wheelabrator
shaping industry

# Operation and Maintenance Manual

## VOLUME 1
## SAFETY AND MACHINE INFORMATION

| | |
|---|---|
| **Serial Number** | 3818 |
| **Customer Name** | Unarco Industries |
| **Machine Type** | 2 Wheel Table Spinner |
| **Manual Issue Date** | 9-19-2022 |

For technical assistance and service for your Wheelabrator machine please contact the location nearest your machine installation:

USA / North America 800 544 4144 / 706 884 6884

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www.wheelabratorgroup.com

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# Operation and Maintenance Manual


# SPECIAL NOTICE.

USE NEW ABRASIVE ONLY PER MACHINE SPECIFICATION. THIS IS ESPECIALLY IMPORTANT IN APPLICATIONS WERE FLAMABLE MATERIAL IS INVOLVED; THESE MAY INCLUDE, BUT ARE NOT LIMITED TO, ALUMINUM AND MAGNESIUM. IF ALL THE PARTICLES PRESENT ON THE SYSTEM ARE LARGER THAN 500 MICRONS, AN EXPLOSION WILL PROBABLY NOT BE SUSTAINED.

# Table of Contents

# Section 1 Introduction

## 1.1 Statement

This manual will benefit you in several ways:

1. It will provide you with safety warnings and instructions to protect you and your equipment from injuries or damage.
2. It will assist you in keeping this equipment in the best possible mechanical condition at all times.
3. It will help you obtain the maximum performance from your equipment.

The instructions and suggestions contained in this manual are based upon practical operating experience. If followed they will help you get the most production and satisfaction from the equipment.

Everyone responsible for the operation and maintenance of your equipment must read and understand this manual before using or working on the equipment.

Our interest in the safest and most successful operation of your equipment continues throughout the life of the equipment. We want it to serve you well. For that reason, please feel free to discuss any problems you may have concerning it or the work you are doing. It will be a pleasure to help you.


**ADDITION COPIES OF THIS MANUAL CAN BE PURCHASED FROM THE EQUIPMENT MANUFACTURER.**

## 1.2 Instruction and Warning Symbols

In this operation and maintenance manual the following symbols are used to identify important operation, maintenance, and safety instructions:

### 1.2.1 Read!

This sign indicates advice regarding operation and maintenance.

### 1.2.2 Caution!

This sign indicates rules and guidelines for a potentially hazardous situation which, if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices.

### 1.2.3 Warning!

This sign indicates rules and guidelines for a potentially hazardous situation which, if not avoided, could result in death or serious injury.

### 1.2.4 Danger!

This sign indicates rules and guidelines for an imminently hazardous situation which, if not avoided, will result in death or serious injury. It may also be used to alert against unsafe practices

### 1.2.5 Electrical Hazard!

This sign indicates rules and guidelines to prevent possible severe or fatal injuries to the person and/or damage to the equipment by electrical causes.

## 1.3 Instructions

### 1.3.1 Reading about Equipment

This manual has been prepared to assist operator and maintenance personnel in understanding the equipment, so that it may be operated safely in the most efficient manner and maintained in the best condition. All personnel responsible for the operation and maintenance of the equipment must read and understand the manual, before using or working on the equipment.

### 1.3.2 Understanding the Equipment

**Before** attempting to operate, service or maintain the equipment, personnel should thoroughly familiarize themselves with the physical make-up of the equipment, be familiar with the major components of the equipment, and have a general understanding of overall operations.

### 1.3.3 Equipment Operators & Maintenance Personnel Qualifications

1. Person must be of legal age for the location to operate and/or service equipment.
2. Person must be able to read and understand the English language to operate and/or service equipment.
3. Person must read and understand operation and maintenance manual before operating and or servicing the equipment.
4. Person must be trained in the operation and safety of the equipment before operating.
5. Only qualified maintenance personnel may service this equipment.

### 1.3.4 Warnings & Precautions

**Operating and maintenance personnel must obey all the warnings and safety precautions posted on the equipment. Serious injury to personnel or severe damage to the equipment may result if the warnings and precautions are not followed.**

### 1.3.5 Receipt of Equipment

Examine the shipment carefully for possible damage in transit. If damage is found, note the damage on the bill of lading, notify the transportation carrier immediately, and advise the Wheelabrator Group.

# Section 2 Safety – Warnings and Precautions

## 2.1 Lockout Tagout

One of the most widely applicable industrial safety principles is Lockout/Tagout. The Occupational Safety and Health Administration (OSHA) and the American National Standards Institute (ANSI) have both addressed the requirement for Lockout/Tagout. OSHA requires that each employer formulates a written procedure for implementing a Lockout/Tagout safety program, including training employees to assure that it is properly utilized. The following are a few important points to keep in mind.

1. The principle of Lockout/Tagout is to protect personnel from the unexpected energization, start up, or release of stored energy from the equipment or process.
2. The Lockout/Tagout principle requires that locks and tags be affixed to the point where energy can be disconnected from the equipment or process.
3. Sources of energy are not restricted to electrical; that is, disconnecting the main power switch may not eliminate all sources of unexpected activation. While electrical power always should be disconnected, a person knowledgeable about the equipment or process must assess the system for circumstances in which other forms of energy may be stored and released.
4. Personnel who are most vulnerable to injury from the activation of energy are maintenance personnel who must disassemble, expose, and work on the equipment in the process of repair or service.

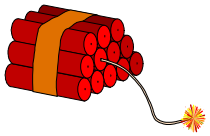
The following serves as a reminder to apply this important safety principle when working on the equipment.

**Disconnect or remove all sources of stored energy before performing maintenance or other service actions.**

**Failure to eliminate or block sources of stored energy can result in unexpected movement of equipment elements and cause serious injury or death.**

**Follow your Lockout/Tagout procedure.**

## 2.2 Media Warnings



### 2.2.1 Highly Explosive Dust

Products (parts), which produce highly explosive dust, such as **Magnesium, Titanium, Zirconium, Thorium,** etc., should not be processed in this equipment, unless appropriate safety measures are followed (consult expert authority). Obtain approval of your plant safety director and comply with applicable NFPA (National Fire Protection Association) guidelines.

**Note: Personnel should not smoke, use matches nor have open flames around this equipment during operation.**

### 2.2.2 Aluminum Media Parts

Comply with all applicable sections of NFPA guidelines for processing or handling of aluminum dust and fines that may be pertinent to your specific operation.

In applications involving the use of dry type bag or cartridge dust collector system and Aluminum Media or surface blasting of Aluminum Parts, precautionary measures must be taken to minimize the risk of dust collector fires and/or explosions. The following procedures should be followed.

#### 2.2.2.1 Adding Limestone – Dry Type Collectors

No. 200 mesh agricultural limestone ($CaCO_3$) should be added to the ventilation system at a continuous rate of 0.2 oz per hour per square foot of filter area. **Caution: $CaCO_3$ is crushed limestone rock (not to be confused with lime, otherwise known as hot lime, burnt lime or hydrated lime. These highly reactive lime products should not be used).**

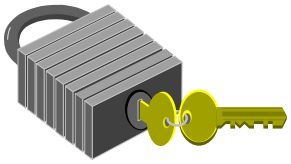
#### 2.2.2.2 Dust Collector Hoppers

The dust collector's refuse hopper(s) must be emptied at frequent intervals and at the end of each shift of operation. Collection of more than 1/3 the hopper capacity should not be exceeded. If external containers are used to collect refuse, they must never be allowed to overfill and back up into the collector hopper. All equipment must be grounded in accordance with the National Electrical Codes (NEC) to minimize static electric charges.

#### 2.2.2.3 Ductwork Velocity – Aluminum Applications

Maintain ductwork air velocity of not less than 4500 FPM.

## 2.3 Maintenance Warning – Electrical



**WARNING**

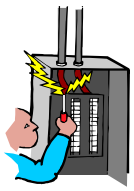
**BEFORE ANY MAINTENANCE WORK IS CARRIED OUT ON THIS EQUIPMENT, THE MAIN ELECTRICAL SUPPLY SWITCH MUST BE IN THE "OFF" POSITION. ANY PERSONNEL PERFORMING ANY MAINTENANCE ON THIS EQUIPMENT MUST FOLLOW ALL APPLICABLE PLANT SAFETY STANDARD OPERATING PROCEDURES SUCH AS LOCK-OUT, TAGOUT, ETC.**

## 2.4 Electrical Precautions

Throughout this manual are safety warnings and precautions that must be obeyed by maintenance and operating personnel. Although the precautions which follow may seem to be over simplified, they should be included in the "Buyer's Safety Program." These are minimum safety requirements for this

equipment and any additional plant safety requirements for your facility shall also be obeyed.

### 2.4.1 Control Panel



1. **DO NOT** operate the equipment with the control panel door open.
2. **DO NOT** use oversized fuses or bypass any fuses. Refer to Electrical Drawing.
3. **DO** verify the correct thermal overload(s) are installed for the motor starter(s) for the full load amp rating of the motor(s) as shown on the motor nameplate.
4. **DO** verify the set point knob on motor starter overload relay(s) are set to match amperage called out for on electrical drawing and matches motor nameplate data.

### 2.4.2 Electrical Motors

Only qualified personnel should perform electrical installation, operation, and maintenance work.

1. **DO** verify all power sources are disconnected before attempting maintenance or repair.
2. **DO** follow your plants Lockout/Tagout procedures.
3. **DO NOT** come in contact with rotating parts.
4. **DO** verify motor(s) are effectively grounded. All the motor(s) on this equipment are securely fastened by metal-to-metal contact on the equipment and effectively grounded provided that the equipment is grounded. Refer to Item 3.4.4 on equipment grounding.
5. **DO** verify the motor's nameplate before starting the motor(s), to ensure that the correct power supply (voltage, frequency, and phase) is being used and that the motor(s) is/are connected according to the connection diagram on the nameplate. Verify that the motor is connected properly for the correct rotation. If motor(s) rotate in the wrong direction, a qualified electrical person may interchange any two line leads at the starter in the control panel.
6. **DO NOT** use the eyebolt on the motor(s) to lift the motor with any additional equipment attached to the motor(s).

### 2.4.3 Equipment Installation Wiring

**DO** verify the equipment is wired and connected with wire of the correct size and correct insulation.

### 2.4.4 Equipment Safety Grounding

1. **DO** verify the equipment, as installed, is effectively grounded.
2. **DO** verify the equipment is grounded in accordance with NEC and any other applicable state or local codes.
3. **DO** verify effective grounding is accomplished by providing a ground path from the equipment to a grounding electrode with a copper conductor. The ground electrode may be:
    a. An underground metal water pipe
    b. A grounded metal building frame
    c. Other local metallic underground systems, such as tanks, plates, or driven pipe or rod.

4. **DO** verify the grounding conductor from equipment to grounding electrode is fastened by a pressure type cable connector (no solder) to a surface that is free of dirt and paint. Electrical devices (motors, controls, etc.) securely fastened to the equipment are grounded if the equipment is grounded.

## 2.5 Maintenance Warning – Mechanical

### 2.5.1 Installation

#### 2.5.1.1 Lift Points


Safety during installation and start up requires placing the equipment without damage or injury and proper hook up to the required utility service.

The equipment may be lifted using the designated lift points that are located at a balance point. Be sure to lift the load with a proper size lifting device and follow safe rigging practices when performing this work. The proper lift points are designated on the equipment by the following sign.

#### 2.5.1.2 Tipping Hazard

Some equipment may have work doors that may cause a change in the equipment's center of gravity when opened. Make sure all doors are securely closed before lifting and make sure equipment is securely anchored before doors are opened.

**Note: DO NOT open doors on equipment until the equipment is anchored securely.**

#### 2.5.1.3 Equipment Placement

1. Be sure to allow sufficient space around the equipment to ensure that operation and maintenance can be performed without endangering personnel.
2. Inspect all access covers to make sure each is in place and secure.
3. Install vent piping to customer's dust collector system or to the dust collector supplied with the equipment.
4. Remove all foreign objects that might have been dropped or left in hoppers, elevator boot, etc.

### 2.5.2 Items to be Checked and Completed before Start-Up

1. Install breathers on speed reducers.
   a. Remove solid fill plug(s) located at the highest position and on the slow (output) side of each reducer. Ensure oil level(s) is/are correct with recommended lubricant(s). (See lubrication chart in Section 5)
   b. Replace solid fill plug with breather plug(s) which is/are enclosed in packet inside electrical panel.

   Note: Some units may be equipped with combination plugs that do not require replacement. Check for air/pressure vent hole in plug before removing. Only un-vented plugs need to be changed.
2. Check motor rotation on all drives.

3. This equipment is normally wired to operate from 460V AC, 3 Phase, and 60 HZ electrical supply. Factory supplied options for 575V AC, 3 Phase, 60 HZ or 230V AC, 3 Phase, 60 HZ operation are available.
4. Before starting the equipment, check that the equipment is properly wired for the voltage it will operate on.
5. Make sure all drive guards, inspection plates, etc. are in place.

## 2.6 Mechanical Precautions

Throughout this manual are safety warnings and precautions that must be obeyed by maintenance and operating personnel. Although the precautions that follow may seem to be over simplified, they should be included in the "Buyer's Safety Program." These are minimum safety requirements for this equipment and any additional plant safety requirements for your facility shall also be obeyed.

### 2.6.1 Mechanical Dos and Don'ts Items:

1. **DO** Achieve **Zero Mechanical State (ZMS)** before performing maintenance on the equipment.
   a. **DO** lockout every power source that can produce mechanical movement.
   b. **DO** lockout shut off valves for pressurized fluid (air, oil or other).
   c. **DO** reduce all accumulators and air surge tanks to atmospheric pressure.

   d. **DO** achieve the lowest practical value for mechanical potential energy for all portions of the equipment.
   **Example:** A belt and bucket elevator system that has stopped with the buckets containing abrasive may reverse from the weight of the abrasive in the buckets.
   e. **DO** achieve the lowest practical value for kinetic energy of the equipment members. Loose or freely movable equipment members and parts must be secured against accidental movement.
   **Example:** A rotating part, such as an airless blast wheel, will continue to rotate for a period of time after the electrical power has been disconnected.

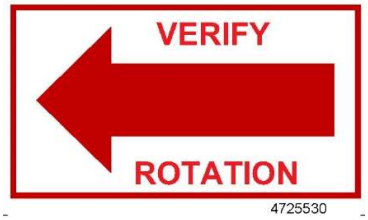
2. **DO** keep all guards in place, except during maintenance or repair work. Remount all guards upon completion of any maintenance or repair work.
3. **DO** wear safety glasses while working near or on the equipment.
4. **DO** wear gloves, when applicable, when working near and on the equipment.
5. **DO NOT** wear loose fitting clothes, jewelry, and watches, while working near belts, chains, sprockets, shafts or other components that are movable.
6. **DO** keep the areas around all equipment clean. Loose abrasive media and dust can cause hazardous conditions.
7. **DO** immediately correct any condition(s) that may result in damage to the equipment or cause injury to personnel.

8. **DO NOT** use your hands to remove excess abrasive from the elevator boot section, rotary screen, screw conveyor or shaker conveyor. Always use a scoop or scraper for removing this abrasive.
9. **DO NOT** attempt to adjust the feed spout, or other wheel parts while the blast wheel is operating or rotating.
10. **DO NOT** attempt to adjust the component parts of the abrasive recycling system or the work parts conveyor system while any part of the blast equipment is in operation.
11. **DO NOT** remove access covers or panels while equipment is operating. Always follow your facility's Lockout/Tagout procedures before removing any covers or panels.
12. **DO** obey all safety signs (caution, warning, & danger) and other precautionary information posted on the equipment or in the equipment operating area.

