# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>SECTION 1: SAFETY RULES</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1 Safety Rules</td>
<td>4</td>
</tr>
<tr>
<td>1.2 Safety Precautions</td>
<td>5</td>
</tr>
<tr>
<td>1.3 Flake Breaker Safety Labels</td>
<td>7</td>
</tr>
<tr>
<td>1.4 Flake Breaker Pinch Points</td>
<td>9</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SECTION 2: INTRODUCTION</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.1 Manual Overview</td>
<td>10</td>
</tr>
<tr>
<td>2.2 Receiving the Unit</td>
<td>10</td>
</tr>
<tr>
<td>2.3 Before Installation</td>
<td>10</td>
</tr>
<tr>
<td>2.4 Before Operation</td>
<td>11</td>
</tr>
<tr>
<td>2.5 Flake Breaker Applications</td>
<td>11</td>
</tr>
<tr>
<td>2.6 Operating Principle</td>
<td>11</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SECTION 3: INSTALLATION</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.1 Introduction</td>
<td>12</td>
</tr>
<tr>
<td>3.2 Location</td>
<td>12</td>
</tr>
<tr>
<td>3.2.1 Foundation</td>
<td>12</td>
</tr>
<tr>
<td>3.2.2 Clearance</td>
<td>12</td>
</tr>
<tr>
<td>3.3 Leveling</td>
<td>13</td>
</tr>
<tr>
<td>3.4 Vibration</td>
<td>13</td>
</tr>
<tr>
<td>3.5 Drive</td>
<td>13</td>
</tr>
<tr>
<td>3.6 Feeding</td>
<td>13</td>
</tr>
<tr>
<td>3.7 Electrical Requirements</td>
<td>13</td>
</tr>
<tr>
<td>3.7.1 Electrical Interlocking</td>
<td>14</td>
</tr>
<tr>
<td>3.8 Unit Check</td>
<td>14</td>
</tr>
</tbody>
</table>
SECTION 4: OPERATION
4.1 Introduction 15
4.2 Safety Check-Up 15
4.3 Starting Check List 15
4.4 Start-up Sequence 16
4.5 Shutdown Sequence 16

SECTION 5: MAINTENANCE
5.1 Introduction 17
5.2 Routine Inspection 17
5.3 Flake Breaker Endplate Removal 17
5.4 Seal and Bearing Removal 18
  5.4.1 Bearings 18
  5.4.2 Packings 18
  5.4.3 Packing Glands 18
  5.4.4 Lantern Rings 19
5.5 Screens 19
  5.5.1 Screen Replacement 20
5.6 Replacement Parts 20

SECTION 6: TROUBLESHOOTING
6.1 Introduction 21
6.2 Start-up Problems 21
6.3 Unusual Drive or Motor Noise 21
6.4 Unusual Flake Breaker Noise 22
6.5 High Temperature 22
6.6 Flake Breaker Bearing Malfunction or Failure 22
6.7 Leaking Air Purge Seals 22
6.8 Leaking Packing Seals 23
6.9 Material Not Flowing 23
6.10 Excessive Vibration 23

SECTION 7: DRAWINGS AND PARTS LIST
7.1 Flake Breaker Exploded View and Parts List 25
7.2 Flake Breaker Endplate Subassembly 26
Section 1: Safety Rules

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**: Indicates a situation where damage to the equipment could result.
- **NOTICE**: Provides helpful information for proper operation of the flake breaker.
1.2 Safety Precautions

**WARNING**

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.

**DANGER**

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.

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 Flake Breaker 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 Flake Breakers 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 Flake Breaker 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 Flake Breaker while it is operating or if it is stalled.

**Illustration 1-1:** Prater Flake Breaker Safety Check List
1.3 Flake Breaker Safety Labels

Illustration 1-2 shows the safety labels used on the Flake Breaker. These labels are important for worker information and must not be removed from the unit.

