G PSR 11 INSTALLATION, OPERATION, AND MAINTENANCE MANUAL

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Section 1: Safety

1.1 Safety Rules

Safety must be considered through all facets of operation and maintenance on any mechanical device. Using proper tools and methods will help prevent accidents and serious injury to you and your fellow workers.

Proper operating procedures and safety precautions are listed throughout this manual. Study them carefully and follow instructions; insist that those working with you do the same. Most accidents are caused by someone's carelessness or negligence.

Examples of the four types of safety notices (Danger, Warning, Caution and Notices) in this manual are listed below:

DANGER: INDICATES AN IMMINENTLY HAZARDOUS SITUATION IN, WHICH PERSONAL INJURY OR DEATH MAY OCCUR.

WARNING: INDICATES A POTENTIALLY HAZARDOUS SITUATION IN, WHICH PERSONAL INJURY OR DEATH MAY OCCUR.

CAUTION

CAUTION: INDICATES A SITUATION WHERE DAMAGE TO THE EQUIPMENT COULD RESULT.

NOTICE

PROVIDES HELPFUL INFORMATION FOR PROPER OPERATION OF THE FULL SCREEN HAMMER MILL

1.2 Safety Precautions

OPERATORS MUST BE INSTRUCTED NOT TO PUT HANDS, FINGERS OR OTHER FOREIGN OBJECTS IN THE MACHINE, AND NOT TO REMOVE ANY COVER, DOOR, HATCH OR OTHER PROTECTIVE DEVICES PLACED ON THIS MACHINE FOR THE SAFETY OF THE OPERATOR. ANY ATTEMPT TO DEFEAT THESE DEVICES COULD RESULT IN SERIOUS INJURY.

ELECTRICAL SERVICE TO THE MACHINE MUST BE LOCKED OUT WHILE ANY REPAIRS OR ADJUSTMENTS ARE BEING MADE OR WHILE ANY COVER, DOOR, HATCH OR OTHER PROTECTIVE DEVICE IS NOT IN PLACE.

WHEN PROCESSING MATERIALS THAT MAY REACT TO A SPARK CAUSED BY METAL HITTING METAL OR STONES, ETC., THE USE OF A MILL DUST COLLECTOR EQUIPPED WITH AN EXPLOSION VENT IS STRONGLY RECOMMENDED. SEE APPENDIX G FOR MORE INFORMATION ABOUT EXPLOSION VENTING.

The precautions listed in this manual may not be all inclusive and others might exist, that are specific to your operation or industry. In addition, nearly all employers are now subject to the Federal Occupational Safety and Health Act of 1970, as amended, which require that an employer be kept abreast of regulations, which will continue to be issued under its authority.

The Full Screen Hammer Mill must always be operated in accordance with the instructions and precautions in this manual and on the caution plates attached to the equipment. Only workers completely familiar with the instructions and precautions in this manual should be permitted to operate the unit. The operators should thoroughly understand these instructions and precautions before attempting to operate this equipment.

Illustration 1-1 is a checklist of safety precautions and proper operating procedures. Failure to observe and follow the precautions may result in serious personal injury or property damage.

Safety Checklist

ALWAYS operate the Hammer Mill in accordance with the instructions in this manual.

DO NOT open inspection doors while unit is in motion.

NEVER work on unit and related components unless electric power and motor drive have been locked out and tagged. The National Electrical Code requires a manually operable disconnect switch located within sight of the motor, or a controller disconnecting means capable of being locked if not within sight of the motor.

DO NOT use the Hammer Mill for processing of material other than the specific application for which it was designed.

AVOID poking or prodding into unit openings with bar or stick.

ALWAYS have a clear view of unit loading and unloading points and all safety devices.

KEEP area around unit, drive and control station free of debris and obstacles.

NEVER operate unit without guards and all safety devices in position and functioning.

ALWAYS allow unit to stop naturally. DO NOT attempt to artificially brake or slow motion of unit.

NEVER put your hand near or in the inlet or outlet of the Hammer Mill while it is operating or stalled.

Figure 1-1: **G PSR 11 Series Hammer Mill Safety Check List**

1.3 G PSR 11 Series Hammer Mill Safety Labels

Figure 1-2 shows the safety labels used on the G Series, and G PSR 11 Series Hammer Mill. These labels are important for worker information and must not be removed from the unit.

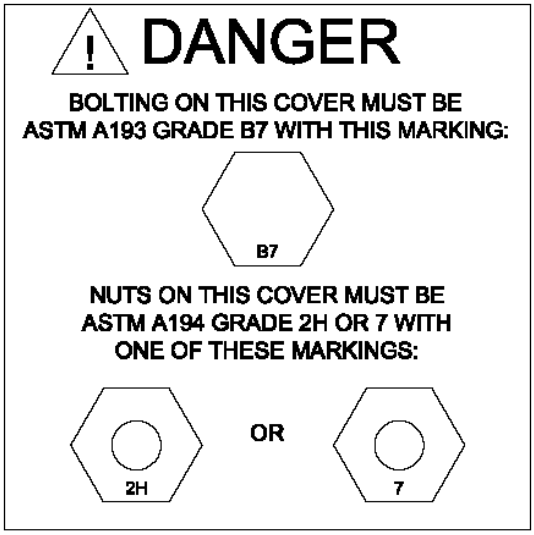


Figure 1-2: Safety Labels for the G PSR 11 Series

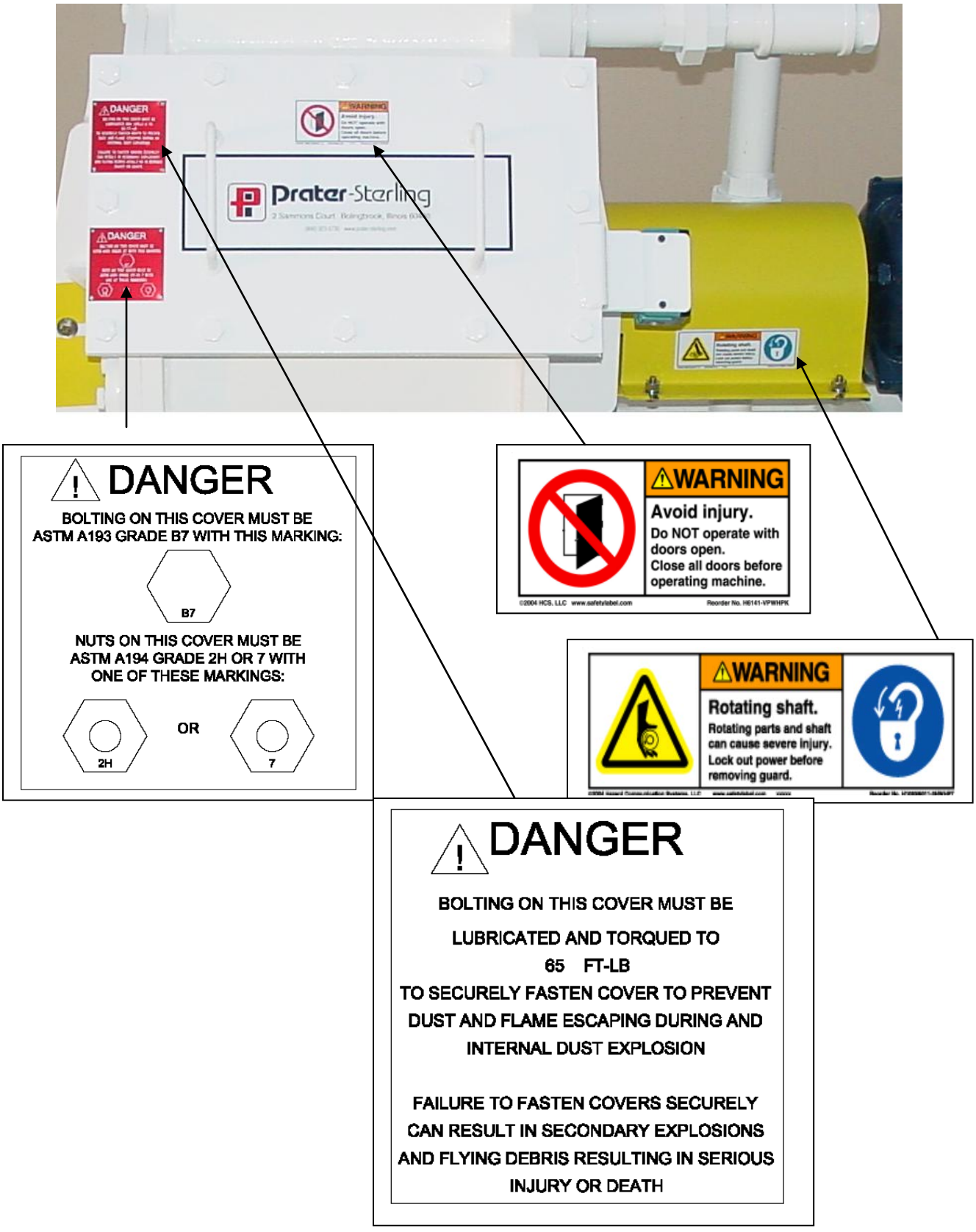


Figure 1-3A: G PSR 11 Safety Label Placement

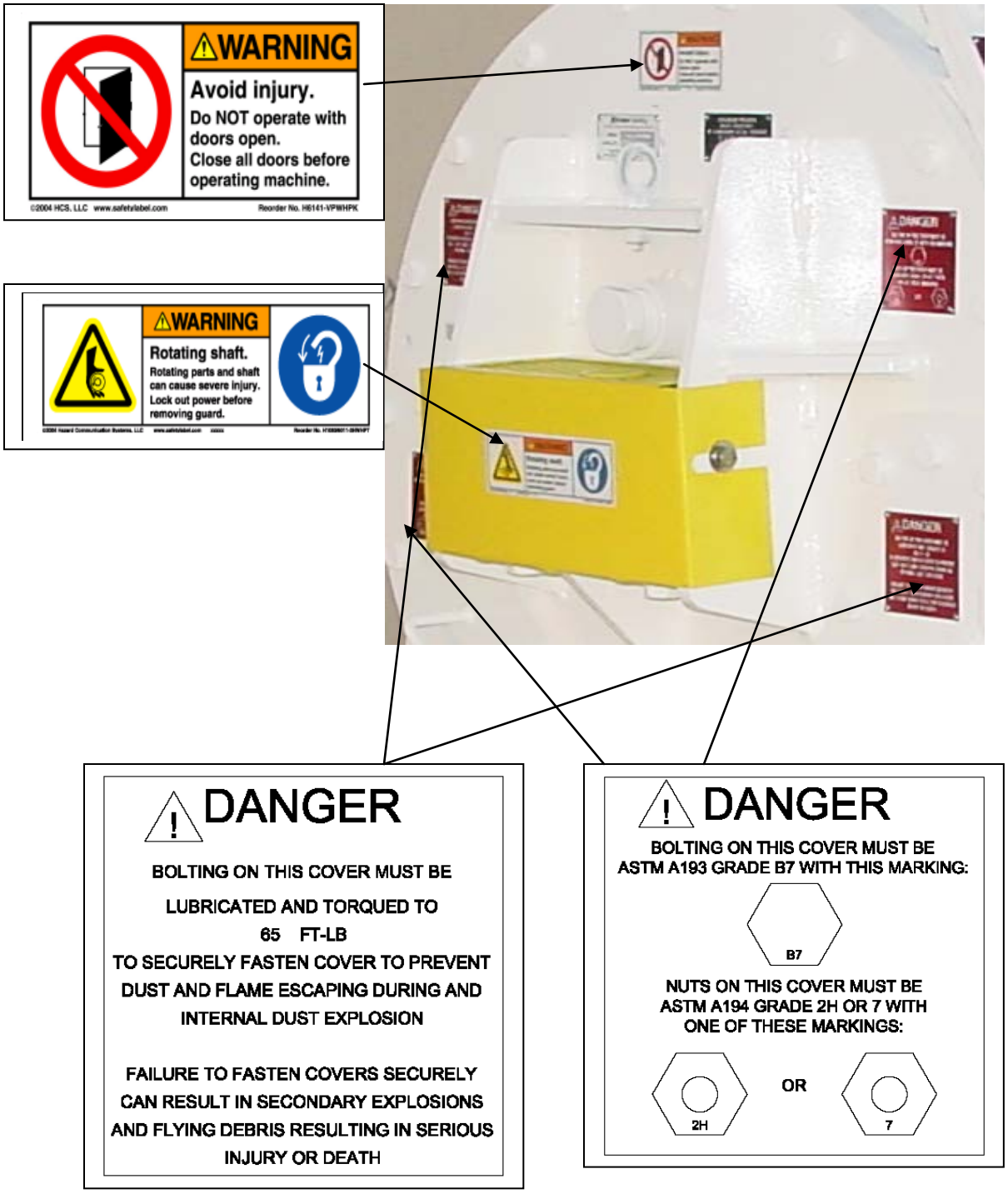


Figure 1-3B: G PSR 11 Series Safety Label Placement

Section 2: Introduction

This section provides an overview of the manual and indicates safety procedures to be followed when installing and operating the Hammer Mill.