## 2.7 Safety Signs

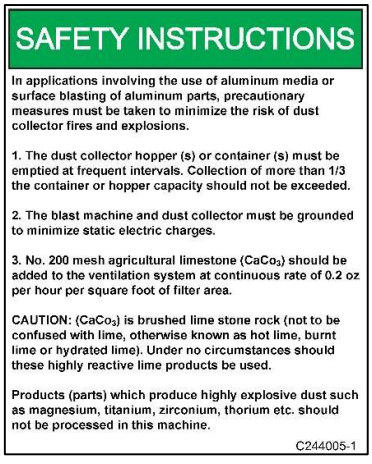
The following safety and danger signs may appear on and around the equipment, it is important that their meaning is fully understood by all operators and maintenance personnel who will come in contact with the equipment:

### 2.7.1 Caution Signs

| Caution Sign | Location | Description |
|---|---|---|
| **C243973-1**<br>  | Heavy Doors<br>Hinged Chutes<br>Blast Wheels | Cautions operator that the item is heavy and to use assistance when lifting |
| **6749820**<br>  | On all blast wheel motors on the equipment. | Cautions the operator to verify that all the blast wheels are rotating per design requirements. |
| **4725530**<br>  | On all motors on the equipment. | Identifies the proper rotation of the motors on the equipment. |

### 2.7.2 Warning Signs

| Warning Sign | Location | Description |
|---|---|---|
| **C243966-1**<br>  | Near pneumatic or hydraulic cylinders and powered mechanisms. | Warns the service personnel to lock out power and bleed lines before servicing the equipment. |
| **C244044-1**<br>  | Boot section of elevators. | Safety instructions for elevators. |
| **C243689-1**<br>  | On the dust collector rotary valve. | Warns the operator or service personnel of the rotating parts; and to lock out before servicing. |
| **C243985-1**<br>  | Near rotating parts. | Warns the operator or service personnel to ensure the machine has stopped; and to lock out before servicing. |
| **C243968-1**<br>  | Drive guard assemblies. | Warns the operator of entanglement danger, and to not operate the machine without drive guards. |
| **C243976-1**<br>  | On drive guards.<br>Cover plates over moving mechanism. | Warns the operator or service personnel to keep hands clear; and to not operate the equipment with the guards removed. |

| Warning Sign | Location | Description |
|---|---|---|
| **C243992-1**<br>  | Chain driven roll conveyors.<br>Chain power transmissions. | Warns the operator or service personnel to keep hands clear; and to not operate the equipment with the guards removed. |
| **C243986-1**<br>  | Rotating shafts.<br>Rotating couplings. | Warns the operator or service personnel to keep hands clear; and to lock out before servicing. |
| **C243987-1**<br>  | Drag chain conveyors. | Warns the operator or service personnel to keep hands clear. |
| **C243980-1**<br>  | Belt conveyors.<br>Wire-mesh belts. | Warns the operator or service personnel to not operate the equipment with the guards removed; and to lock out before servicing. |
| **C244005-1**<br>  | Dust collectors in aluminum applications | Provides safety instructions for the dust collector use in aluminum applications |

| Warning Sign | Location | Description |
|---|---|---|
| **C243982-1**<br>  | Dust collectors<br>Pressure relief panels<br>Pressure relief doors. | Warns the operator or service personnel of a possible fire or dust explosion hazard. |
| **C243983-1**<br>  | On abrasive blast pots. | Warns the operator or service personnel of the steps to take before servicing the blast pot to prevent injury from high pressure air. |
| **C243970-1**<br>  | On all guard covers. | Warns the operator to verify that all guards are secured before operating the equipment. |
| **C243977-1**<br>  | Access doors to air blast booths and paint rooms | Warns that the access door is interlocked and that access is restricted to authorized personnel. |
| **C243993-1**<br>  | Near the dust collector fan. | Warns the operator or service personnel of the rotating parts; and to lock out before servicing. |
| **C243991-1**<br>  | Near safety gates.<br>Restricted access areas. | Warns the operator or service personnel that the area is restricted to authorized personnel only. |
| **C243972-1**<br>  | Near machine and component lifting points. | Shows points on the equipment where it is safe to lift the load. |

| Warning Sign | Location | Description |
|---|---|---|
| **C243989-1**<br>  | At eye level on:<br>Inspection doors<br>Access doors<br>Work doors | Warns the operator or service personnel to wear hearing protection when servicing or operating the equipment. |
| **C243974-1**<br>  | At eye level on:<br>Inspection doors<br>Access doors<br>Work doors | Warns the operator or service personnel to wear safety glasses when servicing or operating the equipment. |
| **C243971-1**<br>  | At eye level on:<br>Inspection doors<br>Access doors<br>Work doors | Warns the operator or service personnel to wear safety glasses and hearing protection when servicing or operating the equipment. |
| **C243979-1**<br>  | Roll conveyors<br>Drag chain conveyors<br>Belt conveyors<br>Shaker conveyors | Warns the operator or service personnel to keep off the conveyors as they move automatically. |
| **C243988-1**<br>  | At eye level on:<br>ladders to service platforms<br>operator's station<br>access doors | Warns to watch their step around the equipment due to possible media or debris on floor. |

### 2.7.3 Danger Signs

| Danger Signs | Location | Description |
|---|---|---|
| **C243965-1**<br>  | Near any component that may start automatically:<br>Elevators<br>Conveyors | Identifies a danger that the machine component may start up automatically.<br>Lock out procedures need to be followed prior to any maintenance or servicing. |
| **C243967-1**<br>  | Near pneumatic or hydraulic cylinders and powered mechanisms. | Identifies a crush danger and that the moving part must be supported prior to maintenance or servicing. |
| **C243975-1**<br>  | Above all elevator boot access and clean out doors on the elevator casings. | Identifies a crush danger due to the rotating exposed elevator buckets. |
| **C251789-1**<br>  | Loader buckets<br>Conveyor up enders<br>Conveyor down enders. | Identifies a crush danger and that the operator must be clear when in operation.<br>Service must be performed in the down position only.<br>Follow Lockout/Tagout procedure. |
| **C244003-1**<br>  | Electrical control panel. | Indicates there is a danger of electrical shock and arc flash explosion hazard<br>Lock out power before opening the electrical control panel doors. |
| **C243999-1**<br>  | Junction boxes that contain 230 Volt. | Identifies danger associated with high voltage. |

| Danger Signs | Location | Description |
|---|---|---|
| **C243997-1**<br>  | Junction boxes that contain 240 Volt. | Identifies danger associated with high voltage. |
| **C243998-1**<br>  | Junction boxes that contain 380 Volt. | Identifies danger associated with high voltage. |
| **C244000-1**<br>  | Junction boxes that contain 415 Volt. | Identifies danger associated with high voltage. |
| **C244002-1**<br>  | Junction boxes that contain 480 Volt. | Identifies danger associated with high voltage. |
| **C244001-1**<br>  | Junction boxes that contain 575 Volt. | Identifies danger associated with high voltage. |
| **C243969-1**<br>  | Drive guards<br>Cover plates over moving mechanisms | Indicates a danger of entanglement and to not operate machine without guards in place.<br>Lockout / Tagout procedures need to be followed prior to any maintenance or servicing. |
| **C243981-1**<br>  | At eye level on access points to screw conveyors. | Indicates danger of entanglement.<br>Lockout / Tagout procedures need to be followed prior to any maintenance or servicing. |

| Danger Signs | Location | Description |
|---|---|---|
| **C243984-1**<br>  | On safety gates and restricted access areas. | Warns the operator or service personnel that the area is restricted to authorized personnel only. |
| **10904493**<br>  | On dust collectors. | Indicates that there is a danger of fire if there are personnel smoking, with open flames or grinding in the area.<br>A Glass D fire extinguisher that is suitable for flammable metals must be used. |
| **10904494**<br>  | On dust collectors. | Indicates that there is a danger if water is used to extinguish a flammable metals fires.<br>A Glass D fire extinguisher that is suitable for flammable metals must be used. |

# Section 3 Blast Wheel

## 3.1 EZFIT Blast Wheel

### 3.1.1 How the Blast Wheel Works

Media from an overhead storage hopper is metered to the center of the wheel unit that is rotating at high speed. A feed spout provides a smooth transition from the feed line to the impeller rotating with the wheel. The impeller moves the media through its multiple tapered openings and out through the single stationary opening in the control cage. Controlled quantities of media are then distributed onto the rotating blade surface at precisely the right time. The media particles picked up on the inner ends of the blade's throwing face are rapidly accelerated as they move to the end of the blades at the outer edge of the wheel. Media then leaves the wheel in the form of a pattern with a narrow width and variable length that must be properly focused on the work surface for the desired results.

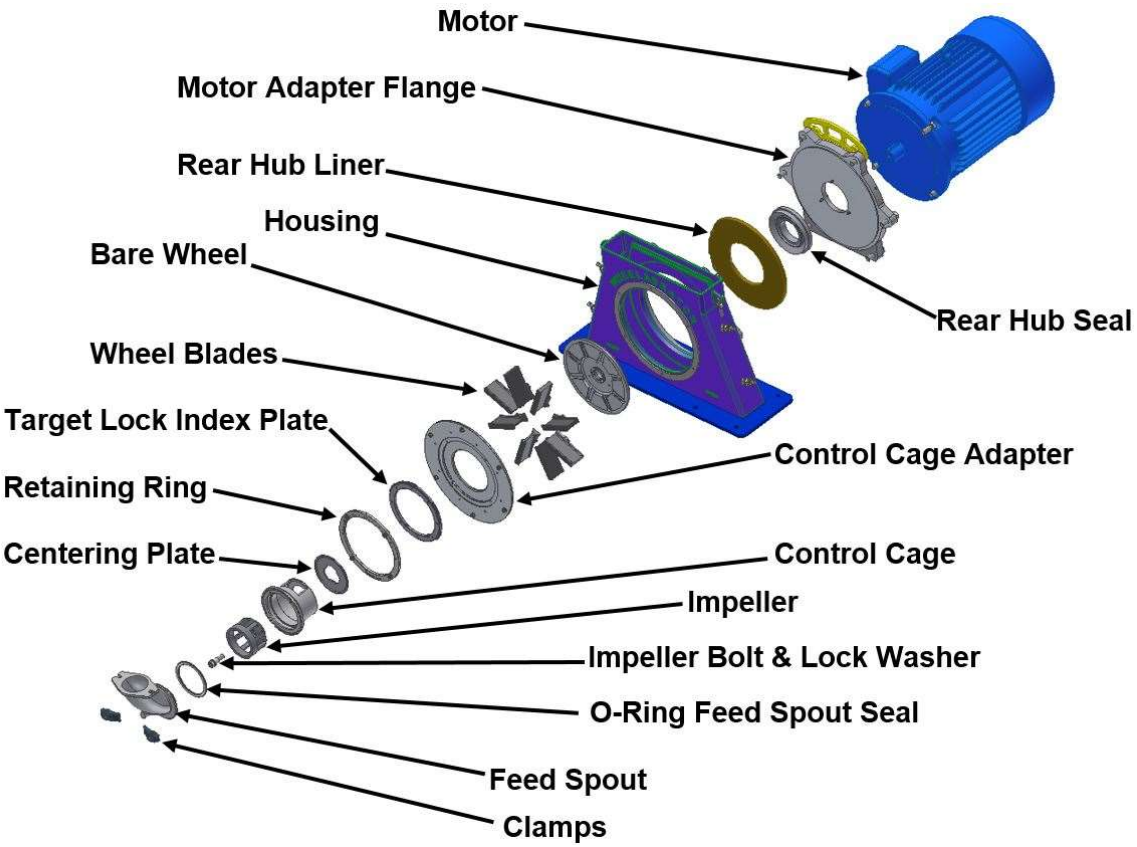



**Figure 4-1**

## A. Wheelabrator 25 EZEFIT Wheel Components

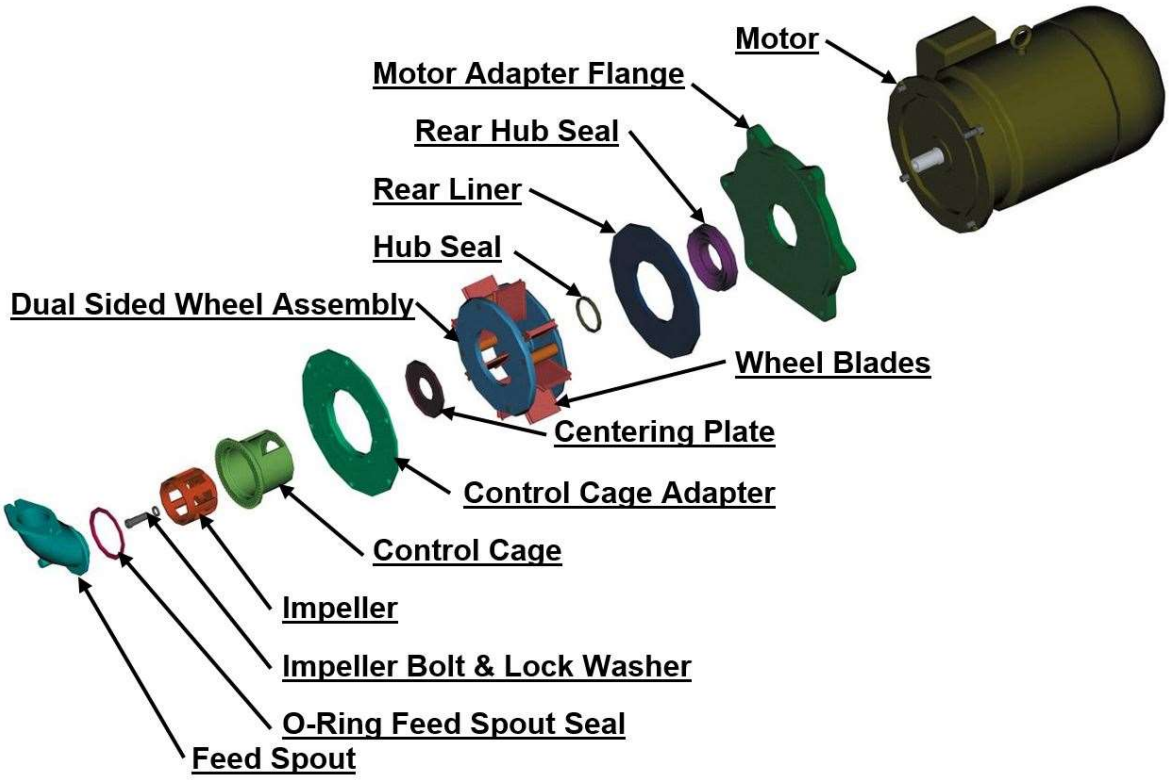



**Figure 4-1A**

## B. Wheelabrator 35 EZEFIT Wheel Components

### 3.1.2 Bi-Directional Blast Wheel Parts

**The Wheelabrator Bi-Directional Wheel consists of the following main components (see** Figure 4-1 & 4-1A).

1. **Motor** – powers the wheel.
2. **Motor Adapter Flange** – aligns and mounts the motor to the wheel housing.
3. **Rear Hub Seal** – patented labyrinth seal configuration, effectively minimizes media leakage.
4. **Rear Liner** – Seals the opening in the wheel housing and protects the motor adapter flange.
5. **Hub Seal** – seals around the hub to prevent media leakage.
6. **Bare Wheel**
    a) **Single Sided Wheel Assembly** - provides rugged blade retention in abusive applications (25EZFIT)
    b) **Dual Sided Wheel Assembly** – Provides rugged blade retention in abusive applications (35EZFIT)
7. **Wheel Blades** – accelerates the media out of the blast wheel towards the work.
8. **Centering Plate** – secures the impeller into wheel assembly for accurate media timing.
9. **Control Cage Adapter** – provides cage alignment for consistent blast pattern and a positive lock.
10. **Control Cage** – regulates the flow of media onto the blades for the proper discharge from the blades onto the work. It is available with various openings that control the blast pattern length and direction.
11. **Impeller** – times and accelerates the media through the opening in the control cage and onto the blades.
12. **Impeller Bolt & Lock Washer** – retains impeller and centering plate to the wheel.
13. **O-Ring Feed Spout Seal** – reduces noise and prevents dust and media leakage.
14. **Feed Spout** – funnels the media into the center of the impeller for distribution through the opening in the control cage onto the blades of the blast wheel.

### 3.1.3 Setting and Adjustment

The setting and adjustment of your Blast Wheel is important for the performance and life of your machine. You will not accomplish the surface preparation of your work if you are not hitting it! Not only will your blast time increase, but you are accelerating wear on the insides of your machine. A properly set control cage can prevent this.

### 3.1.4 Wheel Direction

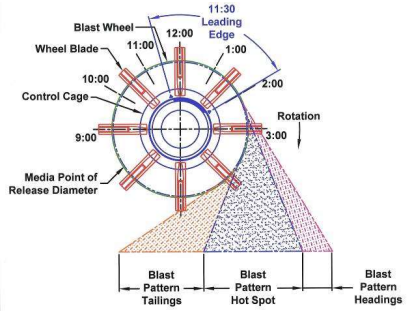
A Blast Wheel can be run in a, clockwise (CW) or counter-clockwise (CCW) direction, depending upon the design requirement of a given wheel. Care should be taken, particularly during start-up that a Blast Wheel is running in

the proper direction. The direction will be clearly identified on the Blast Wheel housing by a directional arrow. To maintain optimum performance during the life of your blast machine, it is vital that the wheel direction remain as originally designed by Wheelabrator.

**DIRECTION OF THE BLAST WHEEL SHOULD BE DETERMINED BY LOOKING AT THE WHEEL FROM THE FEED SPOUT SIDE OF THE BLAST WHEEL.**

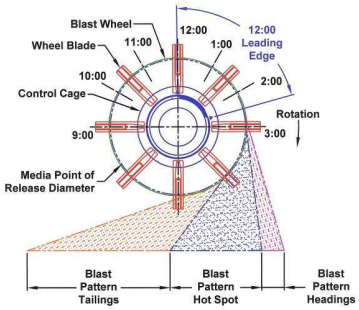
### 3.1.5 Control Cage Setting

1. The control cage setting is one of the most important adjustments that can be made on your machine. A properly adjusted blast pattern will give you an effective and economical surface preparation machine. A pattern that is improperly set will cause premature wear inside the blast cabinet and on the wheel housing liners.
2. To better understand this important setting, please study the sketches shown in Figure 4-2, Figure 4-3, Figure 4-4 and Figure 4-5. Figure 4-2 and Figure 4-3 show a clockwise blast wheel with control cage in two different locations. Notice the shift in the blast pattern from right to left as the control cage is rotated in a clockwise direction. In a similar way, Figure 4-4 and Figure 4-5 show a counter-clockwise blast wheel and the shift in the pattern from left to right as the control cage is rotated counter-clockwise. Therefore, by rotating the control cage in either direction, the blast pattern may be aimed to the exact position necessary to produce the optimum results for your surface preparation requirement.