Illustration 1-2: Prater Flake Breaker Safety Labels
Illustration 1-3: Prater Flake Breaker Safety Label Placement
1.4 Flake Breaker Pinch Points

The Flake Breaker contains several points where care is needed to avoid bodily injury when opening or closing the unit. Always make sure care is used when opening or closing the Flake Breaker. Failure to do so may result in serious injury.

**Illustration 1-4:** Prater Flake Breaker Pinch Points
Section 2: Introduction

2.1 Manual Overview
This manual describes the installation requirements, procedures, and routine maintenance of Prater’s Flake Breaker. Refer to this manual before beginning and during installation. Keep the manual available for future reference. Exploded views are located in the rear of the manual. The procedures throughout this manual refer to these exploded views.

Reliable operation, personnel safety, and long service life of this equipment depend on three important considerations:

- The care exercised during installation.
- The frequency/quality of maintenance and periodic inspections.
- A common sense approach to the Flake Breaker 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 Flake Breaker 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 a possible claim against the delivering carrier.

**NOTICE**

The **RECEIVER** is responsible for inspection and filing claims against the **CARRIER** for any damage to the Flake Breaker in transit.

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. Prater Industries, Inc. does not install your machine. It is your responsibility to provide lockout switches, guards, and other safety devices and safety procedures to protect the machine operator or maintenance personnel.

2.4 Before Operation

Make sure operating personnel are well trained in procedures for operating and maintaining the Flake Breaker. In particular, make sure they understand the essential safety precautions described in Section 1 of this manual.

2.5 Flake Breaker Applications

Prater Flake Breakers are used in a wide range of industrial and agricultural applications. A variety of construction materials as well as blades, pulleys and screens are available to meet virtually any material reducing needs.

When ordering parts or requesting information or service from Prater be sure to state the unit serial number.

2.6 Operating Principle

Prater Flake Breakers are manufactured with quality materials and workmanship and, if given reasonable care, will perform perfectly with minimum maintenance. Each part has been machined to close tolerance to assure the best possible fit between all components as well as interchangeability.

During operation, coarse material is gravity fed into the Flake Breaker through the top of the inlet at the top of the unit. Inside the grinding chamber is one electric motor driven shaft. This shaft is equipped with replicable breaker blades. As the shafts rotate, the breaker blades and fixed blades break up coarse material.

At the bottom of the grinding chamber (below the shaft) is an optional sizing screen. Once the material is reduced to the desired size it passes from the grinding chamber through the holes in the screen and gravity discharged out the bottom of the unit. Screens can be easily changed or eliminated to accommodate a desired material size.

NOTICE

If the Flake Breaker is to be installed in an enclosed room it is important to allow adequate venting to provide proper air volume to the unit. Inadequate air volume will severely restrict throughput of the system and may cause other problems.

If the Flake Breaker is to be installed in an enclosed room it is important to allow adequate venting to provide proper air volume to the unit. Inadequate air volume will severely restrict throughput of the system and may cause other problems.
Section 3: Installation

3.1 Introduction

Proper installation of the Prater Flake Breaker is critical for efficient and productive operation. The proper site preparation and placement of the Flake Breaker and related equipment will insure that the unit operates safely and to its fullest capacity.

The following are important considerations in Flake Breaker Installations:

**Location.** Make sure the operating location will provide strong, vibration-free base support and allow easy access to all parts of the Flake Breaker. Ideally it should have several feet clearance all around it and sufficient room to service the rotor and housing internal components. The Flake Breaker should never be located where it is independently supporting equipment or hoppers above or below it.

**Leveling.** The Flake Breaker must be mounted horizontally on a flat surface, which has sufficient strength to prevent deflections and be large enough to incorporate the full base of the Flake Breaker. Sections 3.2 and 3.3 explain how to check for proper leveling and prevention of vibration damage during operation.

3.2 Location

There are two essential considerations for the Flake Breaker location: the foundation below the machine and the free clearance around it.

**3.2.1 Foundation**

The Flake Breaker must be supported on a flat, vibration free location. It is recommended that all Flake Breakers use a gasket between the mounting surfaces to prevent any leakage of product or air.