2.1 Manual Overview

This manual describes the installation requirements, operational procedures, and routine maintenance of Prater's Full Screen Hammer Mill, Model #'s G5 PSR 11 G6 PSR 11, G7 PSR 11, and G8 PSR 11. Since each Full Screen Hammer Mill is engineered for a specific application, there may be unique features in your particular machine that are not covered in this manual. Refer to this manual before beginning, and during installation. Keep the manual available for future reference. Reliable operation, personnel safety, and long service life of this equipment depend on three important considerations:

- The care exercised during installation.
- The quality and frequency of maintenance and periodic inspections.
- A common sense approach to its operation.

To keep operating costs down and profits up, carefully follow the instructions listed for installation, operation, safety, and maintenance.

2.2 Receiving the Unit

When your shipment arrives, thoroughly inspect the mill and all related equipment. In the event of shipping damage, note the problem on the bill of lading or freight bill and make sure you obtain the driver's signature for possible claim against the delivering carrier.

NOTICE	It is the receiver's obligation to file claims for shipping damage

2.3 Before Installation

Be sure the installation crew or millwrights are aware of installation requirements. If they have any questions or are unsure of proper procedures, clarify the matter to avoid improper installation. Section 3 of this manual covers important steps to ensure safe, vibration-free installation. Personnel responsible for installation should be familiar with these procedures.

In preparing for installation, make sure you provide for all appropriate safety devices. It is your responsibility to provide lockout switches, guards, and other safety deices and safety procedures to protect the machine operator or maintenance personnel.

2.4 Before Operation

Make sure operation personnel are well trained in procedures for operating and maintaining the Hammer Mill. In particular, make sure they understand the essential safety precautions described in Section 1.6.

2.5 Operating Principles

Figure 2-1 illustrates the basic operating principle of the Prater Full Screen Hammer Mill. The G PSR 11 Series mill uses a shaped grinding chamber with distinct grind and release zones. Coarse material is fed to the mill through the top product inlet usually by a gravity rotary feeder. The high-speed rotary action of the hammers impacts and accelerates the material into the pre-grind chamber. The material then enters the shaped grinding chamber, which uses the screens to optimize particle retention time. As material moves toward the 3 o'clock position the shaped chamber reduces the clearance between the screen and the hammers to accelerate particle reduction. At 6 o'clock the hammer to screen clearance is at its minimum for the most intense grinding

At the 9 o'clock position the shaped chamber rapidly opens to double the hammer to casing clearance, allowing sized particles to escape rotation and exit the screen. The finished product is collected in a hopper underneath the mill. Either a mechanical conveying system or a pneumatic system can be utilized to remove the ground material. In either case, it is critical

that the finished material be removed from the mill faster than it is being produced.

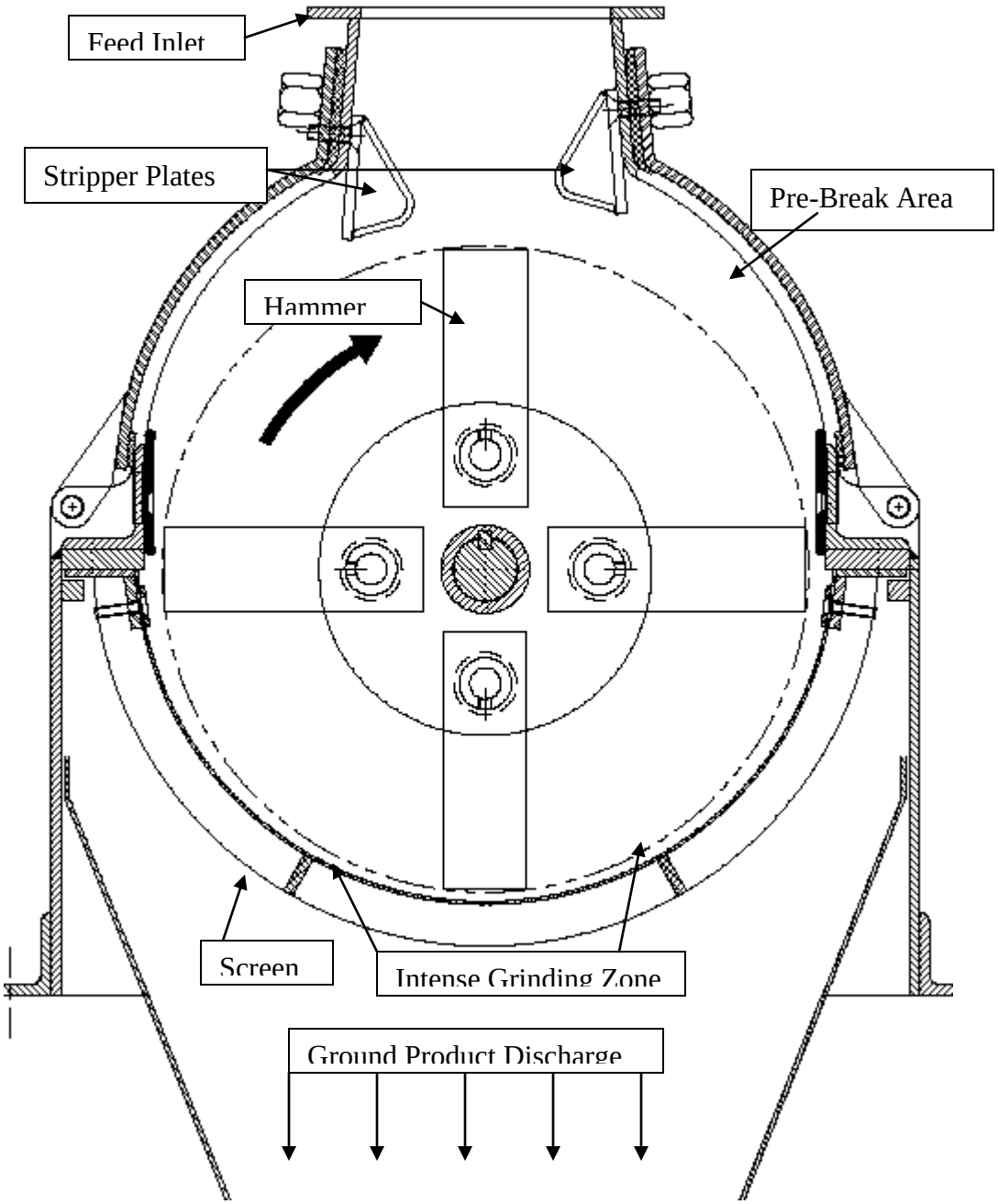


Figure 2-1: Full Screen Hammer Mill Operating Principle

2.6 Custom Applications

Prater Full Screen Hammer Mill's are used for a wide range of industrial and agricultural applications. A variety of hammers, screens, and other grinding elements

are available to meet virtually any grinding need. Please contact Prater Industries to discuss your custom application needs.

Section 3: Installation

This section covers installation procedures to insure safe and efficient operation of the mill.

3.1 Introduction

Proper installation of the Prater Full Screen Hammer Mill is critical for efficient and productive operation of the mill. The proper site preparation and placement of the mill and related equipment will insure that the mill operates safely and to its fullest capacity.

The following are important considerations in Full Screen Hammer Mill installation:

1.) **Location:** Make sure the operating location will provide rigid, vibration free base support and allow for easy access to all parts of the Hammer Mill. **See Section 3.2.**

2.) **Leveling:** The Hammer Mill must be level and must operate without vibration. Sections 3.3 and 3.4 explain how to check for proper leveling and preventing vibration damage during operation.

3.) **Debris Collection:** you must remove foreign matter from the incoming product flow. **See Section 3.5.**

4.) **Air System:** Efficient Hammer Mill operation requires separation of the finished product from the airflow created by the normal grinding process. The method of separation is determined by the type of take-away system used in an installation and, to lesser degrees, the type of product and the fineness of the grind. **See Section 3.7.**

3.2 Location

The size and weight of the Prater Full Screen Hammer Mill make the location and proper support of the mill extremely important for both the operation of the mill and the safety of employees.

There are two essential considerations for the Hammer Mill location: the foundation below the machine and the clearance around the equipment.

3.2.1 Foundation

The Hammer Mill must be placed in a vibration free location and supported by:

- Reinforced steel concrete foundation
- Adequate structural support under floor of unit to prevent oscillation.
- Heavy cross bracing if on an elevated steel structure.

3.2.2 Clearance

There should be sufficient open space in all directions around the mill to allow access for changing screens and other general maintenance operations. No equipment should be resting on or supported by the mill.

3.3 Leveling

The base of the unit must be level and uniformly supported to prevent the following potentially damaging conditions:

- Misalignment of the coupling, mill and motor
- Bending of the rotor shaft
- Bending or twisting of the mill housing or base

Any of these conditions can produce vibrations that will accelerate wear on the hammers and screens and cause possible damage to the mill.

Check for correct unit leveling at the machined surface of both bearing support members of the mill before and after tightening the base fasteners. See Figure 3-1.

To correct leveling:

1.) Insert shims for proper alignment.
2.) Re-check level at both bearing support members and corners of mill.
3.) Fill all gaps between the base of unit and floor with grout.

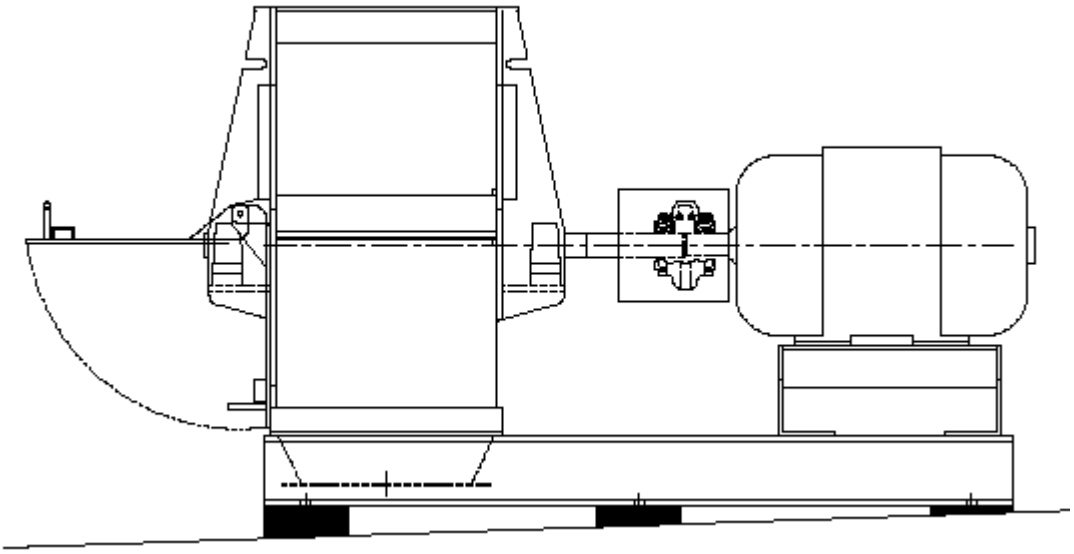


Figure 3-1: Shimming and leveling the mill

CAUTION

ALWAYS use proper support and cross bracing when raising the base of the unit for any reason. This may prevent bowing, bending, or dropping of the unit.

3.4 Vibration

The Prater Full Screen Hammer Mill rotor is balanced to run without noticeable vibration. Vibration indicates a problem that must be found and corrected immediately. Left uncorrected, vibration will cause the following:

- Mill and bearing damage
- Motor damage
- Structural damage

There are several conditions that cause vibration, including:

- Uneven base. **See Section 3.2-3.4.**
- Base not contacting floor at all points. **See Section 3.2-3.4.**
- Mill and motor improperly aligned. **See Section 5**
- Loose motor fasteners.
- Defective motor or mill bearings. **See Section 5.**
- Other equipment transferring vibration through contact with the mill. **See Section 3.2.**
- Worn, missing, or broken hammers. **See Section 5.4.**
- Deviation from recommended balanced hammer setup. **See Section 5.4.**
- Material build-up on rotor
- Foreign material in grinding chamber. **See Section 3.5.**

3.5 Foreign Material

A collection system serves to stop foreign elements from entering the grinding chamber. Damage (broken hammers, punctured screens, etc.) will result if foreign material gets into the grinding chamber. Foreign material entering the grinding chamber may not exit through the screens; such items will have to be extracted by hand after the mill has come to a complete stop.