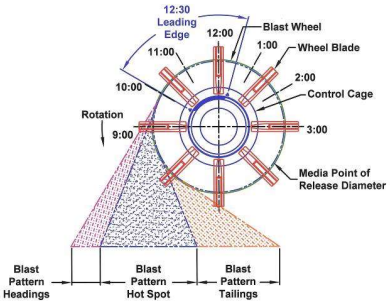

Clockwise Blast Wheel @ 3600 RPM
Leading Edge @ 11:30

**Figure 4-2**



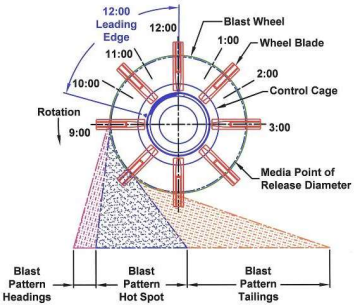

Clockwise Blast Wheel @ 3600 RPM
Leading Edge @ 12:00

**Figure 4-3**




Counter-Clockwise Blast Wheel @ 3600 RPM
Leading Edge @ 12:30

**Figure 4-4**




Counter-Clockwise Blast Wheel @ 3600 RPM
Leading Edge @ 12:00

**Figure 4-5**

### 3.1.6 The 'Hot Spot'

1. The areas in Figure 4-2, Figure 4-3, Figure 4-4 and Figure 4-5 referred to as a "Hot Spot" are characteristic of all blast wheels and are in the areas of the blast where about 70% of the blast intensity is contained. The position of the "Hot Spot" is therefore very important in terms of surface preparation efficiency.
2. By using the arrows marked on the face of the control cage, you may roughly set the control cage position. These arrows identify the location of the opening in the control cage and it is this opening that controls the point where the media is picked up by the blades. The arrows identify the leading and trailing edges or points where the media starts and stops leaving (exiting) the control cage.
3. For a clockwise blast wheel, the arrow on the left is the leading edge and for a counter-clockwise blast wheel the arrow on the right is the leading edge. The remaining arrow indicates the trailing edge for each direction.
4. When reference is made to "hour" settings while discussing the control cage settings, it is important that 12:00 is understood to be at the top and center of any blast wheel housing, exactly opposite or 180° from the wheel housing opening.
5. The best way to locate the Hot Spot is to check and set blast patterns. To eliminate unnecessary work when replacing control cages, the position of the leading edge should be clearly marked to enable the new cage to be placed in the exact same position.

### 3.1.7 Blast Pattern

1. The abrasive thrown by the wheel must contact the work in order to clean it, therefore the blasting efficiency also depends on the direction the abrasive is thrown, i.e. the direction of the abrasive that is thrown is primarily determined by the position of the control cage.
2. The actual check of the blast pattern of the wheel should be made when the machine is put into operation. The check should be repeated when any decrease in blast efficiency is noted and the control cage opening reference mark information has been lost. The blast pattern checked should also be repeated if a change is made in the size or type of abrasive media used and if the RPM (speed) of the wheel is changed.
3. To check the blast pattern, secure a piece of 12-guage sheet metal about 12" x 48" (called a target plate) in the same relative position to the wheels, as the component to be cleaned would be. This plate should be held rigid.

#### 3.1.7.1 To Check Blast Pattern

1. Turn main disconnect off and follow lock out/tag out procedures.
2. Gain access to the blast chamber area.
3. Secure target plate in front of the wheel you are checking
4. Verify target plate is positioned at 90° to blast flow and perpendicular to the wheel.

5. Turn main disconnect on following lock out/tag out procedures.
6. Press control power ‘on’ push button and start entire system except work conveyor.
7. Blast target plate for approximately 45 seconds by setting the cycle timer for 45 seconds or by holding the blast pattern test pushbutton down for 45 seconds.
8. Allow time for dust and abrasive to clear target plate area.
9. Follow shut down, lock out/tag out procedures.
10. Examine target plate for blast coverage.
11. Adjust control cage as required, if needed.
12. Relocate, reposition or replace target plate as required.
13. Repeat this procedure, starting with step #5, for each wheel on the machine.

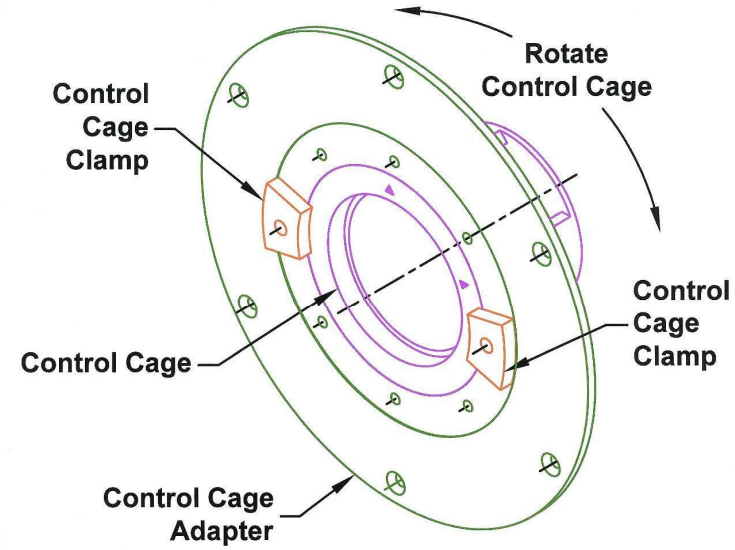
The zone of effective cleaning (Blast Pattern) will be evident on the target plate. If the blast pattern is not satisfactory, the control cage setting must be re-adjusted. Adjustments to the control cage should be no more than 3/8” to 3/4" based on the notches at a time. If the control cage setting is re-adjusted, you must repeat steps 5-10 to confirm the new adjustment.

Once the control cage is properly adjusted, the position of the blast pattern will not change substantially until the internal wheel components wear.

An increase in the percentage of fines remaining in the abrasive can also cause the blast pattern to move and lengthen.

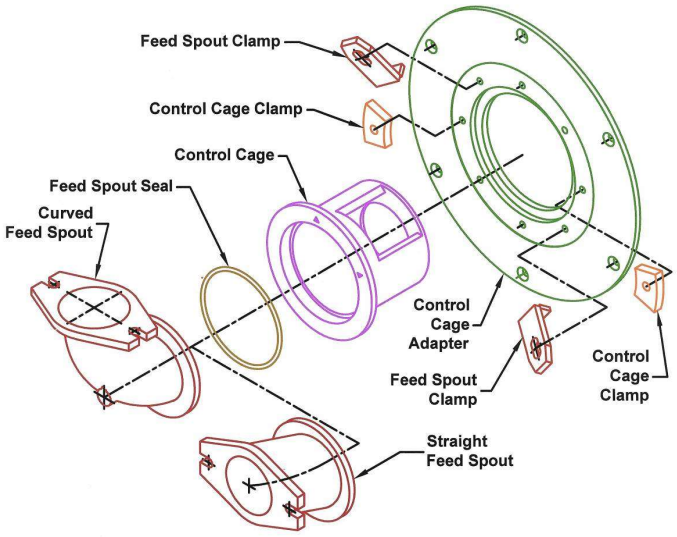
#### 3.1.7.2 How to Rotate the Control Cage

1. Remove feed spout and feed spout clamps as shown in Figure 4-7.
2. Loosen the two (2) control cage clamps as shown in Figure 4-6 & Figure 4-7.
3. With use of a hammer and a drift pin, punch or similar tool inserted into one of the outer notches, it will be possible to tap the control cage to rotate it in the desired clockwise or counter-clockwise direction.
4. Once the desired position is reached, the control cage clamps are replaced and secured. This locks the control cage in position.
5. Mark the face of the control cage adapter on the wheel housing with the location of the leading and tailing edges of the opening in the control cage. This will enable you to replace the control cage in the correct position every time.
6. Replace feed spout and secure the feed spout clamps.




**Control Cage Adjustment**

**Figure 4-6**




**Control Cage Adjustment Components**
**Exploded View**

**Figure 4-7**

**CAUTION: The cast wear parts for wheels are made of very hard, longwearing alloys. Use moderate force when tapping the control cage to avoid breaking, cracking or chipping of cage.**

**Do not use any cast wear parts that show evidence of damage such as chips, cracks, or broken sections.**

# Section 4 Media Handling System

## 4.1 Function of the Lower Reclaim

The lower reclaim function is to collect contaminants spent media thrown by the blast wheels. The media and contaminants are then delivered by the lower reclaim to the bucket elevator boot section. The lower reclaim is part of a total media recovery system to clean and recycle media back to the blast wheel.

### 4.1.1 Types of Lower Reclaims

#### 4.1.1.1 Full Gravity Reclaims:

**a.** Gravity hoppers are used for directing spent media directly to the bucket elevator boot section.

**b.** Gravity hoppers are generally used on small equipment.

**c.** There are no drives or mechanical moving parts in gravity reclaims.

#### 4.1.1.2 Lower Screw Conveyor Reclaims:

**a.** Lower screw conveyors are used when full gravity is not feasible and the product application does not have significant amounts of tramp metal entering the screw area that would otherwise result in jams. Screws may be protected by shed plates, grating, and/or screen.

**b.** The volume of media flow determines the size of screw conveyor and horsepower required to move the abrasive to the bucket elevator boot section.

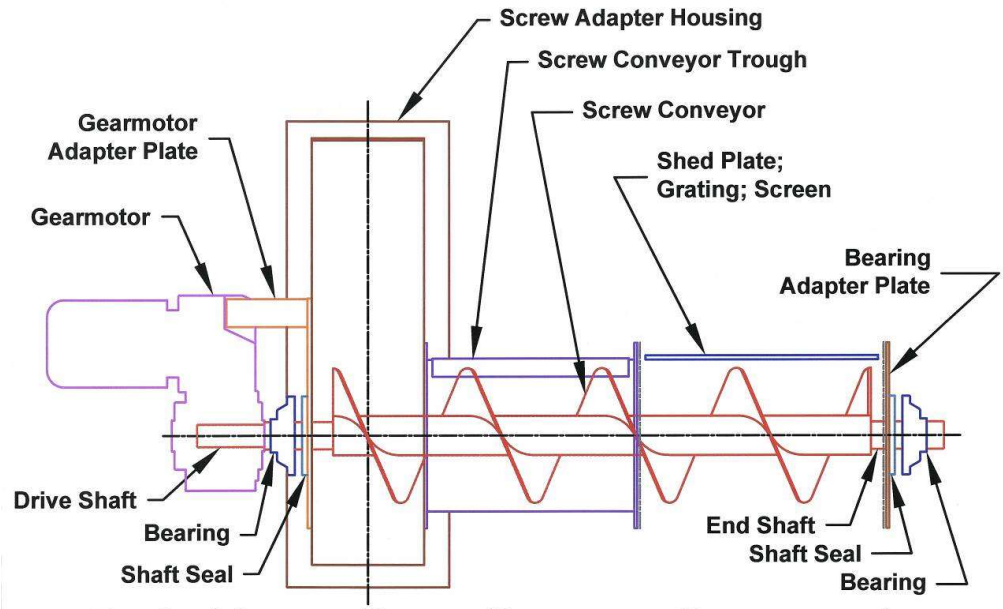



**Figure 5-1**

**c.** Typical components of a lower screw conveyor reclaim are shown in Figure 5-1.

1. **Screw Conveyor** – flighting and tube construction to deliver media to the bucket elevator boot section.

2. **Screw Conveyor Trough** – connects and encloses the screw conveyor between the blast chamber and elevator boot. This may not be required on all applications.
3. **Shed Plate, Grating, Screen** – may be provided to protect the screw from objects that could jam the screw conveyor and also to meter the abrasive to the screw conveyor.
4. **Screw Adapter Housing** – joins the screw conveyor trough to the elevator boot or cabinet. This may not be required on all applications.
5. **Drive Shaft** – fixed to the screw conveyor and mounted through the bearing to drive the conveyor.
6. **End Shaft** - fixed to the screw conveyor and mounted through the bearing to support the conveyor opposite the drive.
7. **Shaft Seals** – prevents media leaking out the ends of the conveyor and protects the bearings from the media. (see Figures 5-2 & 5-3)
8. **Bearings** – supports ends of the screw conveyor.
9. Bearing Adapter Plate – closes the end of the conveyor and supports the bearing.
10. **Gearmotor Adapter Plate** - closes the end of the conveyor and supports the bearing and Gearmotor.
11. **Gearmotor** – mounted on drive shaft to power screw conveyor.

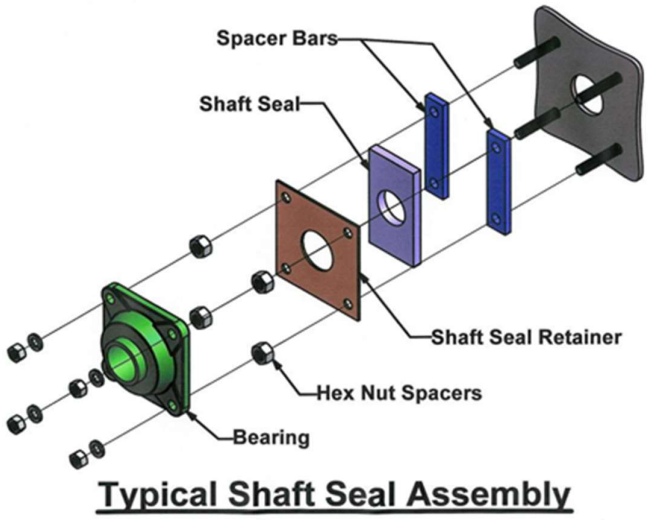
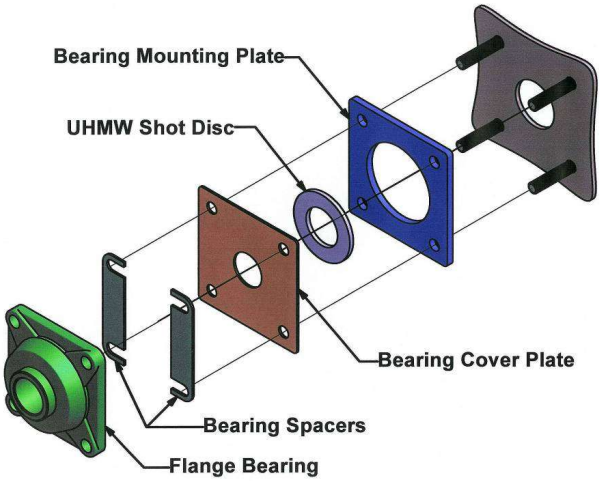



**Figure 5-2**

**d.** A typical shaft seal assembly for a lower screw conveyor is shown in Figure 5-2.

1. **Shaft Seal Spacer Bars** – maintains a space between the adapter plate and the shaft seal retainer for the shaft seal to mount. This allows maintains proper compression of the felt shaft seal.
2. **Shaft Seal** – prevents media leaking out the ends of the conveyor and protects the bearings from the media.

3. **Shaft Seal Retainer** – retains the shaft seal between the shaft seal spacer bars.
4. **Hex Nut Spacers** – maintains a space between the shaft seal retainer and the flange bearing. This allows any media that made it by the shaft seal to drain before contaminating the flange bearing.
5. **Bearing** – supports ends of the screw conveyor.




**Typical Shaft Seal Assembly**

**Figure 5-3**

**e.** Another variation of a shaft seal assembly for a lower screw conveyor is shown in Figure 5-3

1. **Bearing Mounting Plate** – is the base for mounting the other components of the bearing assembly.
2. **UHMW Shot Disc** – prevents media leaking out the ends of the conveyor and protects the bearings from the media.
3. **Bearing Cover Plate** – retains the UHMW shot disc in the bearing mounting plate.
4. **Bearing Spacers** – maintains a space between the bearing cover plate and the flange bearing. This allows any media that made it by the shot disc seal to drain before contaminating the flange bearing.
5. **Flange Bearing** – supports ends of the screw conveyor.

#### 4.1.1.3 Shaker Conveyor Reclaims:

**a.** Shaker conveyors are used when full gravity is not feasible and the product application contains significant tramp metal material entering the reclaim.

**b.** Shaker conveyors are able to separate large trash from the media to prevent it entering the remaining media handling system components and causing damage or jams.

**c.** Shaker conveyors are generally self-cleaning.

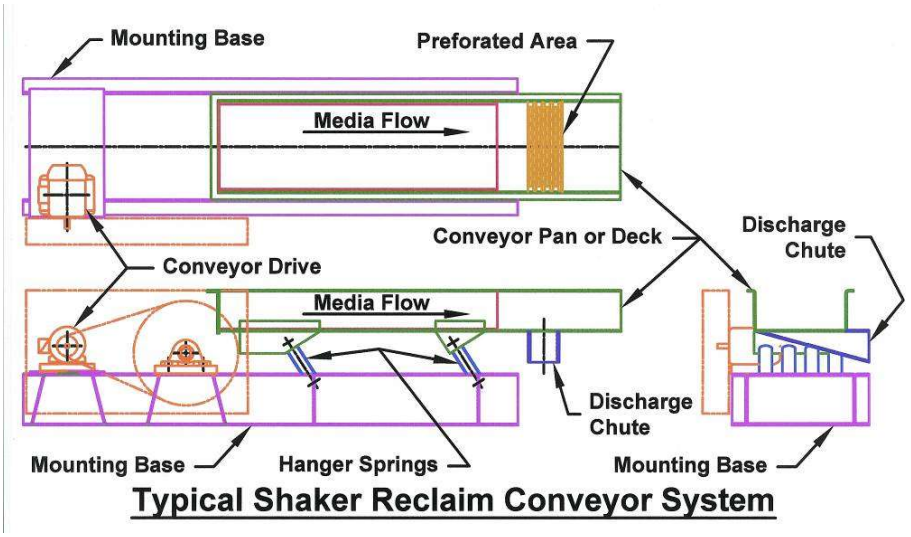


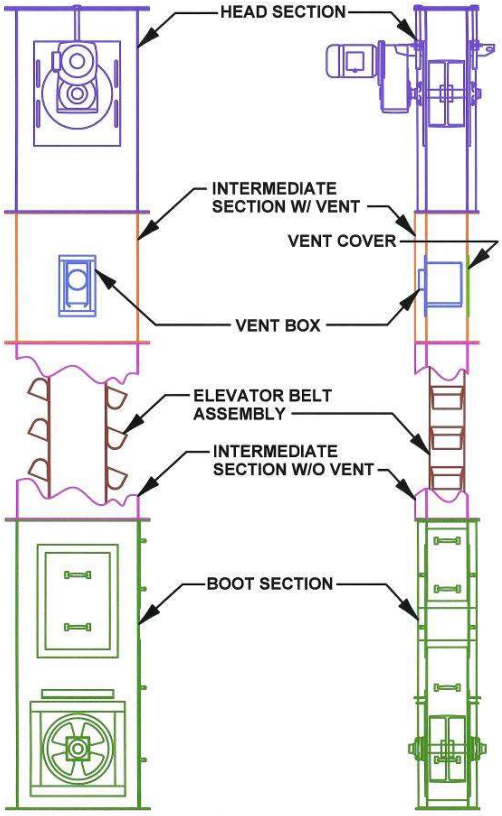

**Figure 5-4**

**d.** A typical shaker conveyor reclaim system is shown in Figure 5-4.

1. **Conveyor Pan or Deck** – controls media and trash while it is being conveyed and reclaimed.
2. **Conveyor Pan Liner** – protects pan from abrasion and impact.
3. **Perforated Area** – separates large trash from media before media is delivered to the elevator boot section.
4. **Discharge Chute** – delivers media to the elevator boot section.
5. **Mounting Base** – supports the shaker conveyor and secures it to the foundation.
6. **Hanger Springs** – are sized to control stroke, frequency, and angle of attack designed to proper conveying action for type media.
7. **Conveyor Drive** – powers the shaker conveyor.

