of reducer and outputting shaft of motor respectively.

Put the motor on the motor bottom plate. Adjust the concentricity between the motor and reducer with shins. The skewness between motor and reducer $\leq 0^{\circ}30'$.and the diametrical removing $\leq 0.4\text{mm}$

Tighten the motor by bolts.

Connect motor wire.

Start motor and check rotation direction. Mount coupling well.


Mount coupling safety covers.

D. 24 Pouring surface layer concrete

Carry out the pouring concrete of skin surface to the elevation of the drawing.

D. 25 Heat insulation

Carry out the heat insulation according to the drawings (insulant provided by user)。

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D. 26 Grounding

Make sure that the mill is grounded to prevent electrostatic charging. The bottom frame is the ground point.

D. 27 Welding work in the mill area

To prevent the damages caused by passing current (especially on the various gears and bearings), it is absolutely necessary to compensate for potential difference.


D. 28 Handing over the mill

The mill must not be handed to the customer before all parts have been tried and shown to function perfectly.

E. Low-speed barring gear of MPF coal mill

E. 1 Low-speed barring gear function

Low-speed barring gear is assistant driving device. Use it when maintaining mill and exchanging wearing parts. Main motor should be cut off when using this device, and mill is driven through main reducer. The low-speed barring gear could transport the coal powder stored in main air room to waste material box after emergency shutdown. Tension rod hydraulic cylinder should be unloaded when using this device. And this time oil temperature in reducer should not be more than 50°C. Or sliding thrust bearing is damaged. Not to operate low-speed barring gear when mill running. Reducer of low-speed barring gear should be filled with lubrication oil. You can check the wearing situation of wearing parts during operating low-speed barring gear.

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E. 2 Technical data for low-speed barring gear

Type		stationary	
Motor rated power	kW	11	
Voltage	V	380	
Frequency	Hz	50	
Rotate speed	r/min	970	
Outputting r	r/min	34.64	
Speed ratio		i	28
Mill rotate speed when using low-speed barring gear	r/min	1.1	
Technical data when starting low-speed barring gear			
Mill motor stops			
Lubrication oil pump speed	min-1	1450	
Pressure provided by tension rod	N	0	
Oil temperature of sliding thrust bearing	°C	<50	
Technical data when stopping low-speed barring gear			
Oil temperature of sliding thrust bearing	°C	>50	

E. 3 Using low-speed barring gear

Oiling

*Some lubrication oil should be oiled when reducer running normally

Lubrication grease

*Every time using low-speed barring gear, inject lubrication grease into the engagement of the half coupling.

Checking the rotation direction

*The rotation direction should be counterclockwise when you face outputting shaft of low-speed barring gear reducer

*Low-speed barring gear could be operated only against this direction.

*Only when low-speed barring gear and mill are separating, can you check the rotation direction

Connecting low-speed barring gear and main motor

*Complying with the manufacture specification, connect them using universal coupling。

E. 4 Operating low-speed barring gear

* Low-speed barring gear can be used firstly only after mill have worked for 200 hours with working speed

*Reducer oil pump should run when running low-speed barring gear.

*Turn on driving motor of low-speed barring gear.

*Notice to observe the change of oil pressure and temperature in reducer.

*Shut down the driving motor after operation.