



VERTICAL SPINDLE PULVERISER SPECIFICATIONS

Overview

The Keegor Vertical Spindle Pulveriser is of the upright standing design, with the friction discs horizontally opposed. The machine is well adapted to produce the finely pulverised product, which is required in any modern Assay Office, in the preparation of ore samples for analysis.

Because of the upright design, the floor area occupied is minimal, allowing for a compact and efficient sample preparation area. The extremely quick grinding process means that a high volume of samples can be handled by each machine daily, making for efficient throughput of samples for further analysis - naturally, this translates into minimal staffing requirements as the machine is very quick and easy to operate.

Accurate grinding times cannot be quoted as this naturally depends on characteristics of the sample - mass of sample, actual feed size, hardness of material, fineness required, etc. - however, for illustration purposes, a 1kg sample of quartzite would typically take no more than 40-45 seconds to grind down from 6mm to 80% minus 75 micron.

Important Notes

The most important aspect in the operation of this machine is in maintaining the integrity of the compressed air supply. It is absolutely imperative that the air is clean, dry and oil free. Obviously, if the air is damp and/or oily, the inside of the machine will be moistened during the operating cycle and it will not clean down properly, resulting in the possibility of inter-sample contamination.

Compressed air must be supplied at the correct pressure and volume - if insufficient air is available, operation will be severely compromised, especially the cleaning system, which is totally dependent on correct pressure and volume of air.

Where absolute certainty ('belt and braces' approach) is required, that there is no contamination between successive samples (e.g. when grinding exploration samples or when high grade and low grade samples are to be processed in the same machine and/or when any uncertainty exists), a barren "wash" can be done by interposing a barren rock (or silica sand) 'sample' between production samples, this will scrub the internal workings of the machine. Although it could be argued that this will lengthen the time of preparing production samples (and this may be true), when taken in the context of being less than a minute to perform this 'wash' it is quickly realized this is a small price to pay for the additional peace of mind.



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General Details

Maximum Feed Size:

The machine is capable of accepting a maximum feed size of approximately 6mm ($\pm 1/4$ ").

Minimum Pulverised Size:

The Pulveriser can reduce the feed down to +/- 80% minus 75 micron with relative ease (dependent on mineralogy of feed material).

Drive:

A totally enclosed fan cooled, 5.5kW (7½HP), 4pole, motor is fitted - this is normally either 380V or 525V (however, other voltages can be accommodated, details on request).

The motor and drive are conveniently mounted behind the machine, where they are out of the way of normal operation yet easily accessed for maintenance. The motor is supplied complete with a 3 groove V-pulley together with V-belt drive to the main shaft of the machine.

For geological fieldwork or remote locations, a petrol or diesel motor can be supplied in place of the electric motor - details and additional price on request.

General:

This Pulveriser is manufactured entirely in South Africa with the exception of small items such as the anti-friction bearings, which are available ex local stocks.

This machine was primarily designed and manufactured for the Precious Metal Assaying industry, where speed of operation, efficiency, thorough grinding of the sample, and no inter-sample contamination are of prime importance.

The machine has, as an integral part, a blow-down system, which thoroughly blows down the internal workings with compressed air, automatically, after each sample has been pulverised to ensure no contamination between samples occur.



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Design Variations and Options

Over the past number of years, there have been requests for machines with various sizes of feed hoppers and receiving beakers, to enable larger samples to be fed, pulverised and collected in a single operation, without the need for dividing the sample before pulverising and re-combining afterwards. This is primarily so that a large sample can be analyzed in its entirety, without splitting and discarding a portion of the sample, as is normal Assay practice.

The following alternative arrangements are available, with only the feed hopper, and receiving chamber different - the rest of the machine is identical to the standard.

Standard Small Arrangement - (1.1 Liter Beaker Capacity):

The standard machine is manufactured with a sample-receiving beaker having a brimful capacity of approximately 1.1 liters (Ø110mm x 118mm deep), and a charging hopper with corresponding dimensions.