## 4.2 Function of the Bucket Elevator

**a.** The belt and bucket centrifugal discharge elevator lifts the abrasive material from the boot (lower) section to the head (upper) section. The contaminated abrasive material is discharged from the head section of the elevator, and then delivered to the separator.




**Typical Elevator Arrangement**

**Figure 5-5**

**b.** A typical elevator arrangement is shown in Figure 5-5.

1. **Head Section** – This is the upper section of the bucket elevator casing. It usually contains the elevator drive.
2. **Intermediate Section with Vent** – This is the part of the elevator casing that contains the vent box.
3. **Vent Box** – This is the outlet to remove the dust from of the elevator casing. It can usually be mounted on either side of the intermediate section depending on the vent piping requirement.
4. **Vent Cover** – Covers the opening in the intermediate section opposite the vent box when part of design.
5. **Intermediate Section without Vent** – This is the part of the elevator casing used to increase the height of the elevator. This section is not always required.

6. **Boot Section** – This is the lower section of the bucket elevator casing. This section receives the spent media from the blast chamber and lower reclaim.
7. **Elevator Belt Assembly** - This bucket and belt assembly transports the abrasive media from the boot section to the head section and discharges it to the upper reclaim system.

### 4.2.1 Elevator Head Section

**a.** The head section is the upper section of the bucket elevator casing. It receives the abrasive media from the boot section of the elevator and discharges the abrasive media into the upper reclaim system.

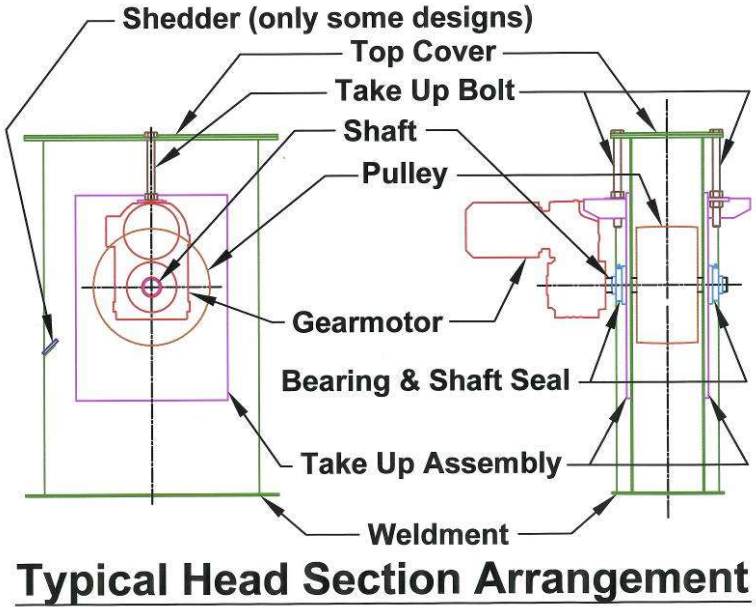



**Figure 5-6**

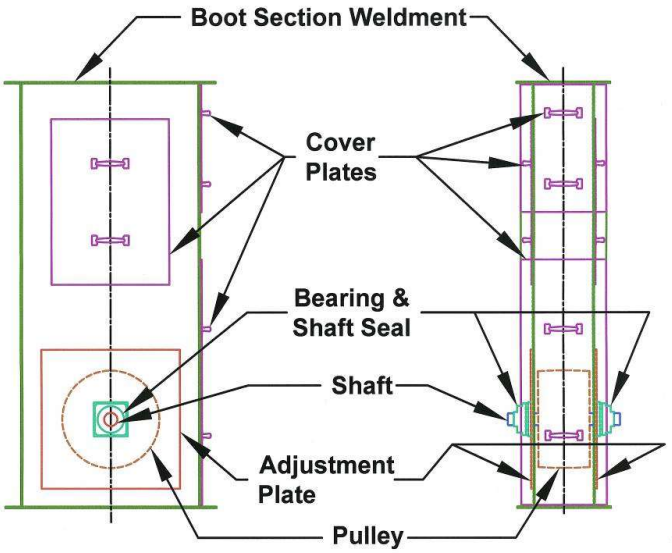
**b.** A typical elevator head section arrangement is shown in Figure 5-6.

1. **Weldment** – is a fabricated housing that the head section components mount to.
2. **Take Up Assembly** – supports the bearings, shaft seals, shaft, and pulley on the weldment. They slide up and down to adjust the tension of the elevator belt assembly. There are two take up assemblies per head section.
3. **Take Up Bolts** – are the links between the weldment and the take up assemblies. Turning the bolts clockwise will tighten the elevator belt and turning the bolts counter-clockwise will loosen the elevator belt. These bolts are also used to adjust the tracking of the elevator belt.
4. **Pulley** – provides a rotating surface to drive the elevator belt assembly. The pulley is usually crowned and lagged to assist in tracking the elevator belt assembly.
5. **Shaft** – supports the elevator head section pulley.
6. **Shaft Seal** – prevents media leaking out from the take up assembly plates and protect the bearings from the media.

7. **Bearing** – supports ends of the elevator head section shaft.
8. **Gearmotor** – is mounted to the head section shaft to power the elevator.
9. **Top Cover** – is the access cover to the elevator head section and a safety cover to guard against the rotating components inside the elevator head section weldment.
10. **Shedder** – is a wear component to assist in delivery of abrasive media and contaminants to the upper reclaim system. This is only used on some designs of elevator head sections.

### 4.2.2 Elevator Boot Section

**a.** The boot section is the lower section of the bucket elevator casing. It receives the abrasive media and contaminants from the lower reclaim of the equipment, and moves the media and contaminants to the head section with the elevator belt assembly.




**Typical Boot Section Arrangement**

**Figure 5-7**

**b.** A typical elevator boot section arrangement is shown in Figure 5-7.

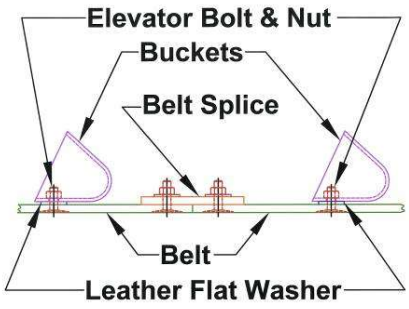
1. **Boot Section Weldment** – is a fabricated housing that the boot section components mount to.
2. **Adjustment Plate** – supports the bearings, shaft seals, shaft and pulley on the boot section weldment. There are usually two of these plates per boot section.
3. **Pulley** – provides a rotating surface for the elevator belt assembly to ride on.
4. **Shaft** – supports the elevator boot section pulley.
5. **Shaft Seal** – prevents media leaking around the shaft and protects the bearings from the media.
6. **Bearing** – supports ends of the elevator boot section shaft.

NOTE: SEE SECTION 4.1.1.2 (D & E) FOR THE TWO TYPES OF TYPICAL SHAFT SEAL ASSEMBLIES. ALSO SEE FIGURE 5-2 AND FIGURE 5-3.

7. **Cover Plates** – are the access covers to the elevator boot section and a safety cover to guard against the rotating components inside the elevator boot section weldment.

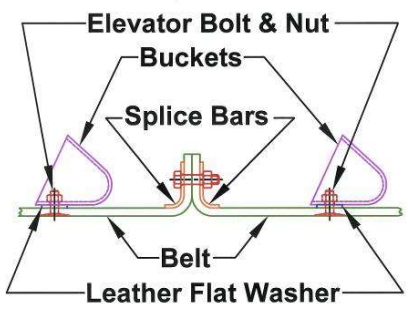
### 4.2.3 Elevator Belt Assembly

**a.** The elevator belt assembly carries the abrasive media and contaminants in buckets from the elevator boot section to the elevator head section. The belt tracks on the elevator head and boot pulleys.




Typical Elevator Belt Assembly with Dutchman Splice

Figure 5-8




Typical Elevator Belt Assembly with Oil Well Splice

Figure 5-9

**b.** Typical elevator belt assemblies are shown in Figure 5-8 with a Dutchman splice and Figure 5-9 with an Oil Well splice.

1. **Elevator Belt** – is manufactured from a multi-ply rubber belting material with an abrasive-resistant top-cover for protection against abrasion and cutting. The elevator buckets and splice are mounted to the belt.
2. **Buckets** – carry the abrasive media. They are usually made out of cast ductile iron for better wear life.
3. **Leather Flat Washer** – spaces the buckets off the belt to help prevent edge of buckets cutting into the belt.
4. **Belt Splice & Splice Bars** – joins the two ends of the elevator belt together to make one continuous belt. There are two types of splices. The Dutchman splice is usually used on low temperature belts and in smaller size elevators. The Oil Well splices are usually used on high temperature belts and in larger size elevators.

## 4.3 Functions of Upper Reclaims

The upper reclaim function is to collect media and contaminants delivered from the elevator. Media and contaminants are then conveyed by the upper reclaim to the media separator. The upper reclaim is a part of a total media recovery system to clean and recycle media back to the blast wheel.

### 4.3.1 Types of Upper Reclaims:

#### 4.3.1.1 Full Gravity Reclaims

**a.** Gravity reclaims are used for transferring media directly from the elevator head section to the separator.

**b.** There are no drives in upper gravity reclaims.

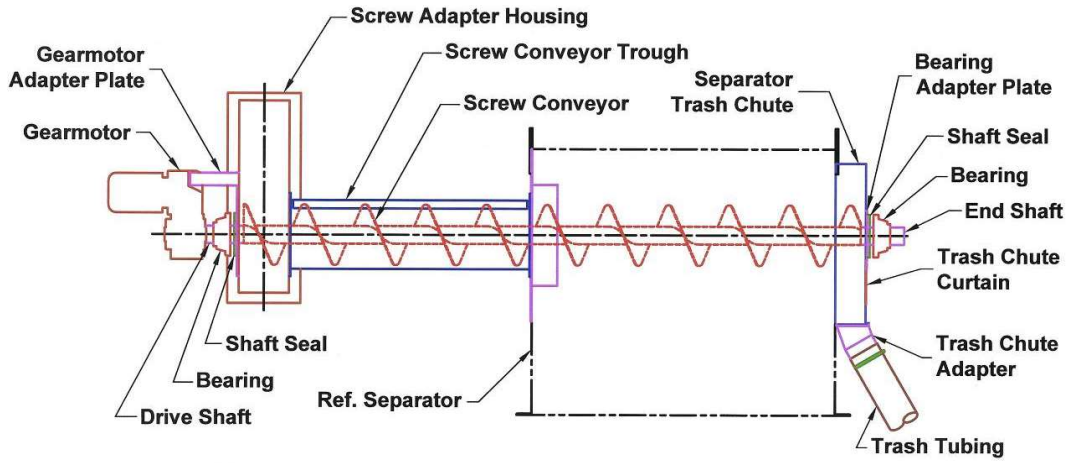
#### 4.3.1.2 Upper Screw Conveyor Reclaims

**a.** Upper screw conveyors are used to reduce system height when full gravity is not feasible.

**b.** The volume of media flow determines the size of screw conveyor and horsepower required to move the abrasive media from the bucket elevator to the separator.

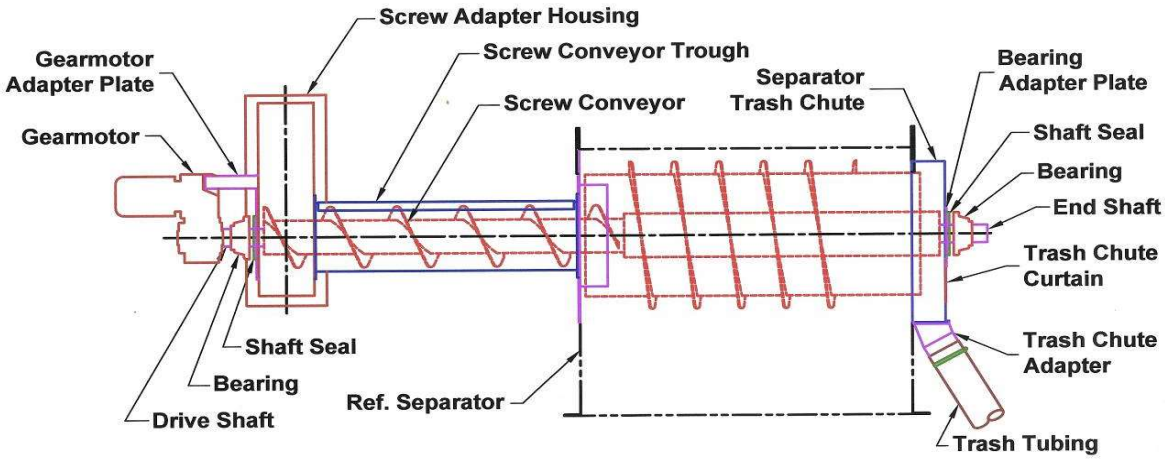
**c.** There are two styles of upper screw reclaim. One is a standard screw conveyor and the other is a screw conveyor with a rotary screen.

(See Figure 5-10 & Figure 5-11)



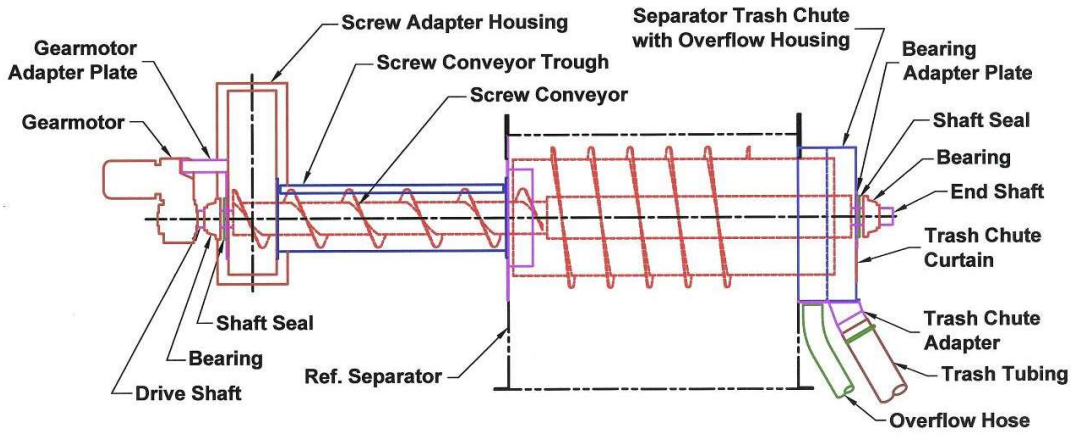

**Typical Upper Screw Conveyor Components**

**Figure 5-10**




**Typical Upper Screw Conveyor Components with Rotary Screen**

**Figure 5-11**




**Typical Upper Screw Conveyor Components with Rotary Screen and Trash Chute with Overflow Housing & Hose**

**Figure 5-12**

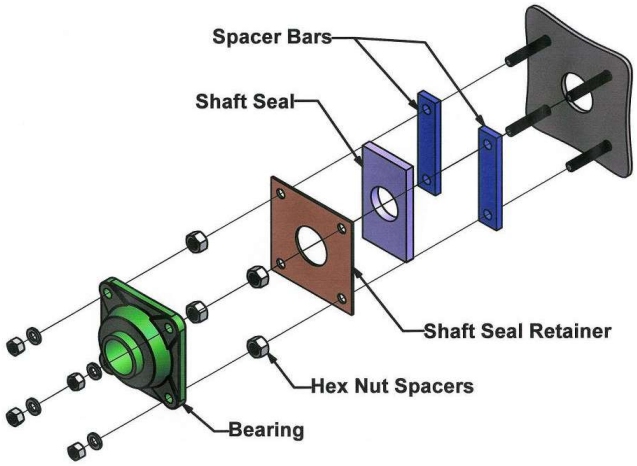
**d.** The following are typical components of an upper screw conveyor reclaim are shown in Figure 5-10 upper screw conveyor and Figure 5-11 upper screw conveyor with rotary screen Figure 5-12 upper screw conveyor with rotary screen screw and trash chute with overflow housing & hose.