3.5.1 Magnet

A magnet will catch most ferrous material. The magnet may be built into the inlet, but for maximum protection, and additional, easily cleanable, magnet should be incorporated into the system prior to the mill. To insure against damage, take every precaution to keep foreign materials out of the grinding chamber.

A clean magnet will catch mild steel metal debris that may cause fires or damage to:

- Hammers
- Screens
- Grinding chamber

Removing debris is important for the magnet to perform to its fullest. When installing the mill, leave adequate access to the magnet for easy cleaning.

If a self-cleaning magnet is supplied with the mill, it has to be made sure that the mill is stopped before the magnets are cleaned. This step helps to maintain safety and prevent metal from falling into the rotating elements.

3.5.2 Additional Separation

If other foreign materials that a magnet will not catch, such as glass, aluminum, rocks, etc. are contained in the product feed, additional separation methods are needed to maintain suitable screen, hammer, and rotor life.

Leave adequate space to access the material collection system when installing the mill. **See Section 3.2.**

Remove debris from the collection system before starting the mill to prevent plugging the screens. A plugged screen will lower capacity as well as reduce the effectiveness of the collection system.

3.6 Inlet and Discharge Isolation

The inlet and outlet connections should be separated from the body of the mill. Use a soft rubber gasket or other pliable material to isolate the inlet and discharge area of the mill from the feeding and discharge chute or hopper.

Separate the inlet and outlet sections from the body of the mill with a minimum metal-to-metal separation of ¼ inch.

3.7 Air Relief

Allow a sufficient amount of unrestricted air to enter and exit the Hammer Mill to achieve maximum capacity. If the air supply is choked or excessive both the grind and efficiency of the mill will be lost. Because of numerous variables in product characteristics, desired grind, and required capacities, we strongly recommend contacting Prater Application Engineering for proper air relief requirements through the Hammer Mill.

Vent or set up the following with an air relief system that allows for proper airflow:

- Feed inlet (if the spouting or feeding device is built to prevent or restrict airflow)
- Bins
- Conveyors
- Bucket elevators

ALWAYS provide sufficient air relief. Inadequate air relief will cause the machine to release dust into the surrounding atmosphere. Dust suspended in the air can be highly explosive and personally hazardous. If inhaled over long periods of time, this dust can cause serious respiratory or internal disorders.

To prevent the release of dust into the atmosphere surrounding the mill, maintain proper negative air relief and a good dust collection system. Consult your products MSDS profile for specific health and environmental issues.

3.7.1 Air Relief Setups

Airflow generated by the spinning rotor of the Hammer Mill and air passing through the mill must be relieved. Air relief techniques differ between mechanical conveying systems and dilute phase pneumatic conveying systems. The systems shown here are only to remove this generated air pressure, NOT for air conveyance of the finished product.

Pneumatic System:

This system is the most common used for the Full Screen Mill. It utilizes an air swept Air Pick Up Base (APUB) to pneumatically convey the ground material to a cyclone or filter receiver. Figure 3-3 shows a typical layout of the Evolution Mill Installed with a pneumatic conveying system.

Mechanical System:

It utilizes gravity discharge from the mill and a screw conveyor or bucket elevator as the mechanical transfer device. Even with this system, there must be a sufficient volume of air going through the mill to aid the passing of material through the screens.

For milling dusty materials or for tip speeds in the range of 19,000 FPM and up, Prater recommends an air relief system mounted on a plenum (expansion) chamber built over the discharge conveyor. See Figure 3-4 for a typical mechanical installation.

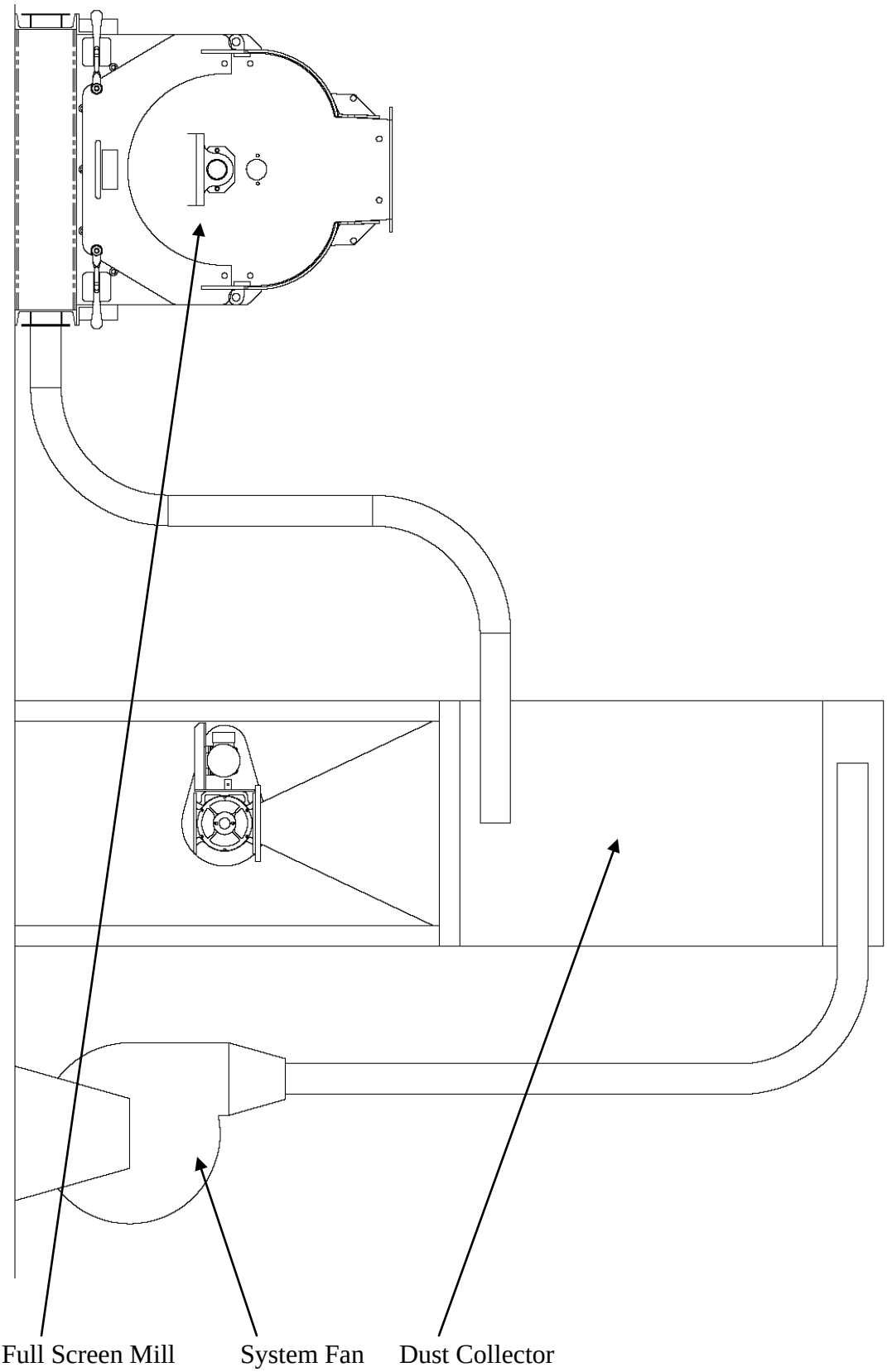


Figure 3-3: Pneumatic Conveying Hammer Mill Installation

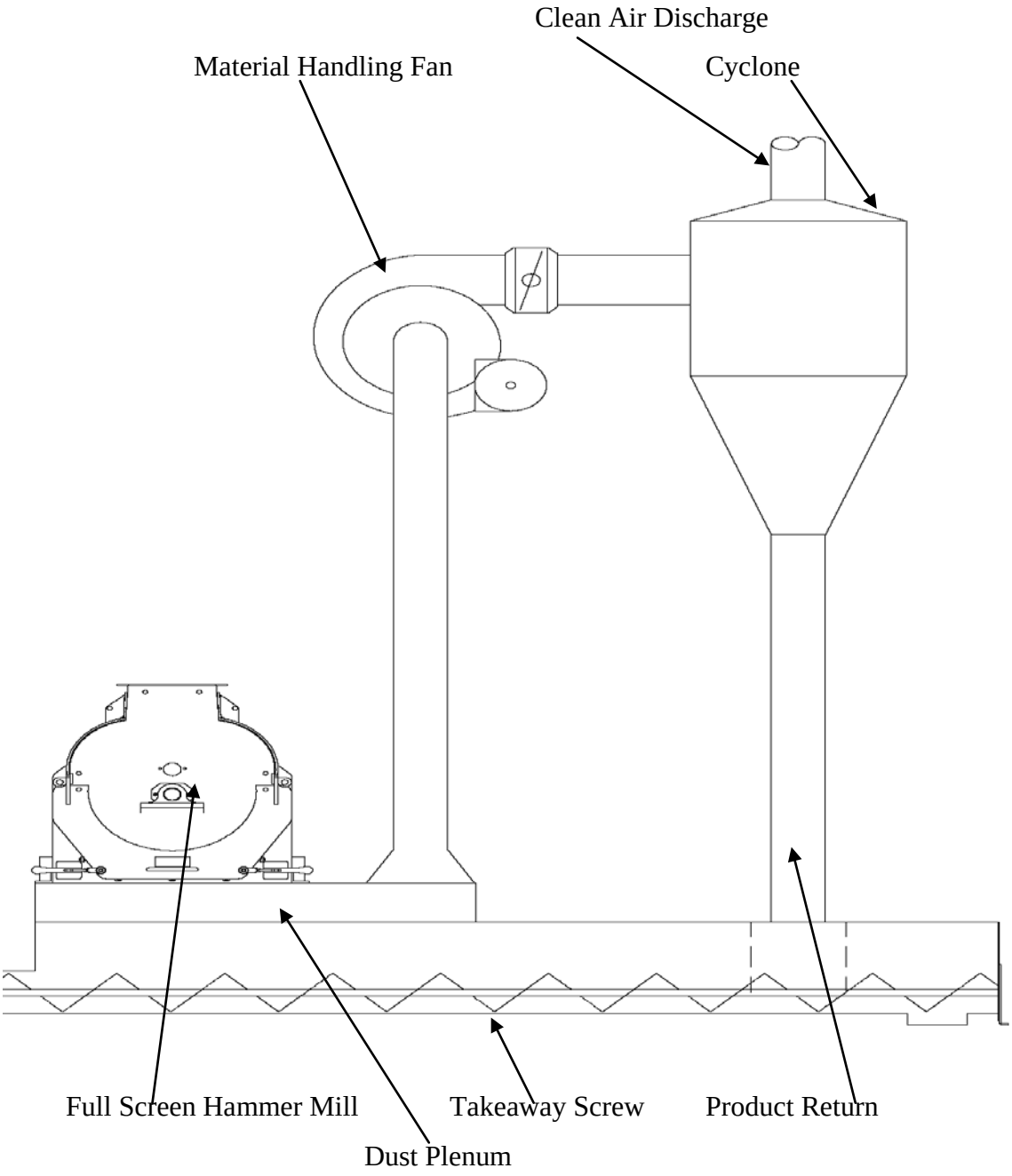


Figure 3-4: Mechanical Conveying Hammer Mill Installation

3.8 Air Flow

The production efficiency of the Hammer Mill depends upon two interrelated factors: the speed of rotation and the amount of airflow. You must establish the airflow requirements with the milling rotor running but without product feed. Maintain the airflow constant at the volume stated in machine specifications during all normal operating conditions.

The speed of the mill rotor and the selected screen assembly will determine the fineness of the product leaving the machine. It is critical for product quality that all air supplies and conveying streams consist of clean dry air.

3.8.1 Air Volume Checks

To allow frequent, accurate checks of airflow, mount permanent measuring devices in the clean air portion of the system. At least one measuring device should be within the clean discharge air stream or between the dust collector and main blower.