**3.2.2 Clearance**

There should be a sufficient open space in all directions around the Flake Breaker to allow access for maintenance operations.
3.3 Leveling

The base of the unit must be level to prevent vibrations that will accelerate wear on the unit or cause possible damage to the Flake Breaker. Before tightening fasteners, check for correct unit leveling at the corners of the Flake Breaker.

To correct level:
1. Insert shims for proper alignment
2. Recheck level at corners of the Flake Breaker
3. Once proper level has been achieved, tighten all fasteners.

3.4 Vibration

The Flake Breaker is constructed to run without noticeable vibration. Vibration indicates a problem that must be found and corrected immediately. Left uncorrected, vibration could cause damage to the unit or structural damage to connected components.

There are several conditions that cause vibration including:
- Uneven base (See Section 3.2)
- Loose motor fasteners
- Defective motor or shaft bearings (See Section 6)
- Other equipment transferring vibration thru contact with the Flake Breaker
- Foreign material in the Flake Breaker
- Worn, missing, or broken breaker blades or screen (See Section 5)
- Deviation from the recommended balanced breaker blade set-up
- Material build up on the shaft

3.5 Drive

The Flake Breaker comes supplied with the proper motor and pulley combination to achieve the correct rotor RPM balanced and properly mounted.

3.6 Feeding

A uniform constant feeding process is essential for the best performance of the Flake Breaker. If the feeding process is not by gravity, a volumetric feeder is recommended.

3.7 Electrical Requirements

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

### 3.7.1 Electrical Interlocking
As a general guide, the last piece of process equipment is started first with subsequent starts working up the line to the Flake Breaker.

### 3.8 Unit Check
After installation is complete, carefully inspect all work before installation crew leaves to see that all instructions have been properly followed.
Section 4: Operation

4.1 Introduction
Pre-run inspections and safety checks throughout this section insure that the Flake Breaker is in proper operating condition. Other aspects of operation covered in this section include: start-up and shut down sequences, and motor rotation.

4.2 Safety Check-Up
Before starting the Flake Breaker check the following:

- The inside of the unit for foreign material, i.e., nuts, bolts, wire, rags, paper, wood, etc.
- That all guards are mounted and secure.
- That all inspection doors are closed and secured.
- That all electrical starting equipment, meters, disconnect switches, and other control devices are clearly visible readily accessible to the operator.
- All chutes to and from the Flake Breaker are constructed so that no one can reach into the unit while operating and no material can fly out and hit someone.

4.3 Starting Check List
This checklist should be followed during the initial installation and after any shut down period or maintenance procedure.

1. Check inside the Flake Breaker and remove any foreign material that may have accumulated during shipment, installation or maintenance.
2. Check rotor for correct direction of rotation relative to material feeding.
3. Check tension and alignment of drive belts.
4. Set up and check compressed air supply if unit is air purged.
5. Make sure no tension from surrounding equipment is placed on unit housing.
6. The initial start should be without product. Check seal effectiveness and tighten if necessary.
7. Feed material into Flake Breaker while unit is in operation.
8. Do not continue to operate when malfunctions occur or problems arise.

4.4 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.

1. Check the motor as it starts for proper rotation and proper amperage.
2. Check interlocks to make sure they are working and in proper sequence.
3. Begin product feed into the system at a low rate (always less than 50% of full rated capacity).
4. Check product for desired fineness.
5. Slowly increase feed to its maximum load condition (amperage). The maximum load for your motor is stamped on the motor nameplate. Use the amperage listed for the voltage you are using.
6. Recheck the fineness of the material and the capacity after reaching the maximum load condition.

4.4 Shutdown Sequence

A typical Flake Breaker 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.

ALWAYS WEAR SAFETY GLASSES WHEN OPERATING THIS MACHINE.

A TIME DELAY IS ALWAYS REQUIRED BETWEEN START-UP OF THE FLAKE BREAKER AND START-UP OF THE FEEDER TO ALLOW THE FLAKE BREAKER TO REACH FULL OPERATING SPEED BEFORE PRODUCT IS INTRODUCED.