1. **Screw Conveyor** – flighting and tube construction to deliver media and contaminants from the bucket elevator to the separator.
2. **Rotary Screen** – is a scalping drum that allows the abrasive and contaminants to flow through a screen, but holds large tramp material inside the screen where it is conveyed to a trash chute. The rotary screen directs any large particles away from the air wash and discharges them into the trash chute to a refuse container.
3. **Screw Conveyor Trough** – connects and encloses the screw conveyor between the bucket elevator and the separator.
4. **Screw Adapter Housing** – joins the screw conveyor trough to the elevator head section.
5. **Separator Trash Chute** – the rotary screen empties the large trapped particles into this housing.
6. **Separator Trash Chute with Overflow Housing**– when there is a surge of media the media is overflowed into the first compartment of the housing. The rotary screen empties the large trapped particles into the second compartment of the housing.
7. **Overflow Hose** – directs the overflow media back to lower reclaim to be recycled.
8. **Trash Chute Curtain** – allows access to clean out any trapped particles that are clogging the entrance to the trash tube.

**Warning: DO NOT clean out separator trash chute with power on the equipment or with the screw conveyor or screen running.**

9. **Trash Chute Adapter** – attaches the separator trash chute to the trash tubing.

10. **Trash Tubing** – conveys discharged trash particles from the rotary screen to the buyer's trash receptacle.
11. **Drive Shaft** – fixed to the screw conveyor and mounted through the bearing to drive the conveyor.
12. **End Shaft** - fixed to the screw conveyor and mounted through the bearing to support the conveyor opposite the drive.
13. **Shaft Seals** – prevents media leaking out the ends of the conveyor and protects the bearings from the media.
14. **Bearings** – supports both ends of the screw conveyor.
15. **Bearing Adapter Plate** – mounts to the separator trash chute for mounting the bearing.
16. **Gearmotor Adapter Plate** - closes the end of the conveyor and for mounting the bearing and gearmotor.
17. **Gearmotor** – mounted on drive shaft to power screw conveyor.

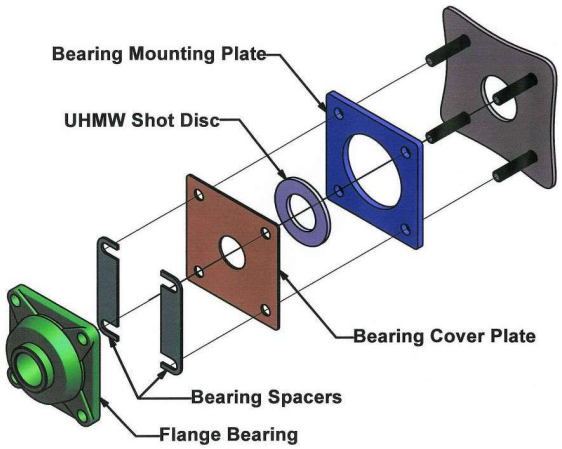



**Typical Shaft Seal Assembly**

**Figure 5-13**

**e.** A typical shaft seal assembly for an upper screw conveyor is shown in Figure 5-13.

1. **Shaft Seal Spacer Bars** – maintains a space between the adapter plate and the shaft seal retainer for the shaft seal to mount. This allows maintains proper compression of the felt shaft seal.
2. **Shaft Seal** – prevents media leaking out the ends of the conveyor and protects the bearings from the media.
3. **Shaft Seal Retainer** – retains the shaft seal between the shaft seal spacer bars.
4. **Hex Nut Spacers** – maintains a space between the shaft seal retainer and the flange bearing. This allows any media that made it by the shaft seal to drain before contaminating the flange bearing.
5. **Bearing** – supports both ends of the screw conveyor.




**Typical Shaft Seal Assembly**

**Figure 5-14**

**f.** Another variation of a shaft seal assembly for an upper screw conveyor is shown in Figure 5-14.

1. **Bearing Mounting Plate** – is the base for mounting the other components of the bearing assembly.
2. **UHMW Shot Disc** – prevents media leaking out the ends of the conveyor and protects the bearings from the media.
3. **Bearing Cover Plate** – retains the UHMW shot disc in the bearing mounting plate.
4. **Bearing Spacers** – maintains a space between the bearing cover plate and the flange bearing. This allows any media that made it by the shot disc seal to drain before contaminating the flange bearing.
5. **Flange Bearing** – supports ends of the screw conveyor.

## 4.4 Functions of a Separator

The separator receives contaminated abrasive media from the upper reclaim. In the separating process, the abrasive media is spread out for uniform distribution through the separator to remove the contaminants from the abrasive media. The abrasive contaminants are delivered to the refuse side of the separator. These contaminants are conveyed to the customer's refuse container by means of flexible tubing with a dribble valve.

### 4.4.1 Types of Separators:

#### 4.4.1.1 Gravity CFS Separator

**a.** The gravity CFS (Compensating Flow Straight) separator receives the abrasive media and contaminants from the head section of the elevator.

**b.** The large contaminants are screened out through a stationary screen.

**c.** The usable abrasive media is separated from the fine abrasive media, sand, and scale.

- This is achieved by pulling air through a curtain of abrasive media.
- This curtain is maintained across the full width of the separator by a sliding baffle and counterweighted swinging baffle system.

**d.** The cleaned usable abrasive media is directed to the storage hopper.

**e.** The fines, sand, and scale are directed to the buyer's receptacle at floor level.

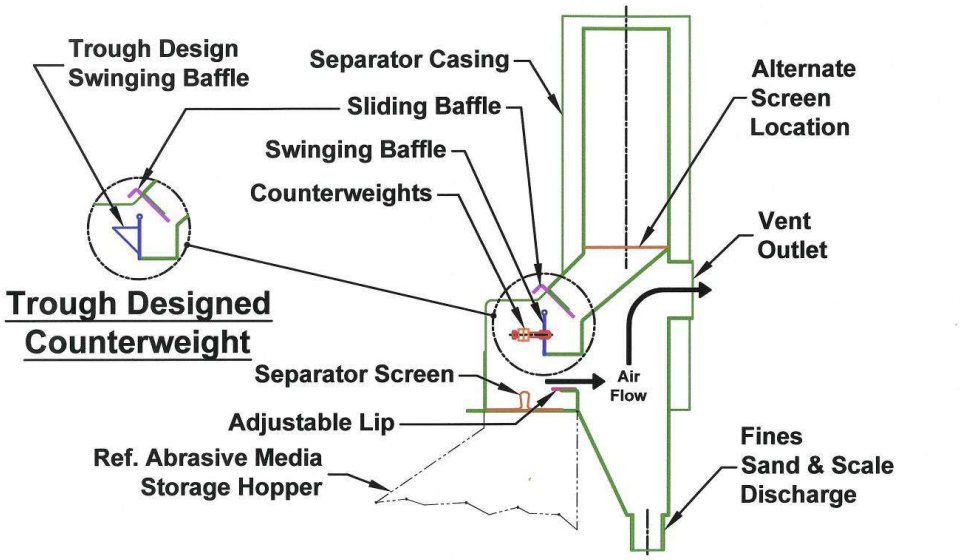



**Figure 5-15**

**f.** The following are typical components of a gravity CFS separator as shown in Figure 5-15.

1. **Separator Casing** – is used to mount the separator components and retain the abrasive media and contaminants to be cleaned.
2. **Sliding Baffle** – is adjustable and regulates the volume of abrasive media and contaminants flowing to the swinging baffle.
3. **Swinging Baffle** – is the mechanism which controls the flow of contaminated abrasive media in a thin curtain across the entire width of the separator at the point of separation.

   Make sure the swinging baffle will not stick on the ends near the vertical housing wall. Grind the edges for clearance if required. The vertical back of the swinging baffle should be perpendicular with the edge of the adjustable lip. Use the slotted holes for the bearing mounts to adjust the position of the baffle as required. The bottom edge of the baffle should clear the adjustable lip by approximately 1/8". This gap may change, based on the size abrasive used, to prevent sticking of the baffle on the horizontal lip. Correct clearance allows the baffle to push against the buildup of abrasive on top of the lip and prevent any partial curtain leakage of abrasive.
4. **Counterweights** – are used to adjust the swinging baffle to obtain a full width curtain. By moving the adjustable counterweights up and back on the rod or adding or removing abrasive from the trough designed counterweights the thickness and width of the abrasive curtain of abrasive can be adjusted.

5. **Adjustable Lip** – is adjusted back about ½" behind the vertical fall line from the upper lip that swinging baffle closes on. The lower lip may need additional adjustment depending on the size, weight, and volume of contaminants.
6. **Separator Screen** – stops large contaminants before they can get to the wheel unit. The screen should be cleaned daily to assure unrestricted abrasive flow to the wheels. Care should be taken when cleaning the screen to assure the contaminants do not fall into the abrasive storage hopper.

#### 4.4.1.2 CFS Separator w/Upper Screw Conveyor Reclaim

**a.** The CFS (Compensating Flow Straight) separator receives contaminated abrasive media from the upper screw conveyor reclaim.

**b.** The large contaminants are screened out through a rotary screen.

**c.** The usable abrasive media is separated from the fine abrasive media, sand, and scale.

- This is achieved by pulling air through a curtain of abrasive media.
- This curtain is maintained across the full width of the separator by a sliding baffle and counterweighted swinging baffle system.

**d.** The screened usable abrasive media is directed to the storage hopper.

**e.** The fines, sand, and scale are directed to the buyer's receptacle at floor level.

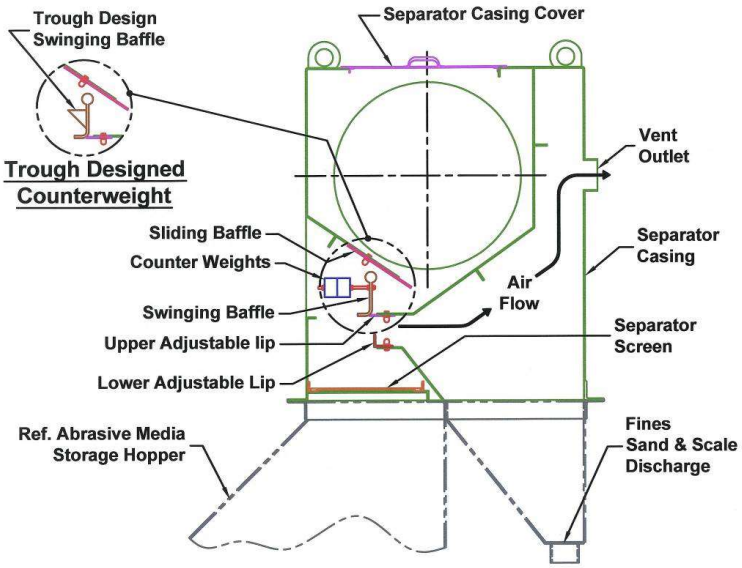



**Figure 5-16**

**f.** The following are typical components found in a CFS separator with upper screw conveyor reclaim as shown in Figure 5-16.

1. **Separator Casing** – is used to mount the separator components and retain the abrasive media and contaminants to be cleaned.
2. **Separator Casing Cover** – is for access to the upper screw conveyor and rotary screen.

**Warning: DO NOT remove separator casing cover with power on the equipment or with the screw conveyor or screen running.**

3. **Sliding Baffle** – is adjustable and regulates the volume of abrasive media and contaminants flowing to the swinging baffle.
4. **Swinging Baffle** – is the mechanism which controls the flow of contaminated abrasive media in a thin curtain across the entire width of the separator at the point of separation.

   Make sure the swinging baffle will not stick on the ends near the vertical housing wall. Grind the edges for clearance if required. The vertical back of the swinging baffle should be perpendicular with the edge of the adjustable lip. Use the slotted holes for the bearing mounts to adjust the position of the baffle as required. The bottom edge of the baffle should clear the adjustable lip by approximately 1/8". This gap may change, based on the size abrasive used, to prevent sticking of the baffle on the horizontal lip. Correct clearance allows the baffle to push against the buildup of abrasive on top of the lip and prevent any partial curtain leakage of abrasive.
5. **Counterweights** – are used to adjust the swinging baffle to obtain a full width curtain. By moving the adjustable counterweights up and back on the rod or adding or removing abrasive from the trough designed counterweights the thickness and width of the abrasive curtain of abrasive can be adjusted.
6. **Upper Adjustable Lip** – is adjusted to keep the back face of the swinging baffle vertical and parallel with the air opening behind the abrasive media curtain.
7. **Lower Adjustable Lip** – is adjusted back about ½" behind the vertical fall line from the upper lip that swinging baffle closes on. The lower lip may need additional adjustment depending on the size, weight, and volume of contaminants.
8. **Separator Screen** – stops large contaminants before they can get to the wheel unit. The screen should be cleaned daily to assure unrestricted abrasive flow to the wheels. Care should be taken when cleaning the screen to assure the contaminants do not fall into the abrasive storage hopper.

#### 4.4.1.3 LP Magnetic Separators

The LP (Low Profile) series of magnetic separators provide a significant improvement in operating efficiency and cost reduction for blast cleaning equipment in a typical foundry.

Using a two (2) stage approach, the LP units remove coarse and fine nonmetallic contaminants from the steel abrasive operating mix and metallic fines from the nonmetallic waste stream.

The primary benefits are:

1. Increased life of wheel components over systems with air wash only separators.
2. Reduced maintenance on the blast equipment and dust collector.

3. Reduced loss of usable abrasive and sand.
4. Reduced ventilation air requirement for separators.
5. Reduced metallic content in reclaimed sand.

**THE ACHIEVEMENT OF THESE BENEFITS AND THE SAFE AND EFFICIENT OPERATION OF THE LP SYSTEM UNITS ARE DEPENDENT ON COMPLETE UNDERSTANDING AND PROPER USE OF THE INFORMATION IN THIS MANUAL.**

#### 4.4.1.3.1 Primary LP Magnetic Separators

**a.** A mixture of ferrous abrasive media and sand enters the primary LP magnetic separator unit from an upper screw conveyor and rotary screen.

**b.** The rotary screen removes oversize contaminants from the mixture and directs this material to a suitable customer provided floor level container through a flexible steel tube.

**NOTE: OVERFLOW MATERIAL CAN BYPASS THE SYSTEM THROUGH A SEPARATE OVERFLOW PIPE AND BE RECYCLED.**

**c.** The ferrous abrasive media and sand mixture that passes through the rotary screen is spread across the width of the separator by the external screw flighting of the rotary screen.

**d.** This mixture is then metered by a sliding baffle to generate a maximum 3/8 “thick controlled flow of material onto the rotating stainless steel drum.

**e.** The flowing curtain of material passes between the adjustable burden plate and the rotating drum with its internal hemispherical (215 degree) section alternating pole adjustable magnet system. See Figure 5-18 (A-A).

**f.** Alternating pole magnets agitate the mixture of ferrous abrasive media and sand to achieve the maximum release of sand particles and the maximum retention of ferrous particles on the drum surface.

**g.** The retained magnetic (ferrous) particles are released from the face of the drum at the end of the magnetic field.

**h.** The released sand with some magnetic particles passes to the Secondary LP separator.

**i.** Released metallic particles are directed to the air wash separator section for classification and operating mix control.

**j.** This uniform curtain of material from the magnetic drum falls onto the sloped surface behind the air wash separator swinging baffle.

**k.** When the abrasive particles build up to the proper height behind the swinging baffle (and adjustable baffle if so equipped) to overcome the resistance of the counter -weights, the swinging baffle will open and permit a uniform thickness curtain of abrasive to flow over the entire edge of the adjustable lip. See Figure 5-19 (B-B).

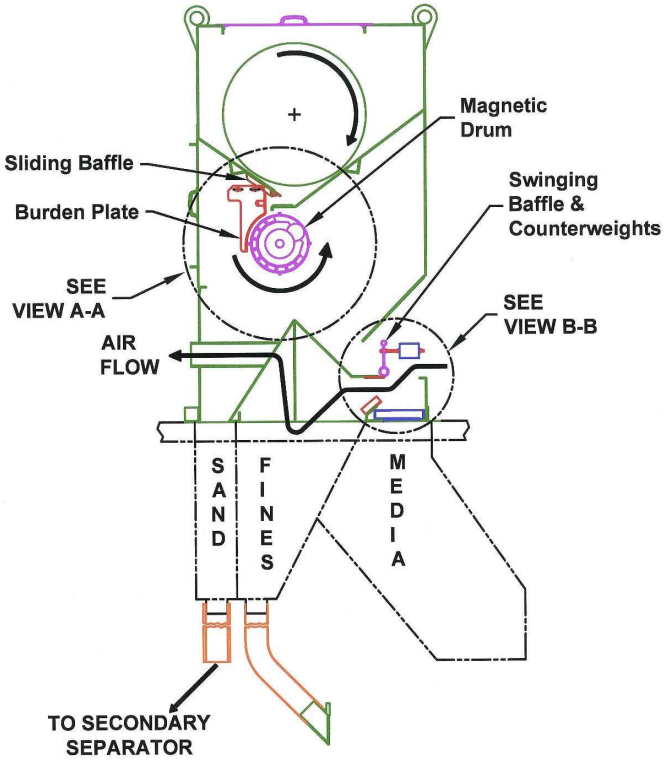
**NOTE: A PROPERLY ADJUSTED AIR WASH SEPARATOR PERMITS ONLY A FULL WIDTH CURTAIN TO BE PRESENTED TO THE AIR FLOW THROUGH THE SEPARATOR.**

**l.** This air flow passes between the adjustable lip and the lower adjustable lip.

**m.** Usable abrasive is directed to a stationary tray screen to capture any oversize material that may have by-passed the rotary screen.

**n.** Usable abrasive passes through the tray screen into the storage hopper for the blast wheels.

**o.** The fine metallic waste material and the small amount of sand removed at the air wash separator pass by the lower adjustable lip and drain into a suitable customer provided waste container at floor level.