Obtaining accurate readings on airflow depends upon choosing the right check point. Select a checkpoint that is two to three feet away from bends, inlets, outlets, valves, or other obstacles in ductwork. Pitot tube readings should be taken near the center of ducts, away from turbulent flow along the sides.
Daily checks of the air readings ensure a safe performance of the system. Checks are also necessary if:

- Feed product is changed
- Rotor speeds are changed
- Screen assembly is changed
- The system is started after a long shut down

A permanently mounted pitot in a clean-air duct is a common method used to check the velocity pressure of air passing through a pipe. Appendix B of this manual

outlines a measuring device using a simple U-shaped glass/plastic tube filled with water and marked with inch scales, usually in 1/10” gradients to allow direct pressure readings in water column inches. The Appendix also contains a conversion table listing air volumes for various pressure readings and duct diameters. The Appendix also contains the recommended air volumes for each size E-Mill.

3.9 Feeding

A uniform constant feeding process is essential for best performance. Therefore the use of a volumetric feeder is recommended, if not fed by gravity only.

A negative air system requires a greater volume of air than a mechanical system. The amount of air necessary is determined by the requirements of the air conveying system plus the air relief on the mill itself. The dust control apparatus of the negative air system will handle any dust created during the grinding process.

3.10 Electrical Requirements

Install connections to meet all national and local electrical codes. Consult with your local power company before installation.

NOTICE

The National Electrical Code requires a manually operable disconnect switch located within sight of the motor, or a controller disconnection means capable of being locked if not within sight of the motor.

Effective October 31, 1989, OSHA requires that all energy disconnect devices be capable of accepting a lock-out/tag-out device. This requirement is mandatory for any new equipment being installed or for replacement, repair or modification of older equipment. The employer must:

- Produce a written program explaining the procedure
- Conduct an annual inspection to verify compliance

- Provide documented employee training in these procedures

The Prater Full Screen Hammer Mill may be started “across the line” if such a procedure is acceptable to your local power company. In order to limit overload on the power supply, larger motors may require reduced voltage starters to “soft start” motors in many areas.

3.10.1 Electrical Interlocking

As a general guide, the last piece of process equipment is started first with subsequent starts working up to the mill.

CAUTION	A time delay is always required between start-up of the mill and start up of the feeder, to allow the mill to reach full operating speed before product is introduced.

Section 4: Full Screen Hammer Mill Operation

This section describes machine operation and procedures to follow before starting the mill.

4.1 Introduction

Pre-run inspections and safety checks throughout operation insure that the mill is in proper operating condition. Other aspects of operation covered in this section include: start-up and shutdown sequencing, motor rotation, and the inlet diverter.

4.2 Pre-Run Inspection

Before starting the Mill, check the following:

- The inside of the mill for foreign material, i.e., nuts, bolts, wire, etc.
- The magnet or other collection device for any accumulation of debris.
- The couplings for proper alignment, **See Section 5.8**
- The inspection doors to see that they are closed and properly secured.
- The electrical starting equipment, meters, disconnect switches, and other control devices to insure that they are clearly visible and readily accessible.
- The guards to see that they are properly mounted.

4.3 Start-up Sequence

This start-up sequence is intended as a general guide. The start-up sequence you use will depend on your specific operation and any unique characteristics of your installation.

As a general guide to electrical interlocking, you turn on equipment in reverse order from product flow. The fan providing airflow is usually started first followed by outlet equipment, the Mill, and the input equipment. The device that feeds product into the system will be the last piece of equipment to be started.

CAUTION

ALWAYS have a time delay between start-up of the mill and start-up of the feeder to allow the mill to reach full operating speed before product is introduced.

Following is a start-up checklist:

1.) Start each piece of equipment, beginning with the fan and excluding the feeder.
2.) Check each motor as it starts for proper rotation and proper amperage.
3.) Check interlocks to make sure they are working and in the proper sequence.
4.) After all the equipment except the feeder has been started, check for proper airflow and pressure readings. **See Section 3.8.**

After all equipment is running properly and correct airflow is achieved, continue the start-up sequence

5.) Begin product feed into the system at a low rate (always less than 50% of full rated capacity).
6.) Check product for desired fineness.
7.) Slowly increase feed to its maximum load condition (amperage). The maximum load for your motor can be found on the motor nameplate. Use the amperage listed for the voltage you are using.
8.) Recheck the fineness of the material and the capacity after reaching the maximum load condition.

CAUTION

NEVER exceed the full load amp reading on your motor nameplate

.

NOTICE

Under some circumstances, full load amperage may not always be attained. Due to the nature of some products, screen plugging may occur before full load conditions are reached.

⚠WARNING

NEVER open the mill or attempt any form of inspection until the mill has come to a complete stop and the electrical disconnect has been locked into the open position

4.4 Shut-Down Sequence

For a typical Full Screen Hammer Mill operation, the shutdown sequence will simply be the reverse of the start-up sequence. Check that you do not have special considerations in your installation that require different procedures. Here is the typical shutdown sequence:

1.) Stop the product feed into the system.
2.) Stop other inlet equipment.
3.) Stop the mill.
4.) Stop outlet equipment.
5.) Stop fans.

4.5 Rotation

To equalize wear on the hammers and/or screens, the rotation of the Prater Full Screen Mill can be reversed. Either changing motor leads or using an electrical reversing switch can reverse the mill.

CAUTION

ALWAYS change the positions of the Stripper Plates to correspond to the direction of the mill's rotation. See Section 4.6.

4.6 Inlet Diverter/Stripper Plates

The purpose of the inlet diverter is to keep material and air from exiting the mill through the inlet. The position of the inlet diverters is determined by the rotation of the mill. *See Figure 4.1*. The diverter at the leading edge of the mill's rotation is always positioned lower than the diverter at the trailing edge.

Remember to correctly reposition the diverters when changing the direction of the mill rotor. If the diverters are not properly positioned, the product will not feed correctly and result in a capacity reduction.

NEVER open the mill or attempt any form of inspection or maintenance until the mill has come to a complete stop and the electrical disconnect has been locked into the open position.

To change position of the diverter:

1.) Loosen setscrews on both sides.
2.) Reposition diverter to opposite side.
3.) Tighten setscrews into locking holes on side plate.

When operating with a very high capacity or a very coarse grind, the diverter may be left out to increase flow. The amount of flow keeps the material from going back out the inlet making the diverter unnecessary in these situations.

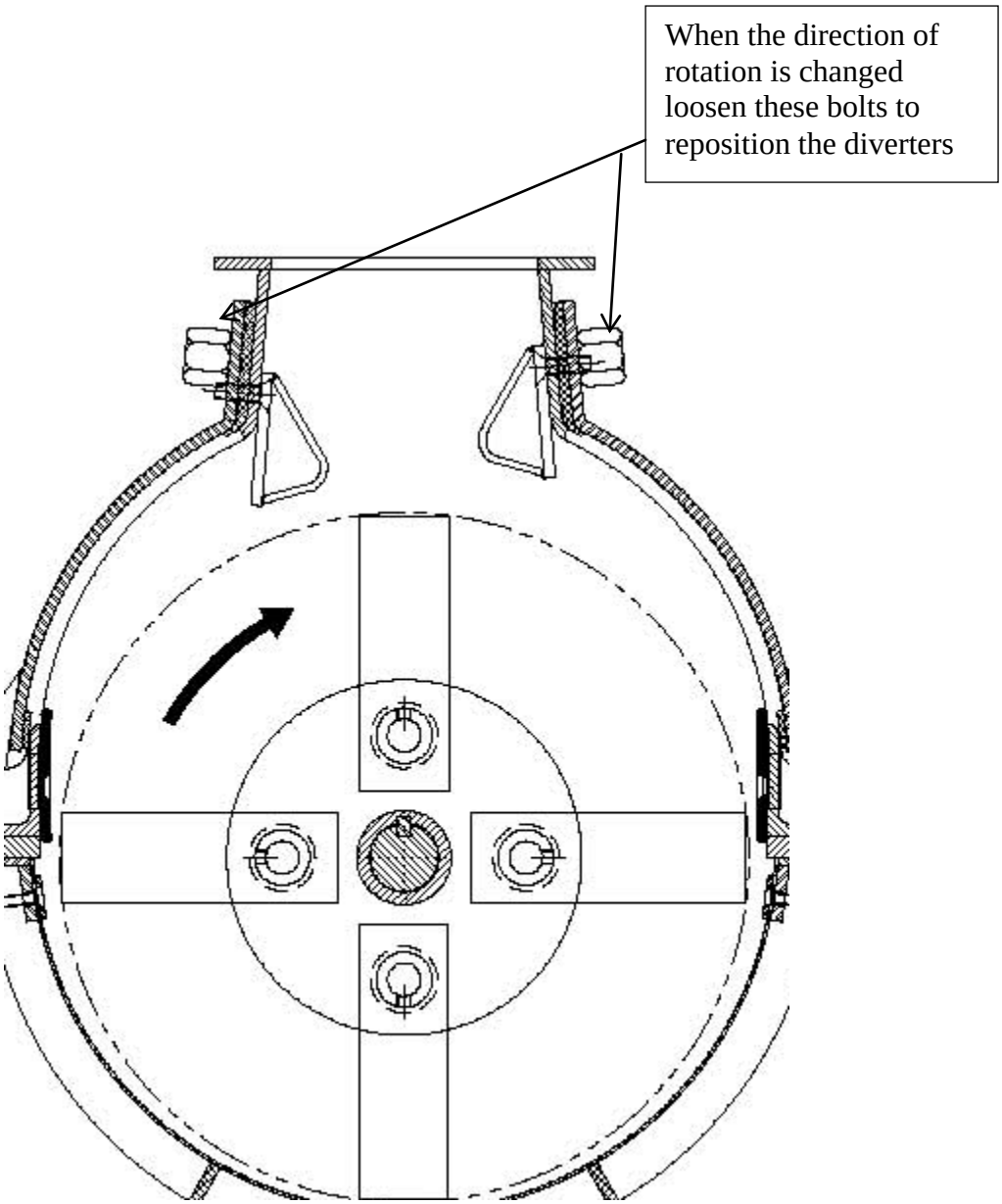


Figure 4-1: Inlet Diverter/Stripper Plate Positioning

Section 5: Maintenance

This section describes the general maintenance and replacement procedures for the Prater Full Screen Mill.

5.1 Introduction

The Full Screen Mill is designed to operate with little maintenance. Routine inspections and regular maintenance will identify any worn or broken parts before they become a problem. Worn or broken parts are damaging to the mill and its output. When operated without vibration or foreign materials entering the grinding chamber, only those parts subject to the heaviest wear, i.e. hammers, screens, and screen dividers will require maintenance.

NEVER open the mill or attempt any form of inspection until the mill has come to a complete stop and the electrical disconnect has been locked in the open position.

5.2 Routine Inspection

Regular inspections are required to give advance warning of a problem. The simple, yet rugged, design of the Prater Full Screen Mill provides easy access for maintenance, cleaning, and service.

To decrease downtime, regularly inspect the machine and output. The output of the mill as well as regular inspections will determine when screens and/or hammers should be replaced, as well as give advance warning of a problem.

Maintain an inventory of standard wear items such as hammers, screens, and cutting plates. Having these replacement parts on hand will save both time and money. Contact Prater Industries Customer Service department for assistance on setting up an inventory for your particular needs.

Regularly check and remove debris from magnets or other foreign material collection systems. If the magnet or other collection system is dirty it could allow damaging materials to enter the grinding chamber, as well as decrease the amount of material flowing into the mill. The magnet or collection system should be cleaned before each start up. If you find a large amount of foreign material getting into the grinding chamber or a product that is prone to contamination, you may need to clean the magnet or collection system more often.

5.3 Screens

NEVER open the mill or attempt any form of inspection or maintenance until the mill has come to a complete stop and the electrical disconnect has been locked in the open position.

