



CONSTRUCTION
BATTERY
EQUIPMENT

BM OXIDE BALL MILL & FILTER



Oxide preparation



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The **Ball Mill** is suitable to produce lead oxide by means of friction between the cylinders produced before by the cylinder casting machine (Shimadzu method). Six parts compose it:

- Rotating room. It is made of steel, welded on the generatrix and mechanically worked, in order to enable the assembling using hubs, on which the ball bearings are assembled. Base and supports. The rotating room is supported by an electrically welded structural steel.

The barrel roller bearings that enable the rotation of the drum are contained in the cast iron housing. The base also supports the cooling water collection tank and the collecting hood, both made of stainless steel AISI 304. The base leans on the counterframe by means of three constrains and two load cells.

- Transmission group. The rotation of the room is done by means of a reduction gear group, which transmits the motion to the pinion and crown, which is connected to the rotating room.

- Lubrication system. The bearing lubricating system, which supports the rotating room, the main motor and the pinion, is centralised. The pinion and crown lubrication system is done automatically by means of a specific pump, which greases the kinematics motion following the time set in the PLC of the machine.

- Cooling system. The temperature inside the Mill is adjusted by means of an efficient Outside water cooling system, and by an air flow, sucked by a fan positioned on the hood that laps the walls room. The temperature adjustment is assured by a thermocouple, which gives the temperature value, and by means of the PLC, which starts the cooling system if necessary.

- Protection hood in stainless steel AISI 304 assures a suitable protection to the moving parts and enables to collect the cooling water sprayed on the outside part.

Operation

The necessary lead cylinder quantity is loaded from the cylinder silo into the rotating room. The rotating rooms starts, and after that, the fan at the base of the filter starts. The friction created by the turning cylinders makes little lead particles because of the temperature created inside, which oxidises and forms the lead oxide. The depression created by the fan installed at the base of the filter generates an air flux, which transports the lighter lead oxide grains from the mill to the filter.



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The oxidation parameters are adjusted by means of a main PLC, which enable the supervision of both the working and the set parameters. The Mill in optimal working conditions (efficient filter, depression, speed rotation, inside temperature, etc.) enables to obtain up to 16-18 tons of lead oxide each 24-h, or 24-26T in 24-h.

Why to prefer us?

The PLC controlled Ball Mill, thanks to recipes (set parameters), allows to maintain the correct cylinders feeding, a low consumption (cooling) of water, and air suction. This allows to work during the year in different environment and material conditions, allowing to produce optimum oxide.

- Feeding control of lead cylinders to have correct quantity/recipe/quality
- Continuous control of oxide production
- Best aspiration system that grants the right dimension of oxide aspiration
- Oxide does not need screening, only smaller particles pass to filtering and grant a top quality paste.
- Number of working parameters that grant complete set of recipes
- Cooling system outside the drum, keeping temperature on starting
- Alarms and signals in relation to exceed parameters
- Less water usage and low electricity consumption
- Lowest level of humidity of lead oxide
- Highest oxidation stability (less +/-1%/24h)

PbO quality : Oxidation : 72 % - 75% Acid suction > 230-280 gr. H₂SO₄/cm³ PbO

Scott Density = 1.15 - 120 gr/cm³ BET 2,2 m²/gr



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FILTER FOR MILL

The 14-ton /24t filter is a Pbo filtering system obtained by a connected Mill. The following main parts compose it:

- Down part : Cyclone - bag holder
- 1 bag snap ring with relevant "Venturi" - Absolute filter - Vacuum fan

Operation

The purposes of dust suction and abatement are mainly two. The first one is keeping the whole system under vacuum-seal (in order not to have any dust emission in the working environment). The second one is extracting the lead oxide powder from the rotating chamber (where grinding and oxidation of the metal are done contemporaneously) and brings it to the hopper of the cyclone filter, from where it is mechanically sent to the silos.

The bags filter, in view of its use, has been over-dimensioned: once the dust granulometry, its quantity on the air per m³/sec and the filtering surface have been stated, it is more than sufficiently applied to keep noxious emissions under permitted tolerance. In any case, there is an absolute filter behind the bags filter in order to prevent any bad effects if a bag breaks.

The air speed, the type of dust in the air, the temperature (120-130 °C) and the lead oxide dust's granulometry result in choosing a dry filtering system, by means of bags made of a special woven together with an absolute filter for a larger guarantee.

There is a cyclone behind the filter: this reduces the dimensions of the bags filter because of the reduced quantity of dust (per m³) in the air. A lead oxide level control is placed on the cyclone in order to detect any possible clogging. This control is also placed on the conical part of the bags filter.

A centrifugal fan sucks air from outside through the rotating chamber of the mill: in this phase, the air brings lead oxide powder on itself, and removes the heat generated both by the metal's attrition on the wall and by the exothermic reaction of the lead oxidation.

The air/lead oxide mixture passes through the rotating chamber and enters the cyclone (inside the filter's body) where about 50% of the powder is separated from the air: then the air passes through the bags filtering woven, where the remaining lead oxide dust is kept.



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At this point, the air quite clean leaves the filter, passes through the ventilator from where it is sent, by means of a shutting valve, to a double absolute filter: now any impurity still present on the air is definitely detected. The air is then sent outside through the absolute filter by means of a chimney.

Differential pressure gauges send to the microprocessor in real time the clogging condition both of the bags filter and of the absolute filter, controlling the whole installation.

Working conditions are:

- average environmental temperature: 20-26°C
- air temperature at the rotating chamber outlet: 115-130 °C
- pressure drop: 120 mm water column
- depression behind bags filter: 450-500 mm water column
- pressure before absolute filter: 60-70 mm water column

Materials applied:

- filter's body: reinforced steel plate
- bags' woven: nomex (weight 500-600 gr/m²)
- absolute filter: paper on wooden framework
- joints: silicone rubber 50 shores

Max emission in the air is 5 □gr/m³

Bags cleaning is done by blowing compressed air in counter-current, accelerated by Venturi scrubbers. The abatement system is controlled by depression-meter, pressure gauges, temperature controller, and differential manometer. All the above are connected to the PLC, and should any parameter be out of range, the plant will automatically stop, being advised by an acoustic and luminous alarm.

During the start-up of the equipment, we supply our Customer with operating and maintenance manuals besides instructions given during the training of the operators of the plant.