**Typical Primary LP Magnetic Separator**

**Figure 5-17**

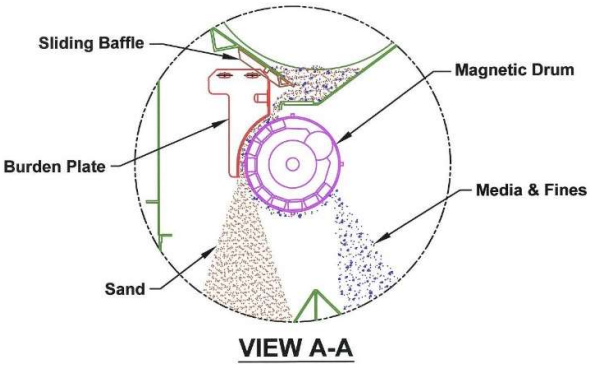



**Figure 5-18 (A-A)**

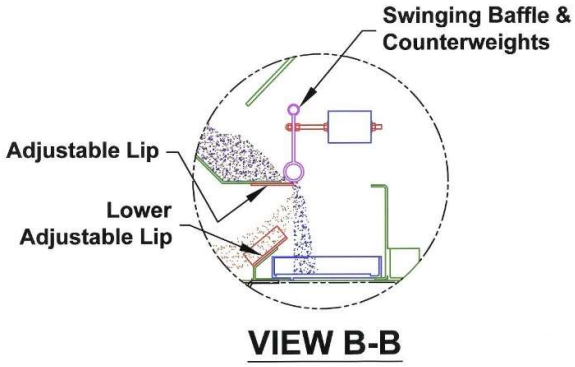



**Figure 5-19 (B-B)**

Key components will require adjustment to achieve the expected operating efficiency in a safe and reliable manner. Reference Figure 5-17,

Figure 5-18 (A-A) and

**p.** Figure 5-19 (B-B).

**Sliding Baffle** - The sliding baffle must be positioned to control the thickness of the abrasive and sand mixture from the rotary screen so it flows onto the outer surface of the rotating stainless steel drum without flooding or overloading the magnetic field. See Figure 5-17 &

**1.** Figure 5-18 (A-A).

**Burden Plate** - keeps the falling mixture of abrasive and sand close to the rotating drum surface and in the magnetic field of the alternating pole magnet system. See Figure 5-17 &

**2.** Figure 5-18 (A-A).

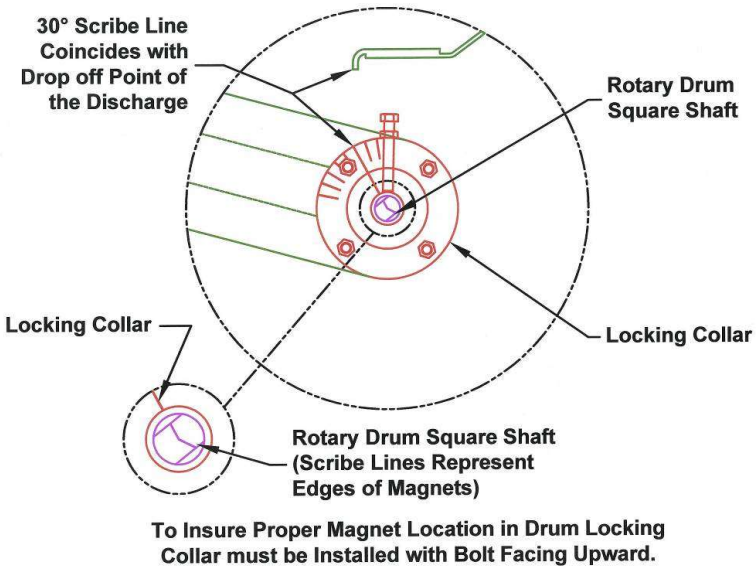



**Figure 5-20**

**Alternating Pole Magnetic Drum** - The magnetic drum system requires proper positioning of the fixed alternating pole magnet inside the rotating stainless steel drum (Refer to Figure 5-17). Using an adjustable wrench on the square end shaft, align the upper end of the scribe mark on the end of the shaft with the longer scribe mark on the face of the locking collar. Record the short scribe mark reference point from the locking collar. This will position the upper magnet edge with the drop off point of the discharge. The initial setting may need further adjustment to use the magnetic field to minimize the impact of the falling abrasive and sand on the drum surface and maintain a good discharge arc for the metallic particles under the drum. See Figure 5-17,

**3.** Figure 5-18 (A-A) and Figure 5-20.

**Swinging Baffle & Counterweights** -The swinging baffle should swing freely but remain closed until sufficient abrasive material builds up behind the baffle to insure the flow of a full width curtain. The air wash will then flow uniformly through the falling material to remove unusable metallic fines and residual nonmetallic contaminants. The counterweights must be positioned to hold the baffle closed

without causing an overflow or partial curtain condition. Make sure the swinging baffle will not stick on the ends near the vertical housing wall. Grind the edges for clearance if required. The vertical back of the swinging baffle should be perpendicular with the edge of the adjustable lip. Use the slotted holes for the bearing mounts to adjust the position of the baffle as required. The bottom edge of the baffle should clear the adjustable lip by approximately 1/8". This gap may change, based on the size abrasive used, to prevent sticking of the baffle on the horizontal lip. Correct clearance allows the baffle to push against the build up of abrasive on top of the lip and prevent any partial curtain leakage of abrasive. See Figure 5-17 &

**4.** Figure 5-19 (B-B).

**Adjustable Lip** - can be adjusted along with the swinging baffle adjustment to achieve the position and relationships described in paragraph 4 above. See Figure 5-17 &

**5.** Figure 5-19 (B-B).

**Lower Adjustable Lip** - Establish a minimum gap of ½' between the top front edge of this lip and the back edge of the falling abrasive mix. Additional adjustments of this lip may be required in conjunction with adjustments in air flow through the separator and size, weight & volume of contaminants. An air gap is necessary to allow some horizontal movement of usable abrasive particles as the horizontal air stream carries the lighter weight contaminants and unusable metallic fines out of the abrasive mix. See Figure 5-17 &

**6.** Figure 5-19 (B-B).

#### 4.4.1.3.2 Secondary LP Magnetic Separators

**a.** A mixture of sand with small amounts of metallic particles enters the secondary LP magnetic separator unit from the primary separator discharge pipe/hose.

**b.** This hose directs the mixture to the top of the separator casing where internal deflector baffles uniformly spread the incoming material out across the width of the separator housing.

**c.** The sand and metallic material is allowed to build up in the upper casing to an optimum level for effective operation of the fixed pole magnet system.

**d.** When the abrasive particles build up to the proper height behind the swinging baffle to overcome the resistance of the counter -weights, the swinging baffle will open and permit a uniform thickness curtain of abrasive to flow over the entire edge of the upper casing.

**NOTE: A PROPERLY ADJUSTED SWINGING BAFFLE PERMITS ONLY A FULL WIDTH CURTAIN TO BE PRESENTED TO THE MAGNETIC DRUM THROUGH THE SEPARATOR.**

**e.** The flowing curtain of material passes between the adjustable burden plate and the rotating drum with its internal hemispherical (~225 degree) section fixed pole adjustable magnet system.

**f.** Sand flows directly off the drum into a hopper and then into a discharge container or transporter provided by the purchaser.

**g.** Metallic particles retained by the magnetic field are released at the rear of the separator unit and pass into a waste metallic container provided by the purchaser.

**h.** An adjustable angle under the magnetic drum is positioned for effective splitting of the sand and metallic discharge material.

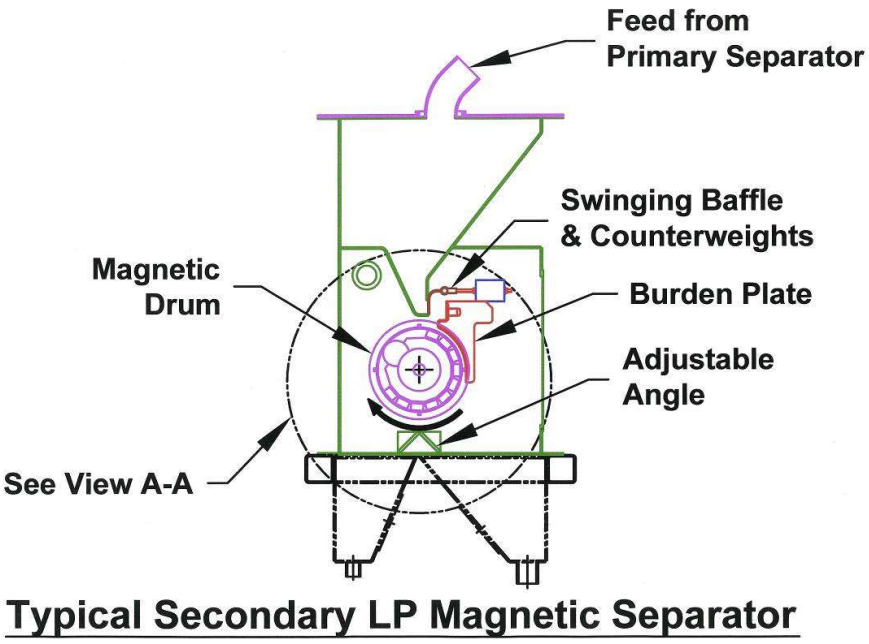



**Figure 5-21**

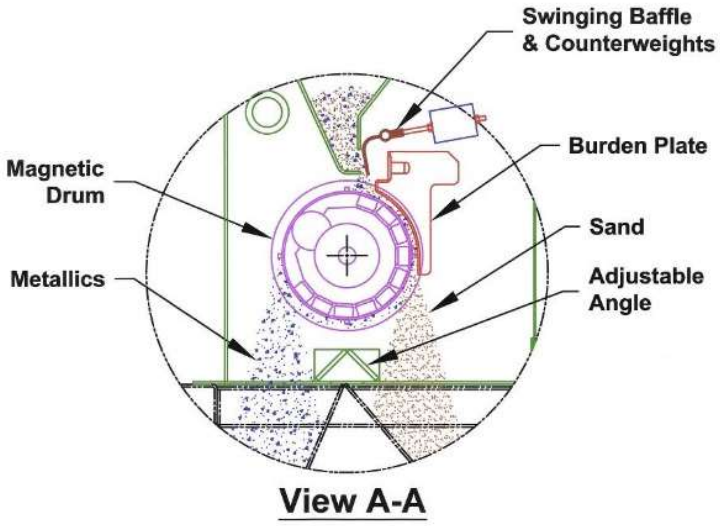



**Figure 5-22 (A-A)**

**i.** Key components will require adjustments to achieve the expected operating efficiency in a safe and reliable manner. Reference Figures Figure 5-21 & Figure 5-22 (A-A).

1. **Swinging Baffle & Counterweights** -The swinging baffle should swing freely but remain closed until sufficient abrasive material

builds up behind the baffle to insure the flow of a full width curtain. The counterweights must be positioned to hold the baffle closed without causing an overflow or partial curtain condition. Make sure the swinging baffle will not stick on the ends near the vertical housing wall. Grind the edges for clearance if required. The vertical back of the swinging baffle should be perpendicular with the edge of the upper casing lip. Use the slotted holes for the bearing mounts to adjust the position of the baffle as required. The bottom edge of the baffle should clear the upper casing lip by approximately 1/8". This gap may change, based on the size abrasive used, to prevent sticking of the baffle on the horizontal lip. Correct clearance allows the baffle to push against the buildup of abrasive on top of the lip and prevent any partial curtain leakage of abrasive. See Figure 5-21 & Figure 5-22 (A-A).

2. **Burden Plate** - keeps the falling mixture of metallic particles and sand close to the rotating drum surface and in the magnetic field of the fixed pole magnet system. See Figure 5-21 & Figure 5-22 (A-A).

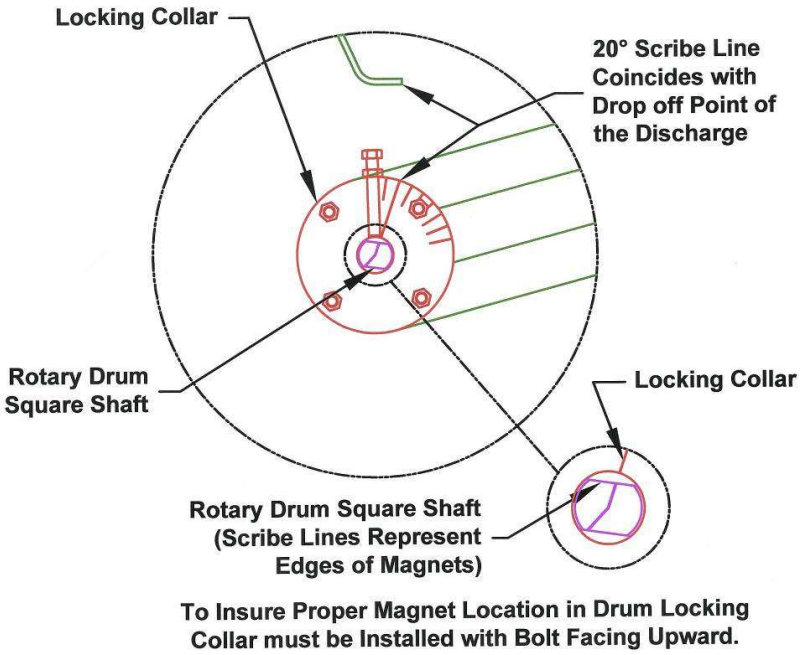



**Figure 5-23**

3. **Fixed Pole Magnetic Drum** - The magnetic drum system requires proper positioning of the fixed pole magnet inside the rotating stainless steel drum (Refer to Figure 5-23). Using an adjustable wrench on the square end shaft, align the upper end of the scribe mark on the end of the shaft with the longer scribe mark on the face of the locking collar. This will position the upper magnet edge directly below the discharge lip drop point below the swinging baffle and the lower edge past the lower hopper adjustable angle. This initial setting may need further adjustment to maintain a good

discharge arc for the metallic particles under the drum. See Figure 5-21, Figure 5-22 (A-A), & Figure 5-23.

This top setting will provide immediate attraction to the small quantities of magnetic material mixed in with the sand. The bottom setting insures effective discharge of metallic particles into the waste hopper area.

4. **Adjustable Angle** - The adjustable angle must be located to allow all metallic particles to discharge from the magnetic drum without contaminating the reclaimed sand material. Moving of the angle will be dependent on the results of a screening and magnetic content analysis of the discharged reclaimed sand. See Figure 5-21 & Figure 5-22 (A-A).

## 4.5 Function of a Dribble Valve

The dribble valve prevents air flow up the separator discharge tube and allows sand, scale and fines to flow to customer's trash receptacle. See Figure 5-24.

### 4.5.1 Mounting and locating dribble valve

1. Dribble valve should be positioned with rubber flap vertical.
2. Dribble valve should be positioned over customer's trash receptacle above the trash angle of repose to prevent material backing up into the tubing.
3. Secure trash discharge tubing to dribble valve with screws.

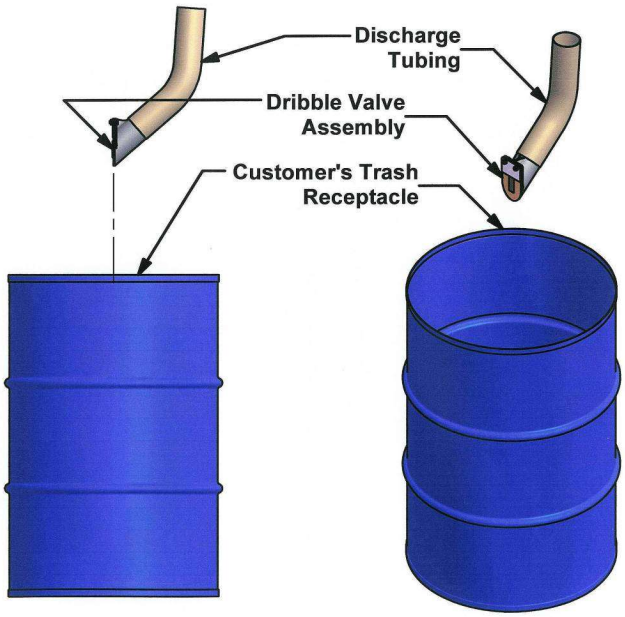



**Figure 5-24**

## 4.6 Function of an Abrasive Media Storage Hopper

**a.** Abrasive storage hopper collects and stores the abrasive media during cleaning cycles and when equipment is not operating.

**b.** The holding capacity of the storage hopper is designed so that when all the blast wheel units are running and the abrasive media has reached a state of equilibrium there remains sufficient reserve capacity to prevent starving the wheel and to protect the hopper from wear.

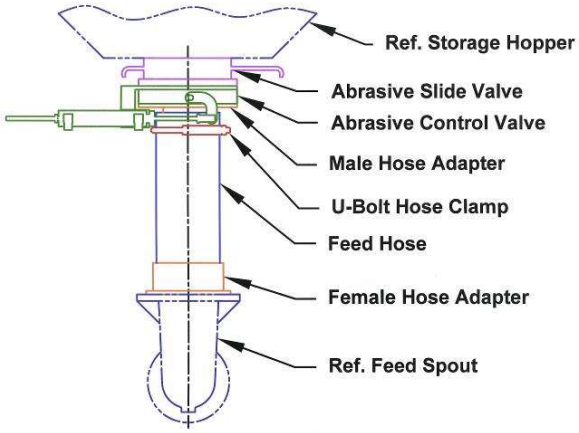
**c.** Storage hoppers are equipped with a hand-hole cover to facilitate mounting of the feed line parts and for clean out. This opening is usually mounted on a vertical wall on the hopper.