The screens control the particle size of the final product. Inspect and clean the screens frequently to maintain the desired output. The screens may require re-rolling, interchange, or replacement if they are showing signs of wear. Worn screens cause:

- Lower capacity
- Increased power costs
- Non-uniform final product
- Coarser output

To check for signs of wear, visually inspect the output of the product as well as the screens themselves. Look for:

- Coarse final product
- Lower capacity
- Worn edges of the screen holes (rounded) **See Figure 5-1**
- Oval shape screen holes **See Figure 5-1**

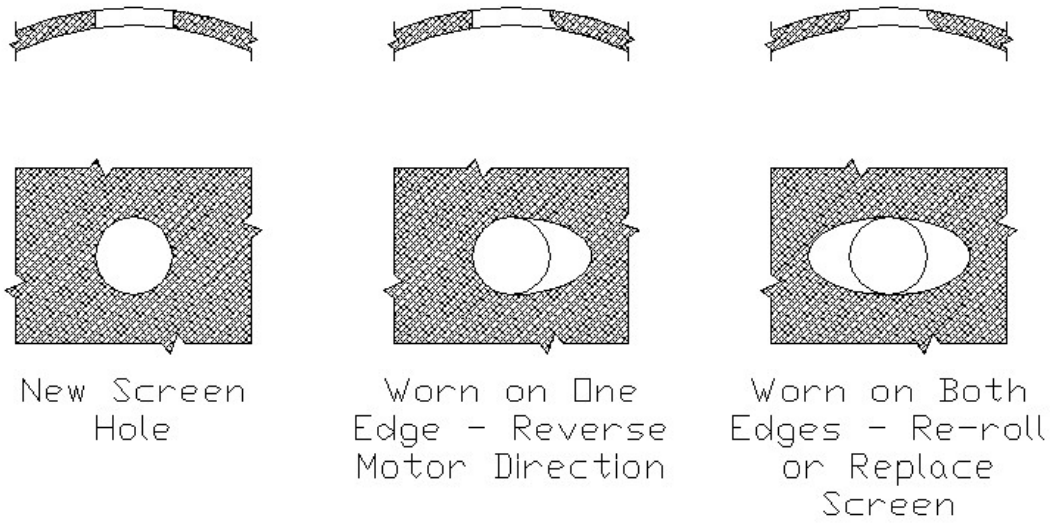


Figure 5-1: Signs of Screen Wear

Excessive wear to screens can be caused by:

- Extremely abrasive product
- Extremely fine product
- Excessively high feed rates
- Incorrect divider to hammer clearances
- Foreign material in the grinding chamber

When screens show signs of uneven wear consider these options to extend the life of the screens:

- Reverse the rotation of the motor if one side is getting more wear than the other
- Turn screens around if there is uneven wear from front to back or side to side
- For screens with punched round holes, you can re-roll the screens to put the sharp edge on the inside and the worn edge on the outside (Special screens that have formed holes rather than punched holes cannot be re-rolled).

5.3.1 Screen Replacement

WARNING

NEVER open the mill or attempt any form of inspection or maintenance until the mill has come to a complete stop and the electrical disconnect has been locked in the open position.

G PSR 11 Series

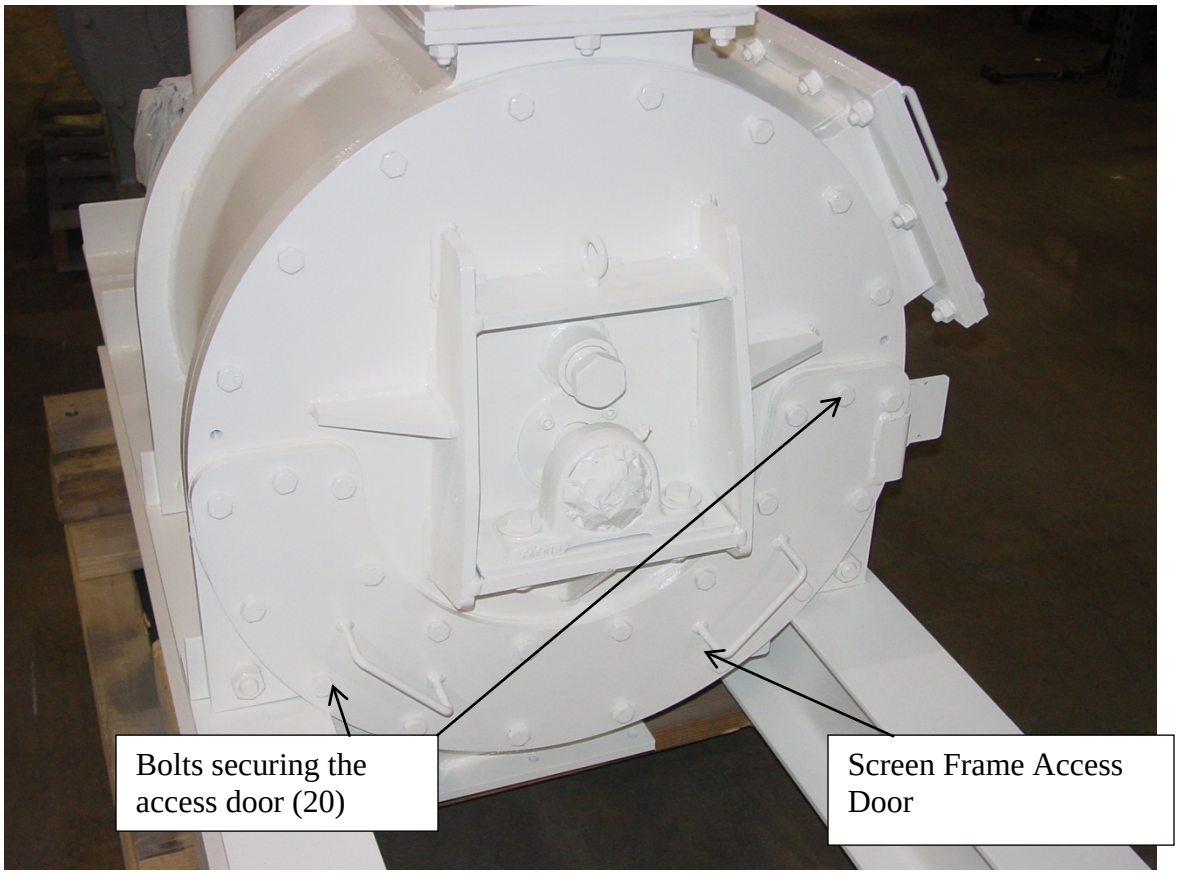


Figure 5-2: G PSR 11 Screen Frame Access Door Access Removal

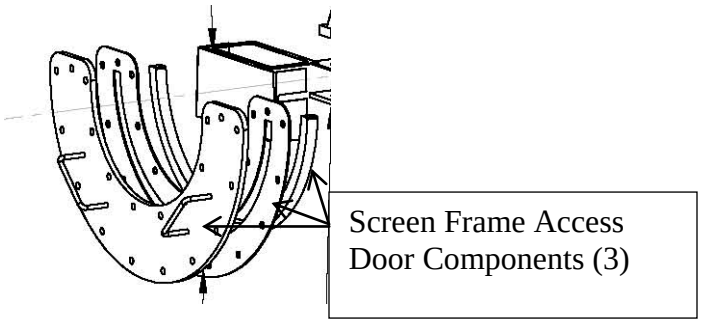


Figure 5-3: G PSR 11 Screen Frame Access Door Components

1. Remove the 20 bolts securing the door to the housing.
2. Remove the Screen Frame Access Door Assembly.
3. Grasp the screen frame and pull out through the access door.

Changing the screen

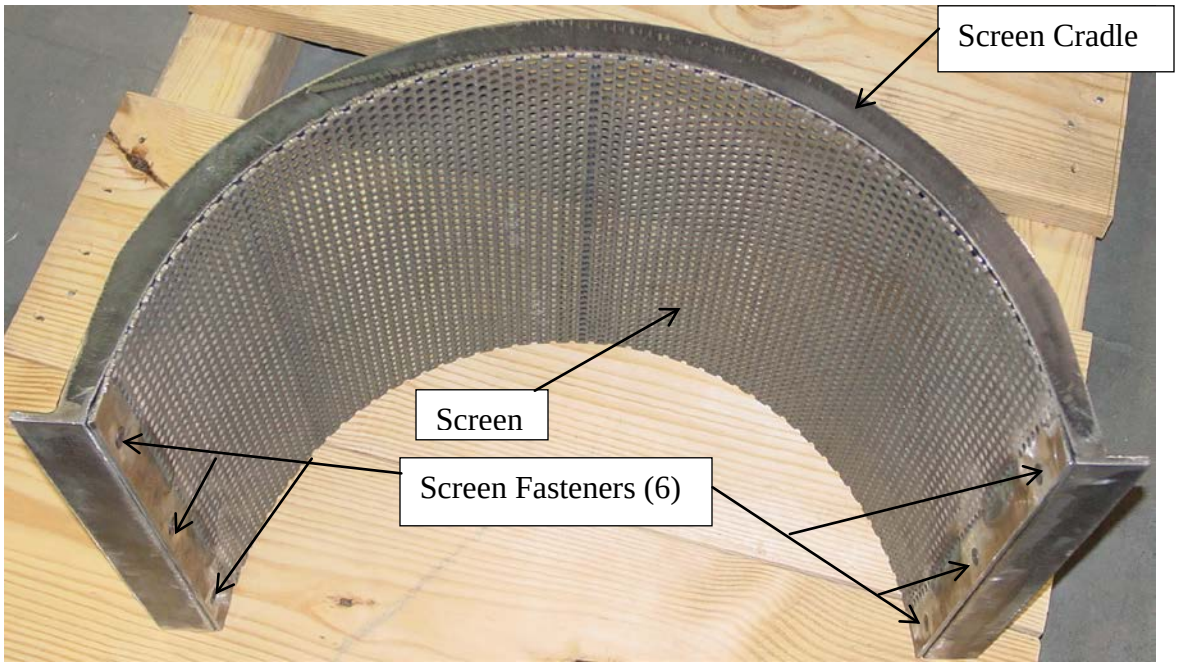


Figure 5-4: G PSR 11 Series Screen Frame Assembly

1. Remove the 6 bolt, lock washer, and nut fasteners securing the screen to the cradle.
2. Remove the screen and install the new screen into the screen cradle.
3. Reinstall the fasteners.
4. Reinstall the screen frame into the mill.

5. Close and secure the screen frame access doors, reversing the procedures for opening them.

Be sure to use the correct bolts and tighten them to the proper torque in the G PSR 11 Series mills

5.4 Inspecting and Replacing the Hammers

5.4.1 Inspecting the Hammers

Prater supplies a wide range of grinding devices to meet virtually every milling need including swivel hammers, rigid hammers, and knife blades. All hammers are pre-weighed and shipped as balanced groups, and may be bench assembled since they need no additional balancing.

Hammers will wear, but should not break under normal operating conditions. Check the hammers in the mill frequently for wear. Worn hammers can result in:

- Vibration
- Coarser output
- Increased motor amperage
- Lower capacity

To check for signs of wear, visually inspect both the product and the hammers themselves. Signs of wear include:

- Edges worn to over ½” on both sides See Figure 5-7
- Decreased output
- Coarser output

Mill output is the most important consideration for determining when hammers should be replaced. When the fineness of the product is not being achieved or the

output is decreased, worn hammers could be the cause. Excessive wear to hammers may be caused by:

- Extremely abrasive product
- Extremely fine product
- Excessively high feed rate
- Foreign material in the grinding chamber

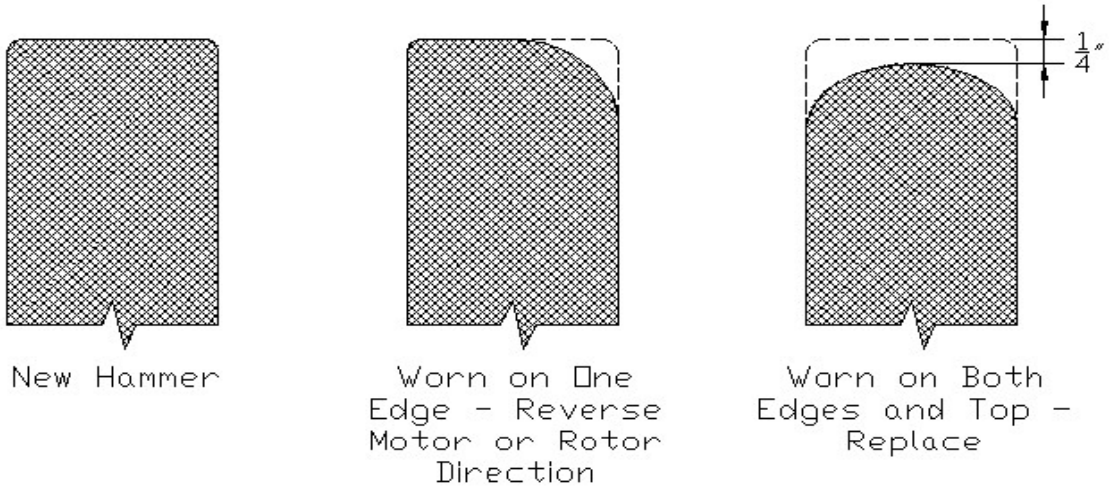


Figure 5-5: Signs of Hammer Wear

5.4.2 Inspecting the Hammers

Refer to Figure 5-8 for the G PSR 11. Remove the 12 bolts securing the Inspection Door to the mill body and lift the door from the body. Refer to Figure 5-7 to determine the next step. If the hammers are worn on both edges proceed with the instructions in Section 5.4.2 to replace the hammers.