DO NOT OPEN FLAKE BREAKER OR ATTEMPT ANY FORM OF INSPECTION UNTIL THE UNIT HAS COME TO A COMPLETE STOP AND THE ELECTRICAL DISCONNECT HAS BEEN LOCKED INTO THE OPEN POSITION.
Section 5: Maintenance

5.1 Introduction

The Flake Breaker is designed to operate with minimal 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 Flake Breaker and its output. When operated without vibration or foreign materials entering the grinding chamber, only those parts subject to the heaviest wear (breaker blades and screens) will require maintenance.

5.2 Routine Inspection

Rotating equipment requires regular routine preventative maintenance procedures. Regular inspection of the breaker blades should be carried out particularly where abrasive materials are being processed. Wear patterns on the breaker blades will vary depending upon operating conditions. Visual inspection will show the necessity for change.

5.3 Flake Breaker Endplate Removal

This procedure should be followed during cleaning and servicing procedure of the Flake Breaker.

1. Turn off the Flake Breaker and allow rotor to come to a complete stop.
2. Lock out electrical power to the Flake Breaker.
3. Remove the hex nuts and washers (Figure 7.1 - 32, 33, 34) and remove the end cap (Figure 7.1 - 20).
4. Loosen the bearing eccentric locking collar (Figure 7.1 - 19).
5. Remove the 6 bolts and washers (Figure 7.1 - 31, 32, 33) fastening the endplate assembly (Figure 7.2) to the Flake Breaker housing (Figure 7.1 - 1).
6. With both hands, firmly pull the endplate assembly (Figure 7.2) free from the Fake Breaker housing (Figure 7.1 - 1). If the endplate assembly (Figure 7.2) is difficult to remove, jack bolt holes have been provided in the endplate (Figure 7.1 - 12) to assist with unseating the endplate from the housing.
7. When Flake Breaker maintenance is complete, follow the above instructions in reverse order to reinstall endplate assembly (Figure 7.2).

5.4 Seal and Bearing Removal

5.4.1 Bearings
The bearings (Figure 7.1 - 19) in the Flake Breaker are lubricated and sealed at the factory, requiring no further lubrication for the life of the Flake Breaker. If bearing failure occurs, contact Prater Customer Service for replacements.

5.4.2 Packings
Three rings of square section, molded, split ring self lubrication packing (Figure 7.1 - 13) are provided in each packing seat, followed by an adjustable packing gland (Figure 7.1 - 15). The standard packing used in the Flake Breaker are made of abrasion resistant polyimide but food grade Teflon packing is available for certain applications.

5.4.3 Packing Glands
Prater Flake Breakers are equipped with a packing gland that is either manually adjusted or self adjusted. Manual adjusted packing glands require periodic adjustment of the packing gland whereas self adjusting packing glands are a unique feature which maintains constant pressure on the packing as it wears making periodic adjustment of packing pressure unnecessary. Manually adjusted packing glands should be monitored periodically to ensure that a constant pressure is kept on the face of the packings for proper sealing. For self adjusting packing glands, pressure has been set during final assembly and inspection at the factory and should be satisfactory for the life of the packing.

When the packings have completed their useful life, replacement can be made quickly and conveniently by following the simple instructions listed below while referring to Figure 7.2.

DO NOT OPEN THE FLAKE BREAKER OR ATTEMPT ANY FORM OF INSPECTION UNTIL THE UNIT HAS COME TO A COMPLETE STOP AND THE ELECTRICAL DISCONNECT HAS BEEN LOCKED IN THE OPEN POSITION.