**Do not remove hand-hole covers in hopper without safely discharging of abrasive storage hopper contents.**

## 4.7 Function of an Abrasive Controls Assembly

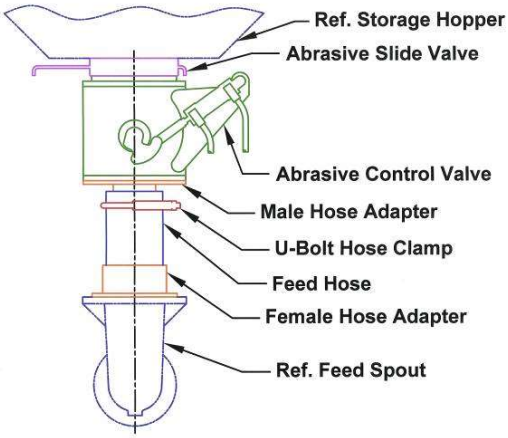
**a.** The abrasive controls assembly regulates the feed of abrasive media between the storage hopper and the blast wheel.

**b.** Adjustable abrasive control valves are provided to regulate the flow of abrasive to the wheels. An air cylinder or magnetic control unit opens and closes each valve. Cylinders are adjustable to obtain the specified flow with different types and sizes of abrasive. Magnetic controls provide variable flow adjustment. This meters the abrasive from the storage hopper to the wheels.



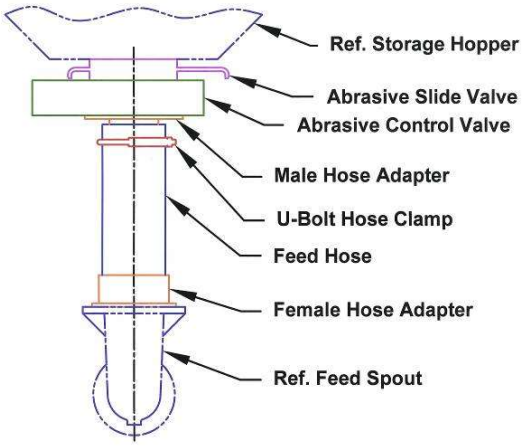

**Abrasive Controls Assembly with Butterfly Type Abrasive Control Valve**

**Figure 5-25**




**Abrasive Controls Assembly with Dipper Type Abrasive Control Valve**

**Figure 5-26**




**Abrasive Controls Assembly with MagnaValve Type Abrasive Control Valve**

**Figure 5-27**

**c.** The following are common components of a typical abrasive controls assembly as shown in Figure 5-25, Figure 5-26, and Figure 5-27.

1. **Abrasive Slide Valve** - This is a manually operated slide valve to open or close the media flow from the storage hopper to the blast

wheel. This valve makes it possible to close off the flow of media to perform repairs and maintenance on the abrasive controls system with have to drain the storage hopper.

**Do not use slide valve to meter abrasive media flow.**

2. **Abrasive Control Valve** - This meters the abrasive from the storage hopper to the wheels. There are three (3) types of abrasive control valves. See Figure 5-25, Figure 5-26, & Figure 5-27.
   - **Butterfly Type** - An air cylinder opens and closes a wafer type paddle valve. The cylinder is adjustable to obtain the specified flow with different types and sizes of abrasive.
   - **Dipper Type** - An air cylinder opens and closes a totally enclosed dipper cup type valve. An adjustable stop, with coarse and fine adjustments, on the valve controls where the cylinder stops to obtain the specified flow with different types and sizes of abrasive.
   - **MagnaValve Type** – This valve is a normally closed magnetic valve suitable for regulation of steel shot and grit. The valve construction includes a permanent magnet for normally closed operation and an electromagnet for controlling shot flow rates. By regulating the voltage to the electromagnetic any desired flow rate may be achieved. When power is off, the valve will hold shot due to the permanent magnet.
3. **Male Hose Adapter** – This is used to attach rubber hose type feed lines to the abrasive control valve.
4. **U-Bolt Hose Clamp** – this secures the rubber hose type feed line to the hose adapter.
5. **Feed Hose** – This conveys the abrasive media from the abrasive control valve to the blast wheel. There are two (2) types of feed lines.
   - **Abrasive Resistant Rubber Hose** – This consists of abrasive resistant rubber hose and is the most common feed line type. It is flexible and easy to install.
   - **Hard Piping** – This consists of a network of hard pipe and weld elbows to feed the wheels.
6. **Female Hose Adapter** - This is used to attach rubber hose type feed lines to the feed spout of the blast wheel.

## 4.8 Abrasive Size and Type

Proper abrasive size and type will vary depending upon the application and this will be determined by testing or by knowledge of previous experience in similar applications. Steel shot is the most commonly used abrasive although steel grit is also used in some applications. Below are some typical sizes and types used in some common cleaning applications.

Figure 5-28 shows the S.A.E. specifications for the steel abrasives with the various screen sizes and the appropriate size designation. You will also note that steel abrasives are available in various hardness's and although the standard hardness is 40 to 48 RC, softer or harder abrasives are desirable for some applications.

### 4.8.1 Suggested Abrasive Mix

| Cleaning Application | Abrasive Type | Abrasive Size |
|---|---|---|
| **Grey Iron Casting** | Steel Shot | S390 and S460 |
| **Steel Castings** | Steel Shot | S550 and S660 |
| **Structural Steel** | Steel Shot | S330 and S280 |
| **Aluminum Die Castings** | Steel Shot | S110 and S170 |
| **Stainless Steel Billets** | Steel Grit | G16 and G18 |
| **Non Ferrous Castings** | Steel Grit | G25 and G40 |
| **Paint Removal** | Steel Grit | G25 and G40 |

### 4.8.2 Importance of the Operating Mix

Although abrasive of a specific size and type will be added to the machine, the final size and shape of the abrasive will vary depending upon the separator setting. As the abrasive makes several passes through the wheels, breakdown of the abrasive reoccurs until the abrasive is taken out of the separator. Therefore, after several hours of operation, a stabilized mix will result with various particle sizes. This mix provides the best cleaning results and is referred to as the operating mix. Maintaining this operating mix is a function of the separator setting, dust collector air volume, and proper abrasive additions. Of these three factors, the separator settings are fixed and the dust collector air volume should be relatively constant and we, therefore, have directed your attention to proper abrasive additions.

Once the operating mix is established, abrasive should be added in small quantities at regular intervals to help maintain a consistent operating mix. If the abrasive level gets too low, and a large amount of new abrasive is added to the machine, this mix will change and could affect the blast profile. Small regular additions will keep the mix consistent which will keep the blasting profile consistent.

### 4.8.3 Maintaining the Operating Mix

Abrasive impact life cycles can be measured in pounds/kilograms used per blasting hour. New abrasive should be added continuously during blasting in amounts equal to the rate of withdrawal or loss from the system.

In the absence of automatic additions, new abrasive should be added once each shift, or after each eight hours of wheel blasting. It is recommended that individual additions not exceed 10-15 percent of abrasive storage hopper capacity.

Delay in adding new abrasive tends to decrease the percentage of coarser sizes in the operating mix. The result will likely be poorer quality cleaning and reduction in the depth of the anchor pattern. However, adding a large quantity of new abrasive at one time increases the percentage of coarser sizes, resulting in a coarsening of surface profile, and for a given through-put speed, insufficient c coverage and poorer cleaning. The result in either case is reduction in operating efficiency, product quality, or both.

Maintaining a uniform and stabilized operating mix requires the abrasive particles removed from the blast machine to be of uniform size to realize the greatest economic benefits from using metallic abrasives, the particle size removed should be the largest size that is ineffective in the cleaning operation. Control of the size to be removed requires careful attention to adjustment of the separator system and of the airflow through the separator.

Care must be taken to prevent (or minimize) loses of abrasive by carryout on the work pieces, by loss through work entry and exit seals on the cabinets, or by leakage elsewhere on the machine.

Generally, the operating mix should contain close to 50 percent of sizes equivalent to or larger than the newly purchased (nominal screen) size. Also, the operating mix should typically contain particles of sizes ranging from one screen size larger to four or more screen sizes smaller than the nominal screen size of the new abrasive.

### 4.8.4 Abrasive Additions

Pre-production trials may need to be conducted to establish operating conditions and to select an abrasive mix.

- Abrasive already in a machine must have been recycled for a sufficient length of time to have generated an operating mix as evidenced by screen analyses.
- If a substantial change in abrasive type, size, or hardness is necessary, the user should consult their Wheelabrator Representative.
- A specifically formulated (screened and sized) operating mix may be obtained from their local Abrasive Supplier for starting up a new machine.
- Once a desired surface finish is achieved, abrasive screen analyses can be made and recorded for reference during later production operations.

### 4.8.5 New Abrasive

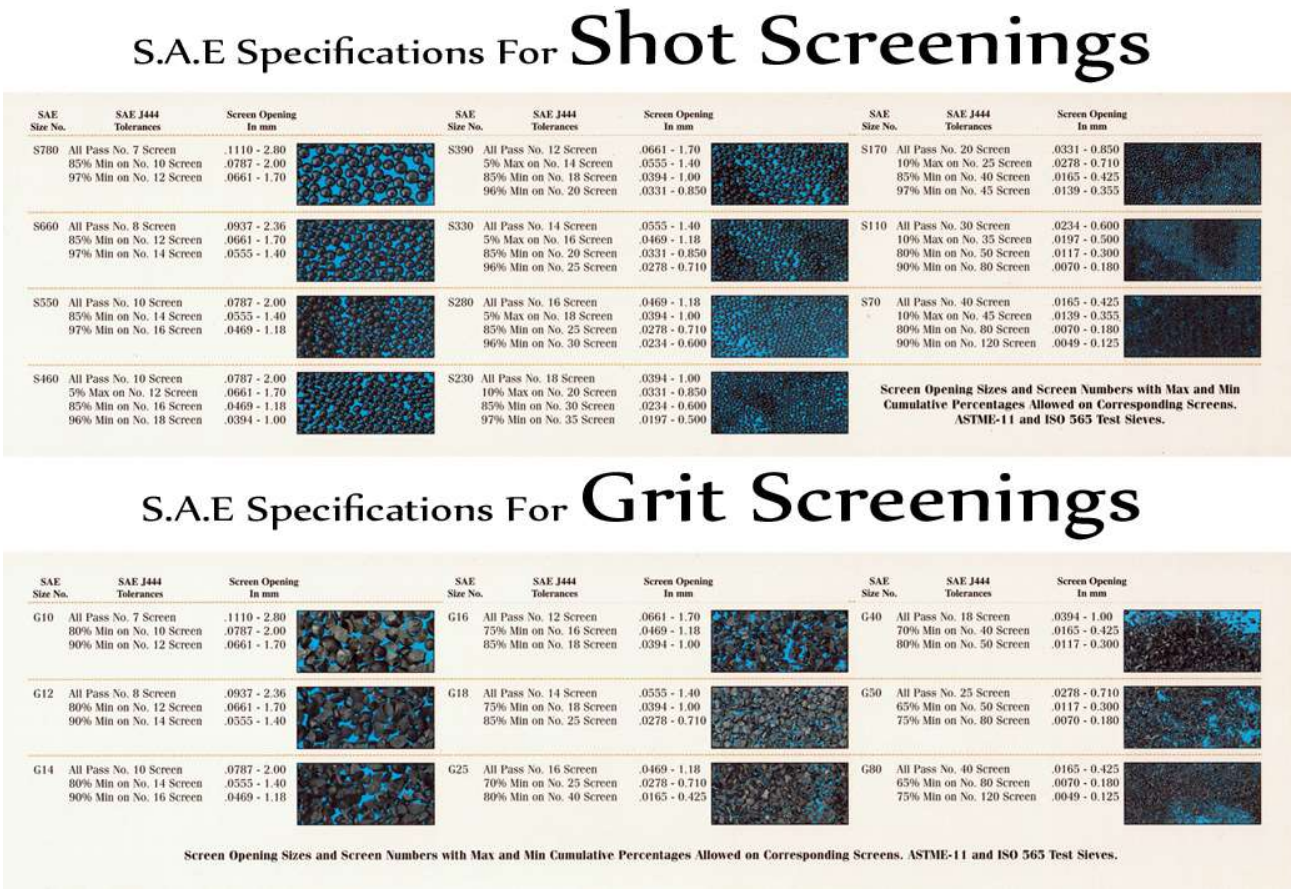
Contract specifications may state the abrasive to be used in a structural steel cleaning application. Size, type, hardness, and applicable manufacturing specifications should be clearly indicated on all pertinent documents.

New abrasive should not be procured on the basis of price alone. Cast steel abrasives, for instance, may have a defective microstructure even though they have the proper hardness. Such abrasive will fail prematurely, resulting in excessive fines in the operating mix and high costs of abrasive consumption. Excessive abrasive fines may overload the recycling and ventilation systems, cause erratic abrasive flow, reduce cleaning effectiveness, and necessitate reduction of cleaning speeds.

The process of evaluating abrasive is time-consuming. Approximate comparisons of quality can be conducted by the average user with

procedures, information, and assistance provided by their local Abrasive Supplier. The most important point is that the lowest priced new abrasive can sometimes become the most expensive to use.

**SAE Specification Screenings for Shot and Grit**



S.A.E Specifications For Shot Screenings

| SAE Size No. | SAE J444 Tolerances | Screen Opening In mm |
|---|---|---|
| S780 | All Pass No. 7 Screen<br>85% Min on No. 10 Screen<br>97% Min on No. 12 Screen | .1110 - 2.80<br>.0787 - 2.00<br>.0661 - 1.70 |
| S660 | All Pass No. 8 Screen<br>85% Min on No. 12 Screen<br>97% Min on No. 14 Screen | .0937 - 2.36<br>.0661 - 1.70<br>.0555 - 1.40 |
| S550 | All Pass No. 10 Screen<br>85% Min on No. 14 Screen<br>97% Min on No. 16 Screen | .0787 - 2.00<br>.0555 - 1.40<br>.0469 - 1.18 |
| S460 | All Pass No. 10 Screen<br>5% Max on No. 12 Screen<br>85% Min on No. 16 Screen<br>96% Min on No. 18 Screen | .0787 - 2.00<br>.0661 - 1.70<br>.0469 - 1.18<br>.0394 - 1.00 |
| S390 | All Pass No. 12 Screen<br>5% Max on No. 14 Screen<br>85% Min on No. 18 Screen<br>96% Min on No. 20 Screen | .0661 - 1.70<br>.0555 - 1.40<br>.0394 - 1.00<br>.0331 - 0.850 |
| S330 | All Pass No. 14 Screen<br>5% Max on No. 16 Screen<br>85% Min on No. 20 Screen<br>96% Min on No. 25 Screen | .0555 - 1.40<br>.0469 - 1.18<br>.0331 - 0.850<br>.0278 - 0.710 |
| S280 | All Pass No. 16 Screen<br>5% Max on No. 18 Screen<br>85% Min on No. 25 Screen<br>96% Min on No. 30 Screen | .0469 - 1.18<br>.0394 - 1.00<br>.0278 - 0.710<br>.0234 - 0.600 |
| S230 | All Pass No. 18 Screen<br>10% Max on No. 20 Screen<br>85% Min on No. 30 Screen<br>97% Min on No. 35 Screen | .0394 - 1.00<br>.0331 - 0.850<br>.0234 - 0.600<br>.0197 - 0.500 |
| S170 | All Pass No. 20 Screen<br>10% Max on No. 25 Screen<br>85% Min on No. 40 Screen<br>97% Min on No. 45 Screen | .0331 - 0.850<br>.0278 - 0.710<br>.0165 - 0.425<br>.0139 - 0.355 |
| S110 | All Pass No. 30 Screen<br>10% Max on No. 35 Screen<br>80% Min on No. 50 Screen<br>90% Min on No. 80 Screen | .0234 - 0.600<br>.0197 - 0.500<br>.0117 - 0.300<br>.0070 - 0.180 |
| S70 | All Pass No. 40 Screen<br>10% Max on No. 45 Screen<br>80% Min on No. 80 Screen<br>90% Min on No. 120 Screen | .0165 - 0.425<br>.0139 - 0.355<br>.0070 - 0.180<br>.0049 - 0.125 |

Screen Opening Sizes and Screen Numbers with Max and Min Cumulative Percentages Allowed on Corresponding Screens. ASTME-11 and ISO 565 Test Sieves.

S.A.E Specifications For Grit Screenings

| SAE Size No. | SAE J444 Tolerances | Screen Opening In mm |
|---|---|---|
| G10 | All Pass No. 7 Screen<br>80% Min on No. 10 Screen<br>90% Min on No. 12 Screen | .1110 - 2.80<br>.0787 - 2.00<br>.0661 - 1.70 |
| G12 | All Pass No. 8 Screen<br>80% Min on No. 12 Screen<br>90% Min on No. 14 Screen | .0937 - 2.36<br>.0661 - 1.70<br>.0555 - 1.40 |
| G14 | All Pass No. 10 Screen<br>80% Min on No. 14 Screen<br>90% Min on No. 16 Screen | .0787 - 2.00<br>.0555 - 1.40<br>.0469 - 1.18 |
| G16 | All Pass No. 12 Screen<br>75% Min on No. 16 Screen<br>85% Min on No. 18 Screen | .0661 - 1.70<br>.0469 - 1.18<br>.0394 - 1.00 |
| G18 | All Pass No. 14 Screen<br>75% Min on No. 18 Screen<br>85% Min on No. 25 Screen | .0555 - 1.40<br>.0394 - 1.00<br>.0278 - 0.710 |
| G25 | All Pass No. 16 Screen<br>70% Min on No. 25 Screen<br>80% Min on No. 40 Screen | .0469 - 1.18<br>.0278 - 0.710<br>.0165 - 0.425 |
| G40 | All Pass No. 18 Screen<br>70% Min on No. 40 Screen<br>80% Min on No. 50 Screen | .0394 - 1.00<br>.0165 - 0.425<br>.0117 - 0.300 |
| G50 | All Pass No. 25 Screen<br>65% Min on No. 50 Screen<br>75% Min on No. 80 Screen | .0278 - 0.710<br>.0117 - 0.300<br>.0070 - 0.180 |
| G80 | All Pass No. 40 Screen<br>65% Min on No. 80 Screen<br>75% Min on No. 120 Screen | .0165 - 0.425<br>.0070 - 0.180<br>.0049 - 0.125 |

Screen Opening Sizes and Screen Numbers with Max and Min Cumulative Percentages Allowed on Corresponding Screens. ASTME-11 and ISO 565 Test Sieves.