5.4.3 Hammer, Spacer, and Hammer Pin Replacement

⚠WARNING

NEVER open the mill or attempt any form of inspection or maintenance until the mill has come to a complete stop and the electrical disconnect has been locked into the open position.

When replacing hammers due to wear, always replace a full set. If replacing a hammer because of breakage, also replace an opposing hammer to maintain balance. Never replace one hammer. You can replace hammers without removing the rotor assembly from the mill.

Figure 5-6: G PSR 11 Hammer Inspection/Removal Access Door

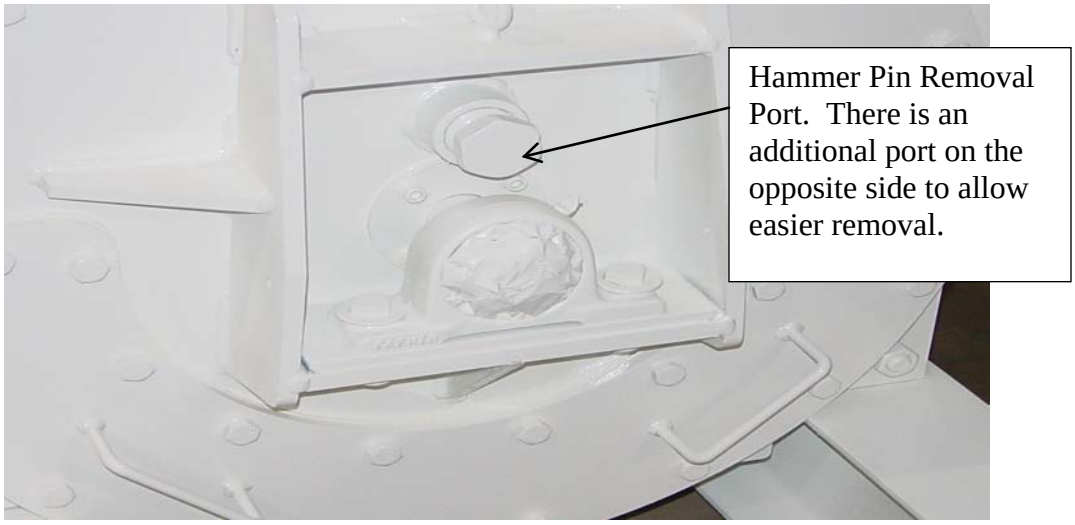


Figure 5-7: G PSR 11 Hammer Pin Removal Port

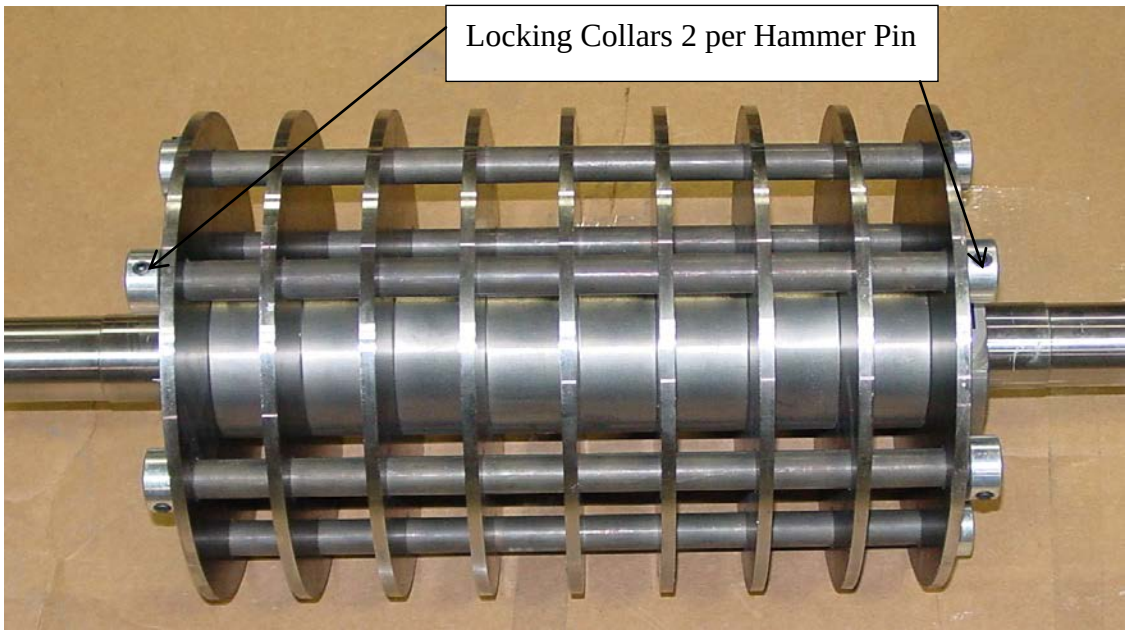


Figure 5-8: Detail of Locking Collars

1. Use the procedures in section 5.4.2 to open or remove the Hammer Replacement Access Door.
2. Refer to Figure 5-9 and remove the covers for the Hammer Pin Removal Access Ports. There are two covers on opposite sides of the mill body.
3. Refer to Section 5.3.1 and open the Screen Removal Access door.
4. If the mill discharge is accessible remove the screen frame assembly to protect the screen from damage due to impact of falling hammers.
5. If the mill discharge is not accessible protect the screen with cardboard or some other material that will absorb the impact energy from any falling hammers.
6. Align one of the Hammer Pins with the Hammer Pin Removal Access Ports.
7. Refer to Figure 5-13 and loosen the set screws of the Locking Collars and remove them through the Hammer Pin Removal Access Ports.

NOTICE

Before disassembly, check the configuration of the hammers on your mill to insure correct reassembly. Bench assembly will make hammer replacement quicker and easier.

8. Remove support pins one at a time. Attempt to push the assembly out by hand from the drive side access port. If you can't move the assemblies use a soft metal like brass and a hammer to tap the pin out. Once it is started slowly pull each support pin out while holding the rearmost hammer assembly until the assembly drops free. Remove each hammer/spacer assembly from the mill. Repeat this until all assemblies have been removed from that pin; then goes on to the next support pin.

9. Carefully inspect the hammer pins, and spacers and replace as necessary.
10. Insert the hammer support pin through the Hammer Pin Removal Access Port and through the hole in the first rotor plate and through each new hammer/spacer assembly. Start with front assembly and continue until the last hammer assembly is in position. Reinstall the Locking Collars onto the Hammer Pins and tighten the set screws. Repeat this step for each Hammer Pin. Reinstall the covers for the Hammer Pin Removal Access Ports.
11. Manually rotate the rotor to ensure there is no contact between the hammers and the stationary internal mill components.
12. Reinstall the screen frame, remove any debris inside the mill, close the screen access Hammer Inspection/Removal doors, and secure.

Be sure to use the correct bolts and tighten them to the proper torque in the G PSR 11 Series mills

5.5 Maintaining/Replacing the Bearings

NEVER open the mill or attempt any form of inspection or maintenance until the mill has come to a complete stop and the electrical disconnect has been locked into the open position.

5.5.1 Maintaining the Bearings

The bearings on a new mill may run hotter than normal during the first several hours of operation. After a period of time the bearing temperatures should fall to a more normal operating temperature. If a bearing after 24 hours of operation continues to run hot, check for proper coupling alignment and correct if necessary. If realignment of the couplings does not solve the problem contact Prater-Sterling Customer Service.
All units are shipped initially fully charged with grease. For units operating 8 hours per day the bearings should be greased every 6 months, 3 months for 16 hour per day operation, and monthly for 24 hour operation. Always use Mobilux No. 2 grease or its equivalent.