Modified Medium Arrangement - (3.5 Liter Beaker Capacity):

This arrangement is a modified version of the standard machine, to enable pulverising of larger samples in a single pass. These machines are custom built to take a large sample-receiving beaker having a brimful capacity of approximately 3.5 liters (Ø150mm x 200mm deep) with a corresponding sized charging hopper.

Modified Large Arrangement - (10 Liter Beaker Capacity):

This arrangement is a modified version of the standard machine, to enable pulverising of very large samples in a single pass. These machines are custom built to take a very large sample-receiving beaker having a brimful capacity of approximately 10 liters (Ø220mm x 275mm deep) with a corresponding sized charging hopper.

Special Arrangement - (Any capacity to suit clients requirements):

Contact our technical department, to discuss the possibility of any special arrangement to suit a particular application.

Motor Starter (Optional Extra)

A motor starter can be factory fitted, as an optional extra (the motor starter comprises an enclosure with start/stop buttons and a direct on line contactor with motor overload protection, and is cabled to the motor).



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Noteworthy Features

The Keegor Vertical Spindle Pulveriser has been designed and built to fill a long felt need in an industry which is becoming more and more aware of the importance of accurate Assaying.

Much thought has gone into the design of the machine. The departure from conventional design has been fully justified by the outstanding performance and reliability of this machine.

Exceptionally High Recovery

The unique design and pneumatic self-cleaning system reduces grinding losses to the barest minimum and prevents residual dust and carryover between samples.

Automatic Cleaning

A unique pneumatic disc parting and blow-down system automatically cleans the feed hopper, receiving funnel and discs after each grind cycle.

Rapid Sample Processing

The 11" (280mm) discs, and sturdy shaft are driven by a 5,5kW (7½HP) 4 Pole motor which means quick sample processing. The automatic cleaning system eliminates cleaning between grind cycles, thus increasing productivity.

Dust-Free Operation

Any escaping dust generated in the grinding process is drawn away through the base of the machine, which provides for a clean environment and eliminates the need for operators to wear respirators. It also substantially reduces clean-up time.

Freedom from Maintenance

The heavy-duty construction, simplicity of design and few wearing parts keeps maintenance costs to a minimum. All moving parts are situated above the grinding chamber and are sealed from dust.

Long Disc Life

The 11" (280mm) diameter, cast iron grinding discs are horizontally opposed and designed to give fast grinding and long life. The discs are easily adjusted by the hand-wheel at the top of the machine, and when adjusted correctly, are just clear of one another, eliminating the possibility of polishing, generating unnecessary heat, and iron contamination.



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Special Cleaning Features

The receiving cup for the pulverised product cannot be withdrawn from the machine unless the control lever is in the 'discs parted' position, ensuring that no part of the pulverized sample is trapped between the discs.

Upon withdrawal of the sample receiving cup, a latching device is activated which opens a blow-down valve which introduces a high pressure stream of air into the swivel connector housing at the various points where residual dust is likely to lodge.

One rotating jet scours the grinding face of the stationary (upper) disc while two rotating jets sweep the sides of the receiving funnel.

A stationary jet of air also enters the top of the cylinder support and stationary disc holder, blowing downward onto the upper grinding face of the lower (revolving) disc.

A perforated pipe mounted on the lower face of the feed hopper cover expels dust from the feed hopper after each grind cycle.

When the sample receiving cup is reinserted under the funnel, the latching device closes the blow-down air valve, thus shutting off the cleaning air at all blow-down points.

The control lever is then returned to the discs closed or grind position and the pneumatic cylinder raises the platform, clamping the sample receiver immovably to the funnel and also brings the grinding discs together.

This system ensures that a strict sequence of operation must be adhered to and that no important cleaning operation is bypassed.