1. Turn off the Flake Breaker and allow rotor to come to a complete stop.
2. Lock out electrical power to the Flake Breaker.
3. Advance both spring release nuts (Figure 7.2 - 8) along spring release screw (Figure 7.2 - 7) until spring retainers (Figure 7.2 - 5) are disengaged from the packing gland (Figure 7.2 - 4).
4. Slide packing gland (Figure 7.2 - 4) from spring retainers (Figure 7.2 - 5) by rotating it 90°. Slots are provided in the packing gland (Figure 7.2 - 4) to allow this rotation.
5. Slide the packing gland (Figure 7.2 - 4) along the rotor shaft towards the bearing (Figure 7.2 - 2) until the packing glad (Figure 7.2 - 4) is free of the endplate (Figure 7.2 - 1).
6. Remove the worn packings (Figure 7.2 - 3) and add new packings as required.
7. To reassemble the packing gland to its operating position, it may be necessary to further compress springs (Figure 7.2 - 6) by advancing spring release nuts (Figure 7.2 - 8) against spring release retainers (Figure 7.2 - 5) until packing gland (Figure 7.2 - 4) can be re-engaged with the spring retainer (Figure 7.2 - 5).
8. Once this is done, follow the above described procedure in reverse order.

5.4.4 Lantern Rings
Under certain operating conditions, especially when the Flake Breaker is handling abrasive dust, it may be desirable to purge the packing gland with compressed air or inert gas. This is accomplished by installing a lantern ring (Figure 7.2 - 3A) in the glad in place of the inner-most ring of packing, immediately adjacent to the rotor side of each endplate (Figure 7.2 - 1). The ring is so designed as to distribute the air or gas evenly in a thin film around the shaft. Lantern rings are generally made of brass, but nylon and stainless steel lantern rings are also available.

5.5 Screens
The screen controls the particle size of the final product. Inspect the screen frequently in order to maintain the desired output. The screen may require re-rolling or replacement if they are showing signs of wear. Worn screens could potentially cause:

- Lower capacity
- Increased power costs
- Coarser product output

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

- Coarse final product
- Reduced or lowered capacity
- Worn edges of the screen holes
- Oval shaped or elongated screen holes

Excessive wear can be caused by:

- Extremely abrasive product
- Extremely fine product
- Excessively high feed rate
5.5.1 Screen Replacement
When the sizing screen has become worn, replacement can be made quickly and conveniently by following the simple instructions listed below while referring to Figure 7.1 and Figure 7.2.

1. Turn off the Flake Breaker and allow rotor to come to a complete stop.
2. Lock out electrical power to the Flake Breaker.
3. Remove the endplate assembly (Figure 7.2) by referring to Section 5.3 of this manual.
4. Remove the sizing screen (Figure 7.1 - 9) from the grinding chamber.
5. Seat new screen in grinding chamber.
6. Replace endplate assembly (Figure 7.2).

5.6 Replacement Parts
For replacement parts or spare parts kits, contact Prater Customer Service. Please have the serial number of your unit available to ensure the correct part numbers and quantities are ordered.

DO NOT OPEN THE FLAKE BREAKER OR ATTEMPT ANY FORM OF INSPECTION UNTIL THE UNIT HAS COME TO A COMPLETE STOP AND THE ELECTRICAL DISCONNECT HAS BEEN LOCKED IN THE OPEN POSITION.
Section 6: Troubleshooting

6.1 Introduction

This section is offered as a general guide to analyze problems. If after reviewing this section you have not identified your problem, contact Prater Customer Service Department at 1-800-323-5735 for further assistance.

6.2 Start-Up Problems

Prater equipment is made of high quality materials and assembled by skilled workers who take pride in their work. However, even on the best equipment there can still be start-up or operational problems. If trouble occurs, please check the following:

**WARNING**

DO NOT OPEN THE FLAKE BREAKER OR ATTEMPT ANY FORM OF INSPECTION UNTIL THE UNIT HAS COME TO A COMPLETE STOP AND THE ELECTRICAL DISCONNECT HAS BEEN LOCKED IN THE OPEN POSITION.