5.5.2 Replacing the Bearings on the G PSR 11 Series

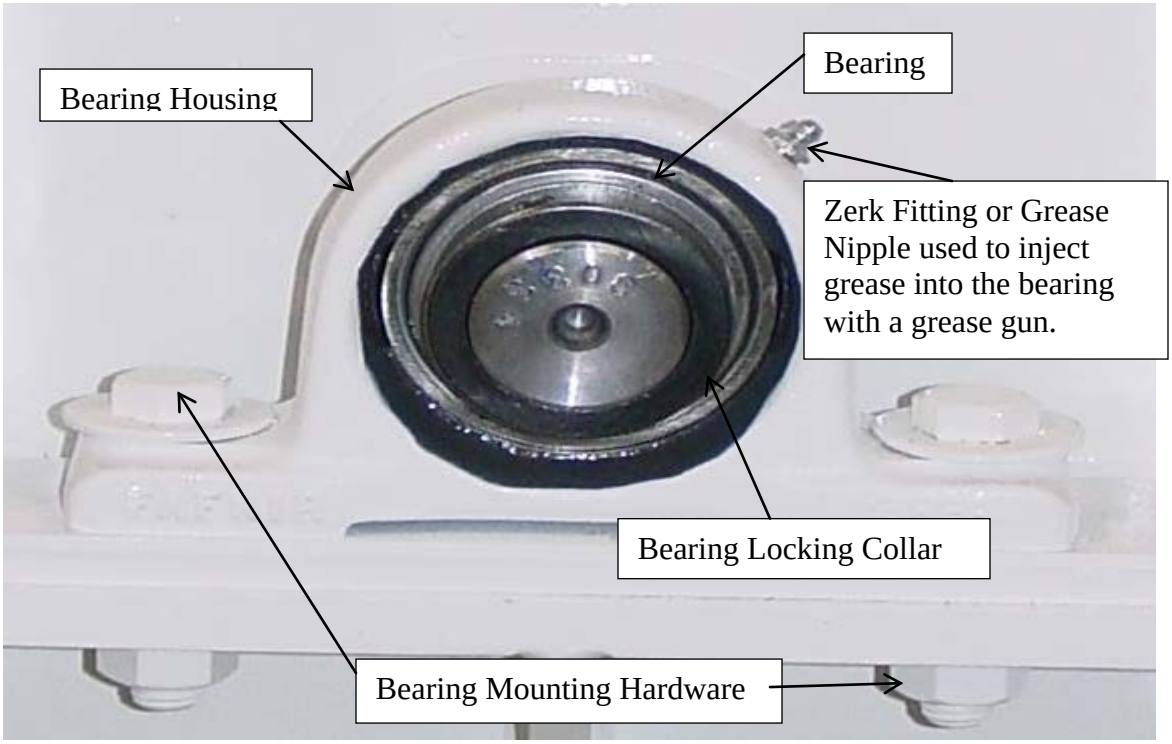


Figure 5-9: Bearing detail and Identification

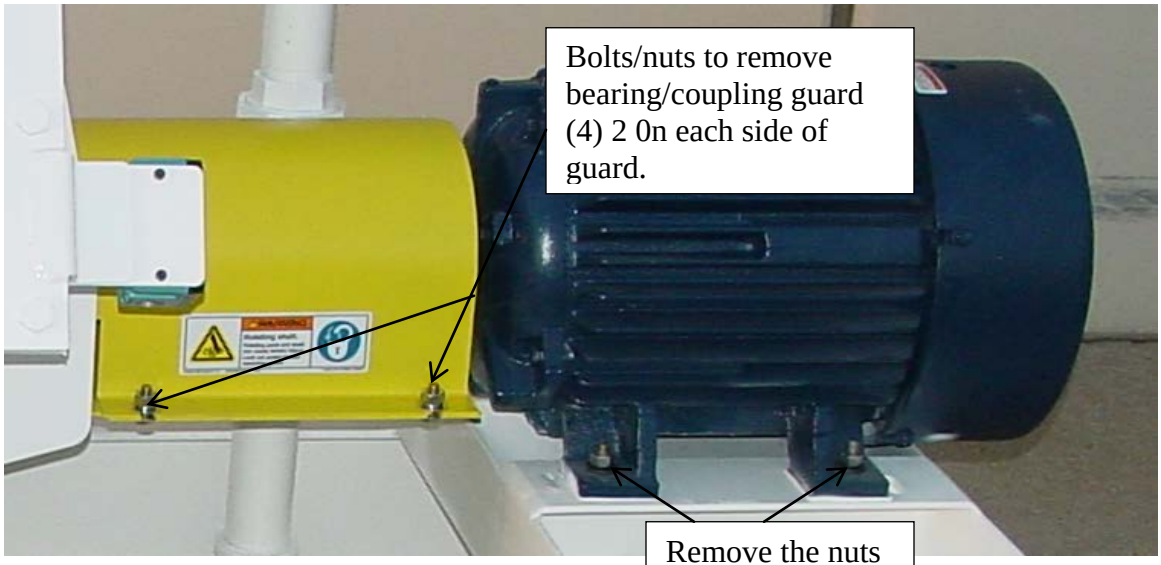


Figure 5-10: Coupling Guard and Motor

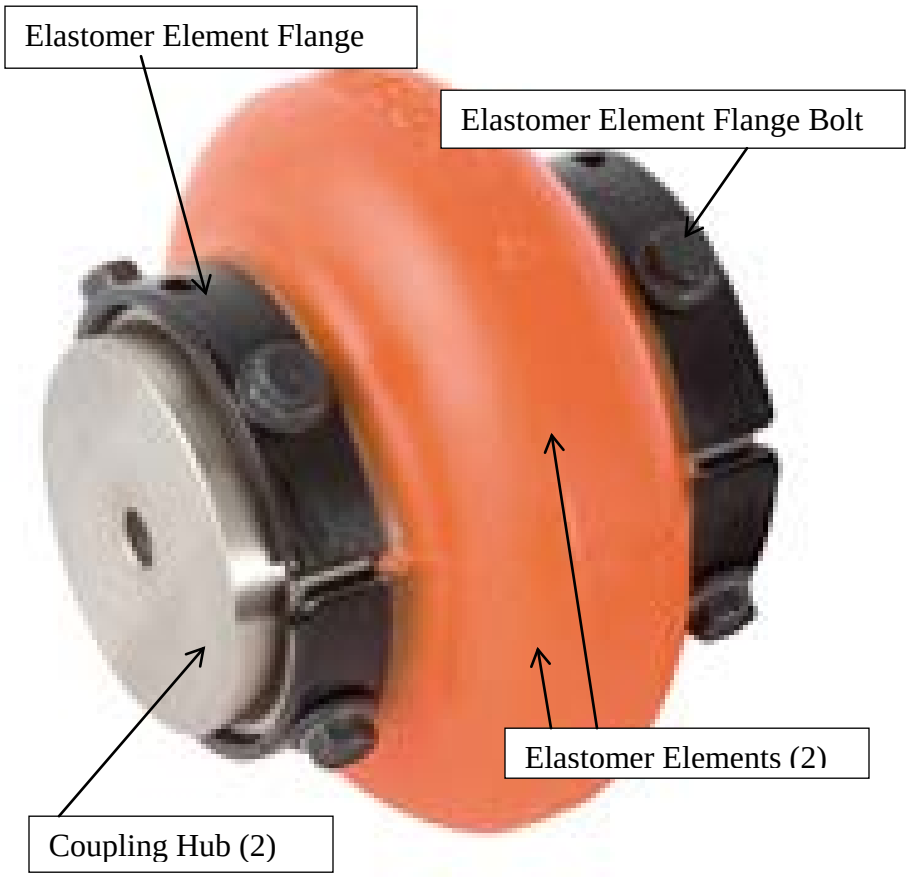


Figure 5-11, Omega Elastomer Coupling Components

Figure 5-12: Non-Drive Side Bearing/Shaft Guard

⚠WARNING

NEVER open the mill or attempt any form of inspection or maintenance until the mill has come to a complete stop and the electrical disconnect has been locked into the open position.

1. Remove the bearing/shaft guard cover from the non-drive side bearing assembly by loosening the bolts shown in Figure 5-17.
2. Remove the guard from the drive side bearing/coupling assembly by removing the nuts and bolts shown in Figure 5-15.
3. Remove the elastomer element flange bolts shown in Figure 5-16.
4. To remove the coupling hub from the rotor shaft it will be necessary to move the motor slightly by removing the nuts shown in Figure 5-15. The coupling hub can then be removed by loosening the set screw and sliding the coupling off the shaft.
5. If it is not possible to access the rotor through the top of the mill, refer to the procedure in 5.4.2 to open the mill side access doors.
6. Secure the rotor with a strap to keep it from falling when the bearings are removed.
7. Refer to Figure 5-14 and remove the bearing locking collar and the bearing mounting hardware and remove the bearing. Be sure to note the placement of any shims under the bearing block.
8. Install the new bearing onto the shaft and loosely install the mounting hardware but not the locking collar.
9. Repeat steps 7 and 8 for the opposite side bearing assembly.
10. Center the rotor in the grinding chamber by adjusting the position of the shaft and finish tightening the mounting hardware.
11. Install the bearing locking collars and secure.
12. Rotate the Rotor by hand to ensure there is no contact between the hammers and the mill interior.

5.5.3 Coupling Installation Instructions

Because of the possible danger to person(s) or property that may result from improper use or installation of products, it is extremely important to follow the proper installation and operational procedures.

All rotating power transmission products are potentially dangerous and can cause serious injury. They must be properly guarded in compliance with OSHA standards for the speeds and applications in which they are used. It is the responsibility of the user to provide proper guarding.

Failure to secure cap screws properly could cause coupling components to become dislodged during operation resulting in personal injury.

1. Inspect mill shaft and hub bore making sure they are free from dirt and burrs. Be sure the key fits the shaft properly.
2. Mount the hub onto the shaft and secure loosely for minor adjustment of spacing. Where tapered bushings are used, follow bushing manufacturer's instructions. If hub is bored for an interference fit, we recommend heating the hub in water, oil bath, or an oven and quickly positioning it on the shaft. Do not spot heat hub as it may cause distortion.

Coupling alignment is directly related to equipment and coupling life. Although Omega couplings can withstand gross misalignment, care should be taken for best possible alignment to assure optimum performance. The calipers straightedge alignment procedure is described below. If greater alignment accuracy is desired, a dial indicator method is recommended. There are occasions when equipment manufacturers require more specific alignment tolerances, in which case the manufacturer's recommendations should be followed.

1. To correct for angular misalignment, use calipers to check the gap between hubs. Adjust or shim equipment until the gap is the same at all points around the hubs.
2. To correct parallel offset, place a straightedge across the hub flanges in two places at 90^{o} to each other. Adjust or shim equipment until the straightedge lays flat on both sides.
3. Tighten down connected equipment and recheck alignment.

1. Place half of the elastomer element around the hubs and secure with self-locking cap screws. The elastomer element will space the other

hub. It is important to have cap screws properly tightened. See Figure 5-18 for recommended cap screw torques and instructions.

Max. HP	Ft. Lbs.	Nm
30	17	23
100	30	56
300	75	100

Figure 5-13: Cap screw Torque Specifications

2. Next secure the other hub.
3. Mount the other half of the elastomer element to the hub. Be sure to secure the rings to the spacer element if provided. Tighten all cap screws to the recommended cap screw torques in Figure 5-18.

The same procedure applies to both the standard design coupling and spacer coupling installation.

CAUTION

Cap screws have self-locking patches, which should not be reused more than twice. Cap screw can be further used with application of a thread-locking adhesive. Do not lubricate cap screw threads.

13. Reinstall the guards and close and secure all access doors.

5.5 Replacing the Mill Shaft and/or Rotor Plates

To gain access to and remove the rotor in the G PSR 11 series mills it is necessary to remove sections of the mill body. Once the rotor has been removed the disassembly and reassembly is the same for each series rotor.

⚠WARNING

NEVER open the mill or attempt any form of inspection or maintenance until the mill has come to a complete stop and the electrical disconnect has been locked into the open position.

5.5.1 Removing the rotor from the G PSR 11 Series Mill

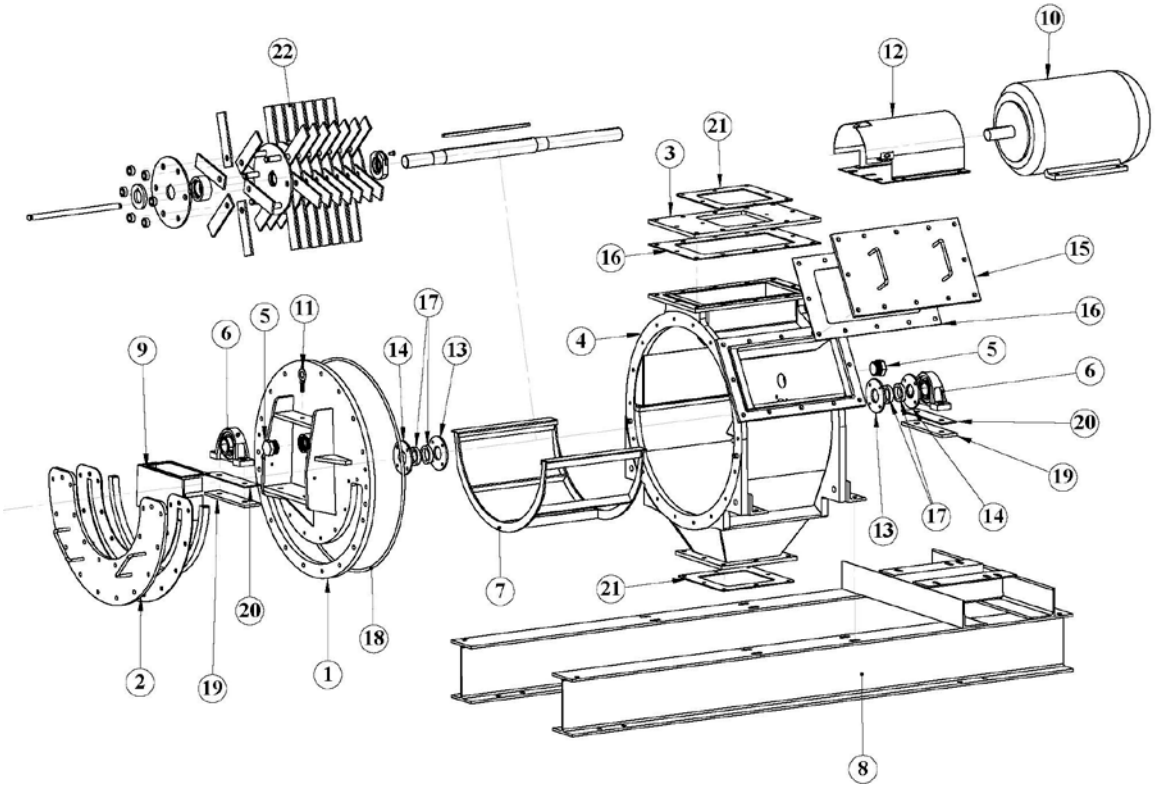


Figure 5-14: Exploded View G PSR 11 Series Mill

ITEM NO.	DESCRIPTION	QTY.
1	FRONT COVER ASSEMBLY	1
2	SCREEN ACCESS DOOR ASSEMBLY	1
3	AIRLOCK ADAPTER PLATE	1
4	BODY ASSEMBLY	1
5	1-1/2" NPT, HEX HEAD PLUG	2
6	PILLOW BLOCK BEARING	2
7	SCREEN CRADLE ASSY	1
8	FRAME	1
9	GUARD, BEARING COVER	1
10	MOTOR	1
11	EYEBOLT	1
12	COUPLING GUARD	1
13	INSIDE SEAL RETAINER	2
14	OUTSIDE SEAL RETAINER	2
15	INSPECTION DOOR ASSY.	1
16	GASKET	2
17	PACKING	4
18	SEAL, FRONT PLATE	1
19	BEARING SHIM	2
20	BEARING SHIM	2
21	GASKET, PAV-8	2
22	ROTOR ASSY.	1

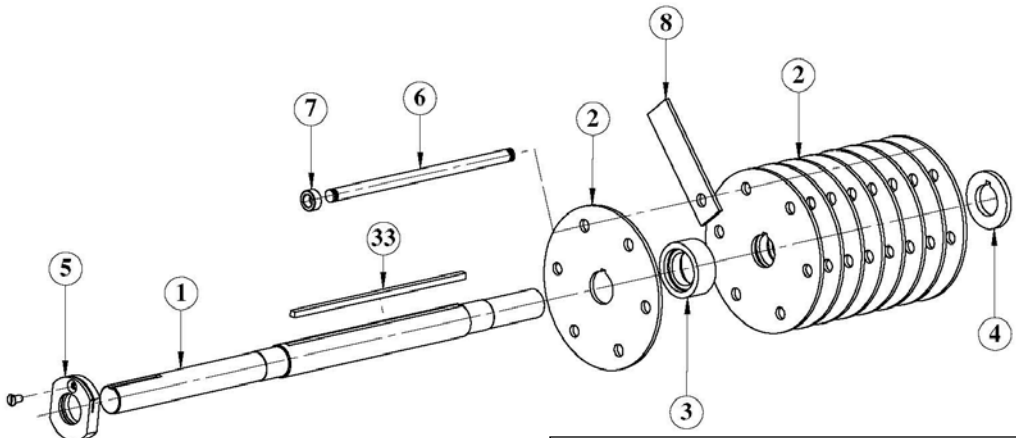
Figure 5-15: BOM for G PSR 11

A. Refer to Section 5.3.1 and remove the Screen Access Door.
B. Refer to Section 5.4.3 and remove the Hammers, Spacers and Hammer Pins from the rotor.
C. Refer to Section 5.5.2 and remove the Bearings from the Mill Shaft.
D. Refer to Figure 5-14 and remove the Outside Seal Retainer, Figure 5-14, 14.
E. Refer to Figure 5-14 and remove the bolts securing the Front Cover Assembly, Figure 5-14, 1 and remove the cover.