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Special Safety Features

Belt Guard

A metal belt guard is mounted around the moving parts of the motor and pulleys, to protect the operator during normal operation.

Motor Starter

A motor starter can be factory fitted, as an optional extra (the motor starter comprises an enclosure with start/stop buttons and a direct on line contactor with overload protection, and is cabled to the motor). If the client opts to supply and fit his own, we recommend that it be mounted directly onto the machine with the off pushbutton in easy reach of the operator.

This will allow the machine to be quickly turned off in the event of the discs binding.

Dust Collection

The automatic self-cleaning and dust extraction system prevents dust from escaping into the surrounding atmosphere. This eliminates the need for operators to wear respirators and reduces operator contact with dust during normal operation and cleanup.

Protecting from Moving Parts

In addition to belt guards, this machine also provides protection from all other moving parts. The shaft, pistons, and bearings are completely sealed from access during operation. The receiving funnel fully covers the grinding discs and cannot be removed while the discs are in the grind position.

Hinged Feed Hopper

The feed hopper is long and precisely angled, with a sturdy hinged cover to prevent material from leaving the machine once it is fed into the chute.



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Technical Specification

Main Frame

The main frame of the machine consists of a series of gray iron castings, precision-machined at the joint faces. The frame is spigoted for location in the case of the upper, stationary disc, and recessed in the case of the lower, revolving discs.

Motor Drive

The machine is driven by a 5.5kW (7½HP), 4-pole squirrel cage induction-type motor (normally 380V or 525V, 3-phase - but any other specified voltage can be accommodated). The motor is mounted at the top rear of the machine, well removed from the grinding zone and general working area. The motor is driven by three A-section V belts and features a high efficiency rating for economic operation.

Main Shaft and Bearings

The main shaft is fabricated of EN9 steel with a tensile strength of 45 tons. The shaft is supported at the upper end by a single row, deep groove, heavy-duty ball-race. It is supported at the lower end by a heavy-duty, self-aligning double row, spherical roller bearing, with the axial thrust being taken up by a heavy-duty ball thrust race. All bearings are rated for the heaviest duty and the assemblies are packed with grease and sealed against the ingress of dirt and moisture.

Piston

The piston is an integral part of the main spindle housing and incorporates accurately machined bearing housings for the main spindle as well as a fine thread adjusting mechanism which permits accurate control of the product size.

Piston Barrel

The piston barrel is an integral part of the main frame and is a one-piece casting accurately machined and polished in the bore.



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Technical Specification

Grinding Chamber and Discs

The grinding chamber is a fully enclosed compartment situated inside and at the top of the pedestal of the machine. It is fitted with accurately machined grinding discs, cast in a special iron-carbon alloy. Manganese-steel discs are also available. The discs are easily accessible for inspection and renewal through the pedestal doors but cannot be accessed during operation. The adjustment of the discs is by means of a large diameter hand-wheel, concentric with the main spindle and easily accessible at the top of the machine.

Dust Extraction Requirements

For maximum efficiency and operator safety, the dust extraction requirement (per machine) is approximately 20m³/min (±706cfm) from the flanged connection at the rear of the machine.

Compressed Air Requirements

Air must be available at the bulkhead fitting on the machine's base (½" BSP connection) at minimum of 550kPa (±80psi) and a maximum of 650kPa (±95psi). A volume of approximately 200 liters per minute (±7cfm) is necessary for trouble free operation. Oil and moisture traps are essential to ensure the air is completely clean and dry, in order to prevent sample retention on the discs and receiving funnel. An air receiver is also recommended if more than one Pulveriser shares the compressor system.

Total Mass

Total dry mass of the machine is approximately 860 kg (1 895 lbs.).

Approximate Dimensions

Approximate dimensions of the machine are a 1m x 1m footprint with a 2m overall height. A half-meter to one-meter clearance is required all around for operation/maintenance.

Additional Information

For any additional information or queries, please do not hesitate to contact our technical department