1. Check the power source for sufficient power as specified on the nameplate. Check the wiring connections and the motor protection devices, i.e. fuses, circuit breakers and overload elements. Replace fuses if blown and reset the circuit breakers or overload elements if tripped.
2. The motor may be burned out. If it is, it will need to be repaired or replaced.
3. Check for proper assembly of the drive belts and sheaves. The belts may be disconnected or broken.
4. Check for jamming of the rotor. If jammed, the unit may need to be disassembled and cleaned. Do not attempt this until the unit has been locked out.
5. The bearings or seals may need to be replaced.

6.3 Unusual Drive Motor Noise

If the Flake Breaker drive is making an unusual noise during operation, check the following:
1. Check for proper alignment of the drive components. Align the sheaves with a straight edge or laser level. Ensure that the belts are not rubbing against the drive guard.

2. Check for proper adjustment of the belt. If the belt is too tight, it will overload the shaft bearings.

6.4 Unusual Flake Breaker Noise

If an unusual noise is heard during the operation of the Flake Breaker, check the following:

1. Check the motors amp draw to determine whether material build-up inside the grinding chamber is overloading the motor. If the build-up is excessive, clean the grinding chamber after locking out power to the unit.

2. The rotor may be rubbing on the fixed blades. Check for external loads on the inlet and outlet flanges. The Flake Breaker is not to be used as a support for loads other than the drive assembly and line adapters. Make sure rotor is centered in the housing so that it does not rub the endplates or fixed blades.

6.5 High Temperature

Motors operating under rated load (amp draw) and ambient conditions, as specified on the nameplate, may feel warm when touched. If overheating is suspected, check the following:

1. Check for proper operating of the Flake Breaker bearings. See section 6.7.

2. Check for excessive material build-up in the grinding chamber. See section 6.4.

3. Verify that the electrical overload elements are properly sized per the full load amp specification on the motor nameplate. Oversized elements will not protect the motor from overload.

4. Check for proper ventilation around the motor. Material or dust build-up on the exterior of the motor may hamper ventilation.

6.6 Flake Breaker Bearing Malfunction or Failure

Disassemble the bearing(s) from the Flake Breaker and check the following:

1. Check for wear, dirt or material in the bearings. If there is damage, replace the bearings.

6.7 Leaking Air Purge Seals

If air loss from the air purge seals are noticed, check the following:

1. Check to insure that a compressed air supply has been installed to the Flake Breaker. Never operate a Flake Breaker that has air purge seals without purge air. If the Flake Breaker has been operated without the air purge operating, the seals could be damaged and need to be replaced.
2. Check for proper operation and adjustment. The air should be set 3-5 PSI above the conveying system operation pressure. If the air is set too low, material will not be properly cleaned from the air purge diffusers and will damage the seals. The seals should be replaced.

6.8 Leaking Packing Seals

If air or material is noticed leaking from the packing seals, the packing may be worn or damaged. Remove and replace the seals.

6.9 Material Not Flowing

If material is having difficulty flowing into or out of the Flake Breaker, check the following:

1. Check for material build-up on the rotor. Clean the Flake Breaker rotor after the unit has been locked out.

2. Check for correct Flake Breaker RPM.

3. Check the screen for screen blinding or wear. Replace or clean the screen as needed.

6.10 Excessive Vibration

Excessive vibration is an indication that something has changed and needs correction. Stop and inspect the unit thoroughly.
Section 7: Drawings and Parts List

The following figures and illustrations are provided to assist in the operation and maintenance of Prater Flake Breakers as well as a general reference for any spare or replacement parts for Prater Flake Breakers. For specific Flake Breaker questions please contact Prater Customer Service.
SECTION 7.2: FLAKE BREAKER ENDPLATE SUBASSEMBLY
(TWO SUB ASSEMBLIES PER UNIT)

<table>
<thead>
<tr>
<th>ITEM NO.</th>
<th>DESCRIPTION</th>
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<tr>
<td>1</td>
<td>ENDPLATE</td>
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<td>2</td>
<td>BEARING &amp; LOCKING COLLAR</td>
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<tr>
<td>3</td>
<td>PACKING</td>
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</tr>
<tr>
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<td>LANTERN RING (OPTIONAL)</td>
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</tr>
</tbody>
</table>