2. Remove the rotor from the mill body and place in a stand Figure 5-16 with the drive side down for stability.

3. Remove the Locking Nut Figure 5-17, 4 from the shaft.
4. Using at least 2 lifting straps/hooks remove the first rotor plate Figure 5-16, 2.
5. Remove the Rotor Plate Spacer Figure 5-17, 3.
6. Continue to remove the plates and spacers until all have been removed.
7. Replace Shaft, Key, and Locking Nuts if necessary.
8. Reverse the procedures in steps 11 – 14 to rebuild the rotor assembly.
9. Reinstall the Rotor Assembly into the mill body.
10. Reassemble the mill bodies by reversing the procedures 5.6.1 or 5.6.2 depending on the style of the mill.
11. Refer to Sections 5.5.2, and 5.5.3 to reinstall the mill bearings, and drive assemblies.
12. Refer to Section 5.4.3 and reinstall the Hammers, Spacers, Hammer Pins, and the Screen Frame Assembly.
13. Rotate the rotor by hand to ensure there is no contact between the rotor and the mill interior.
14. Reinstall all Access Doors, Guards, etc.

Figure 5-16: Rotor in stand for disassembly and reassembly



1. Shaft
2. Rotor Plate
3. Rotor Plate Spacer
4. Locking Nut
5. Locking Nut
6. Hammer Pin
7. Hammer Pin Spacer
8. Hammer
33. Key

Figure 5-17: Rotor Assembly Exploded View

Section 6: Troubleshooting

This section describes the general maintenance and replacement procedures for the Prater G and G PSR 11 Series Mills.

6.1 Introduction

This section is offered as a general guide to analyzing problems. If after reviewing this section you have not identified your problem, contact a Prater customer service representative for further assistance.

NEVER open the mill or attempt any form of inspection until the mill has come to a complete stop and the electrical disconnect has been locked in the open position. Never attempt to slow down the mill by any means mechanical or otherwise.

Symptom	Possible Cause	Suggested Solution
Final Product Is Too Coarse	1. Improper screen size	1. Install proper screens
	2. Worn or damaged screens	2. Rotate or replace screens
	3. Feed rate too high	3. Adjust to proper feed rate
	4. Improper air flow	4. Correct or adjust air flow
	5. Worn hammers	5. Rotate or replace hammers
	6. Improperly installed screens	6. Install screens properly
	7. Feed product change a. moisture b. size c. fat content d. chemical differences	7. Inspect feed product and adjust system as required
Final Product Is Too Fine	1. Improper screen size	1. Install proper screens
	2. Screens blinding a. hygroscopic material b. heat sensitive material c. high moisture d. high fat content	2. Clear screens and check feed product. Contact your Prater representative if further assistance is required.
	3. Air flow too low a. duct restricted b. dust collector plugged c. blower damper closed d. filters dirty e. blower drive belt slipping	3. Adjust to proper air flow a. Remove restriction b. Clean dust collector c. Open blower damper d. Replace filters e. Retention belts
Low Capacity	1. Screens worn a. abrasive product b. fibrous product c. tramp materials	1. Rotate or replace screens
	2. Screen size too small	2. Install proper screens

	3. Improper air flow	3. Adjust to proper air flow
	4. Non-uniform feed causing fluctuating mill motor amperage of more than 10%	4. Correct feed to mill, feed must be smooth and non-pulsating
Excessive Mill Vibration	1. Missing, broken, damaged or worn hammers	1. Replace damaged or broken hammers a. Replace all if worn
	2. Material build-up in rotor	2. Clear rotor of obstructions
	3. Foreign material in grinding chamber	3. Remove foreign material, inspect magnet and collection system
	4. Mill or motor shaft bent	4. Replace shaft and related parts
	5. Bad bearings	5. Replace bearings
	6. Hammers Locked under pin	6. Free hammers and check for damage
	7. Coupling misalignment	7. Readjust coupling
	8. Loose base bolts	8. Tighten bolts to original torques
	9. Improper hammer pattern	9. Install hammers correctly
	10. Worn screen clamps	10. Replace screen clamps
	11. Weak base structure	11. Provide adequate base structure
Excessive Wear	1. Product very abrasive	1. Contact your Prater representative
	2. Product too fine	2. Contact your Prater representative
	3. Feed rate too high	3. Adjust feed rate to proper level
	4. Product contaminated with foreign matter	4. Clean product
Bearing Failure	1. Improper coupling alignment	1. Align coupling properly
	2. Excessive grease in bearing	2. Clean and grease bearing or replace
	3. Inadequate lubrication	3. Grease bearing
	4. Foreign materials in bearings	4. Clean and grease bearing or replace
	5. Improper bearing alignment	5. Install bearing properly
	6. High vibration	6. Correct vibration problem
	7. High ambient temperature	7. Use high temperature grease

6.2 Mill Data

If problems cannot be diagnosed by using the Troubleshooting Guide, contact your Prater representative. Before calling for assistance, collect the data listed below. This information is essential to establishing the cause of problem conditions and determining solutions.

1. Size of mill.
2. Perforations of screen.
3. Motor horsepower.
4. Idle amperage.
5. Amperage with product load.
6. Capacity at full load.
7. Fineness analysis of feed and ground product – anticipated and actual – moisture content.
8. Problem – requirements of product.
9. Air flow and static pressure – before and after the mill.
10. Blower motor amperage with and without product (if used).
11. RPM of mill.
12. Direction of rotation and location of Stripper Plates/Inlet Diverters.

Appendix A: Airflow Information

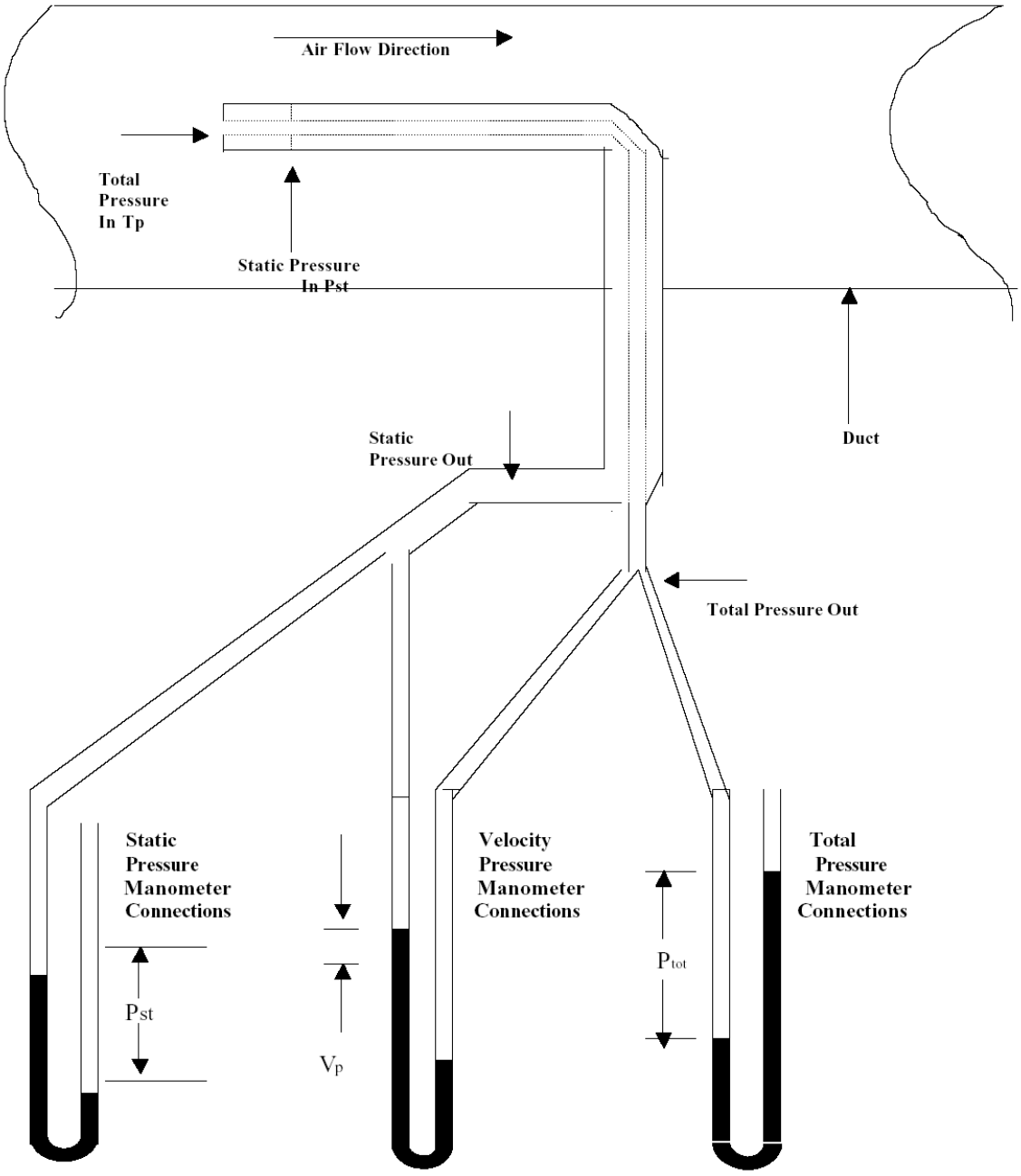


Figure B-1: Measuring air volume with a U-Tube Manometer and pitot tube

Duct OD (Inches)		4	5	6	8	10	12	14	16	18
Duct ID (Inches)		3.83	4.83	5.83	7.79	9.79	11.79	13.79	15.79	17.74
Duct Area (SQ. FT)		.081	.128	.187	.331	.523	.758	1.037	1.360	1.716
Velocity Pressure (Inches WC)	Air Speed (fpm)	Air Flow CFM (Cubic Feet per Minute)								
.10	1266	103	162	237	419	662	960	1313	1722	2172
.20	1791	145	229	335	593	937	1358	1857	2436	3073
.30	2194	178	281	410	726	1147	1663	2275	2984	3765
.40	2533	205	324	474	838	1325	1920	2627	3445	4347
.50	2832	229	362	530	937	1481	2147	2937	3852	4860
.60	3102	251	397	580	1027	1622	2351	3217	4219	5323
.70	3351	271	429	627	1109	1753	2540	3475	4557	5750
.80	3582	290	458	670	1186	1873	2715	3715	4872	6147
.90	3799	308	486	710	1257	1987	2880	3940	5167	6519
1.00	4005	324	513	749	1326	2095	3036	4153	5447	6873
1.10	4200	340	538	785	1390	2197	3184	4355	5712	7207
1.20	4387	355	562	820	1452	2294	3325	4549	5966	7528
1.30	4566	370	584	854	1511	2388	3461	4735	6210	7835
1.40	4739	384	607	886	1569	2478	3592	4914	6445	8132
1.50	4905	397	628	917	1624	2565	3718	5086	6671	8417
1.60	5066	410	648	947	1677	2650	3840	5253	6890	8693
1.70	5222	423	668	977	1728	2731	3958	5415	7102	8961
1.80	5373	435	688	1005	1778	2810	4073	5572	7307	9220
1.90	5521	447	707	1032	1827	2887	4185	5725	7509	9474
2.0	5664	459	725	1059	1875	2962	4293	5874	7703	9719
2.10	5804	470	743	1085	1921	3035	4399	6019	7893	9960
2.20	5940	481	760	1111	1966	3107	4503	6160	8078	10193
2.30	6074	492	777	1136	2010	3177	4604	6299	8261	10423
2.40	6205	503	794	1160	2054	3245	4703	6435	8439	10648

Table A-1: Air Volume Table