**Figure 5-28 - Screen Opening Sizes and Screen Numbers with Max and Min Cumulative Percentages Allowed on Corresponding Screens. ASTME – 11 ISO 565 Test Sieves.**

## Section 5 Ventilation

A properly sized and efficiently operating dust collector system is required for effective control of dust and separation and collection of broken down abrasive media and contaminants generated by the blasting action. See Figure 6-1 for typical ventilation arrangement.

Each ventilation point requires a specific volume and velocity of air to keep particulates suspended in the air stream; avoid dusting at the machine and provide adequate separation of contaminants. A reduction in surface preparation effectiveness and gradual process degradation will occur without proper ventilation.

After effective operation of ventilation system has been confirmed, air volume and velocity readings should be taken at each vent point and recorded as the standard. Periodic checks should be made to watch for changes in these readings that would indicate potential ventilation problems.

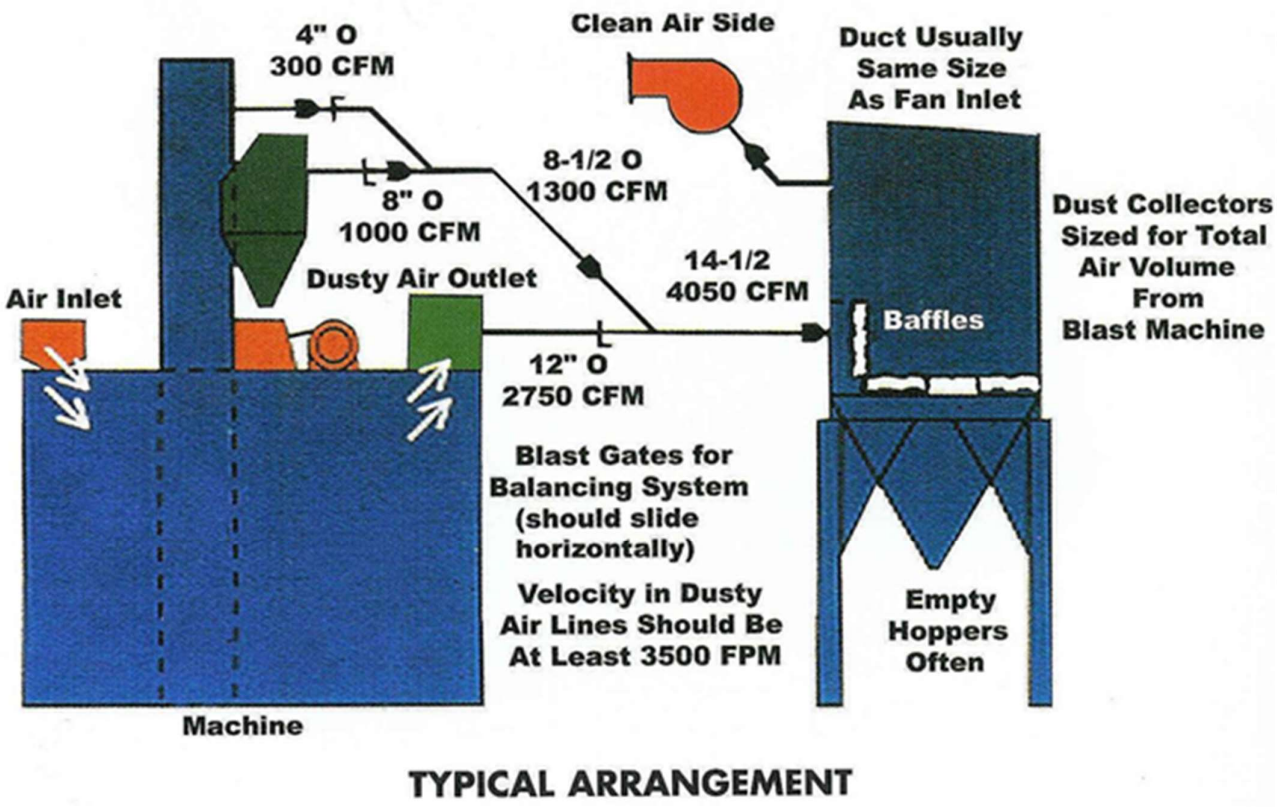



**Figure 6-1**

### 5.1 Dust Collectors

Dust collectors provide three very important functions related to the clean and efficient operation of a blast cleaning machine.

1. The dust collector exhaust fan maintains a steady air flow through the separator, required for the air wash operation. The air flow pulls dust, fines, and other contaminants from the thin curtain of abrasive media that falls over the lip of the separator. Operating properly, a dust collector will take out only unusable fines.

2. The dust collector exhauster provides a negative pressure in the blast cabinet. This is needed to keep dust from puffing out of the blast machine. The puffing effect is caused by the air pump action from blast wheel units.

   By creating a negative pressure and controlling the flow of air to the dust collector, air outside the cabinet is dawn into the cabinet, rather than air and dust inside the cabinet being forced out.

3. The dust collector retains the fine particles, which otherwise would be exhausted to the atmosphere and cause a potential air pollution problem. Because of the potential environmental problems created by dust and the need for good plant housekeeping and good community relations, it is necessary for all blast equipment to be operated with an efficient dust collector system.

## 5.2 Three Types of Dust Collectors

### 5.2.1 Shaker Bag Style

The shaker bag style dust collector is an intermittent duty, automatic or manual shaker type unit. Its construction incorporates multiple tubular bags with internal access required for maintenance and inspections. Dust particles are captured on the inner surfaces of the inflated bags when the fan is operating. Bags may be made of various fabrics with the most common being cotton sateen or polyester for blast equipment applications. Incoming air is diverted by a baffle and slowed via expansion into the hopper. Large contaminants drop into the hopper and finer material is collected on the inside of the bags. Cleaning is performed by stopping the fan to allow the bags to go slack before shaking them for a specific interval, usually about three minutes. This action removes most of the dust from the inner surface of the bags so the dust can then fall into the hopper. See Figure 6-2 for Typical Shaker Bag Style Dust Collector.

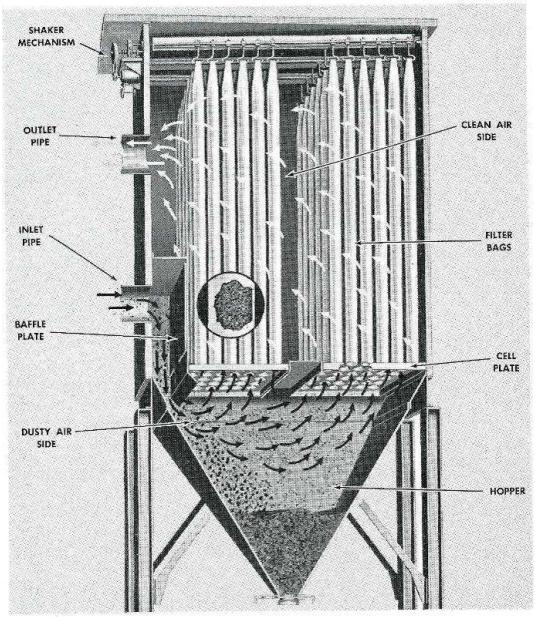
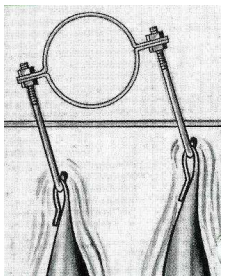



**Figure 6-2**

# Typical Shaker Bag Style Dust Collector

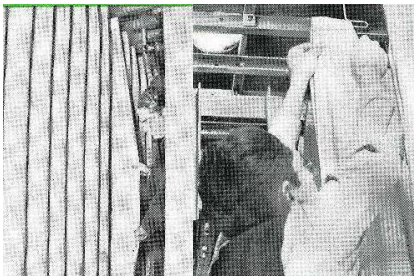
### 5.2.1.1 Elements of a Typical Shaker Bag Style Dust Collector:

#### 5.2.1.1.1 Shaker Mechanism



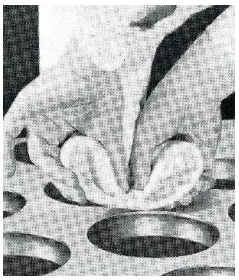
Dust-tubes are cleaned by the gentle but highly efficient motion of the shaker mechanism which is driven by a totally enclosed motor located at the clean air side or outside the dust collector. The shaker provides a gentle wave-like action from top to bottom of each bag. The motion is similar to the action obtained by hand shaking a rug.

#### 5.2.1.1.2 Filter Bags



Filter bags are usually made of cotton sateen fabric, making them inexpensive cloth filters. No metal contacts the filtering area of the cloth filter bags.

#### 5.2.1.1.3 Cell Plate



The cell plate retains the bottom or open end of the filter bags that features a sewed-in ring-type spring. This end is folded in half and inserted through a cell plate hole for installation (see picture). When pressure on the hoop spring is released, the tube snaps into place, providing an instant, positive seal with the cell plate surface.

#### 5.2.1.1.4 Inlet Vent

The dust-laden air enters the dust collector from the equipment vent piping through the inlet vent as shown in Figure 6-2.

#### 5.2.1.1.5 Baffle Plate/Liner

The dust-laden air entering the dust collector strikes the baffle plate/liner where the sudden change in direction and reduction in air velocity cause heavier particles to drop out immediately into the hopper. All materials large enough to wear the filter fabric drop out of the air stream so only the small dust particles reach the filter bags as shown in Figure 6-2.

#### 5.2.1.1.6 Fan Outlet Vent

The cleaned air from the dust collector is exhausted through the fan outlet vent to the atmosphere as shown in Figure 6-2.

### 5.2.2 Pulse Bag Style

The pulse bag dust collector is a continuous, automatic, pulse-type unit. Its construction incorporates multiple tubular bags supported by tubular steel wire cages. Access may be from outside or from an integral enclosure on the roof. Dust particles are effectively captured on the outer surface of the tubular bags as the air flows through the material into the center of the cage frames. The bags may be made of various fabrics with the most common being cotton sateen or polyester for blast equipment applications. Cleaning is performed by various Venturi systems using periodic metered pulses of high pressure air down the center of the wire cages. This reverse air pulse halts the inflow of air and releases the collected dust from the outer surface of the bags. Each pulse sequence frees the dust particles to work their way down the bags and into the hopper.

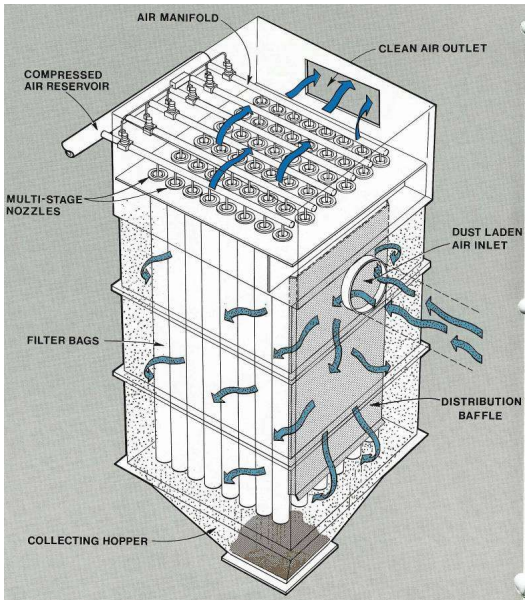



**Figure 6-3**

## Typical Pulse Bag Style Dust Collector

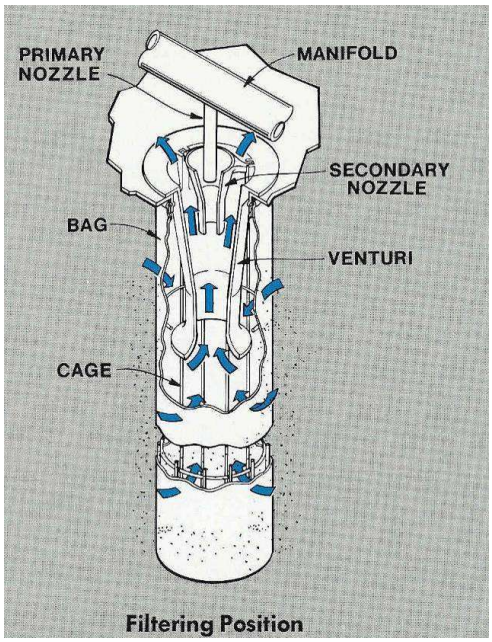



**Figure 6-4**

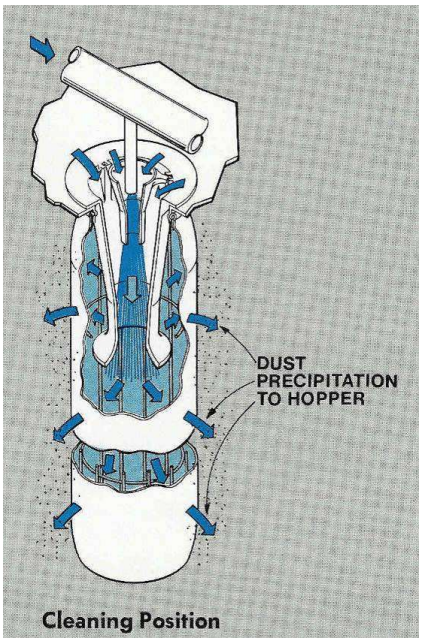



**Figure 6-5**

#### 5.2.2.1 Elements of a Typical Pulse Bag Style Dust Collector:

##### 5.2.2.1.1 Inlet Vent

The dust-laden air enters the dust collector from the equipment vent piping through the inlet vent as shown in Figure 6-3.

##### 5.2.2.1.2 Baffle Plate/Liner

The dust-laden air entering the dust collector strikes the baffle plate/liner where the sudden change in direction and reduction in air velocity cause heavier particles to drop out immediately into the hopper. All materials large enough to wear the filter fabric drop out of the air stream so only the small dust particles reach the filter bags as shown in Figure 6-3.

##### 5.2.2.1.3 Filter Bags

Filter bags are supported by tubular steel wire cages see Figure 6-4 and Figure 6-5. The bags may be made of various fabrics with the most common being cotton sateen or polyester for blast equipment applications.

##### 5.2.2.1.4 Compressed Air Reservoir

The compressed air reservoir stores compressed air to insure minimum pressure drop and maximum air storage for each valve. See Figure 6-3.

##### 5.2.2.1.5 Air Manifold

The air manifold distributes the air from the compressed air reservoir evenly to the multi-stage nozzles to clean the filter bags. See Figure 6-3.

##### 5.2.2.1.6 Multi-Stage Nozzles

A controlled blast of compressed air is released from the primary nozzle into the secondary nozzle located in the throat of the Venturi nozzle. The volume of air is magnified by the addition of the secondary and tertiary air being drawn into the dust-laden filter bag. See Figure 6-4.

This sudden release of energy into the filter bag causes it to instantly expand to its maximum diameter throwing the dust off the outer surface. As soon as the cleaning energy is spent the bag returns to its normal filtering position and the now airborne dust falls to the collection hopper with an assist from the downward air patterns.

##### 5.2.2.1.7 Venturi

The Venturi cone, as shown in Figure 6-4 and Figure 6-5, helps funnel the pulsed air from the manifold header into the center of the filter bag and cage.

##### 5.2.2.1.8 Fan Outlet Vent

The cleaned air from the dust collector is exhausted through the fan outlet vent to the atmosphere as shown in Figure 6-3.

### 5.2.3 Cartridge Style

A cartridge style collector is a continuous, automatic, pulse-type unit. Its construction offers a compact design with ease of servicing. Dust particles are effectively captured on the outer surfaces of cartridge filter elements made of various materials appropriate to the individual applications. Cleaning is performed by various Venturi systems using periodic metered pulses of high pressure air into the center of the cartridges. This reverse air pulse halts the inflow of air and releases the collected dust from the outer surface of the

cartridge. Each pulse sequence frees the dust particles to work their way down the side of the cartridge into the waste hopper and container. See Figure 6-6.

**Figure 6-6**

## Typical Cartridge Style Dust Collector

### 5.2.3.1 Elements of a Typical Cartridge Style Dust Collector:

#### 5.2.3.1.1 Inlet Vent

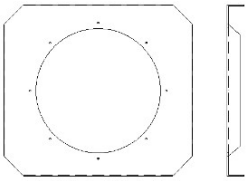
The dust-laden air enters the dust collector from the equipment vent piping through the inlet vent.

#### 5.2.3.1.2 Baffle Plate/Liner

The dust-laden air entering the dust collector strikes the baffle plate/liner where the sudden change in direction and reduction in air velocity cause heavier particles to drop out immediately into the hopper. All materials large enough to wear the filter fabric drop out of the air stream so only the small dust particles reach the cartridge filters.

#### 5.2.3.1.3 Typical Cartridge with Clamping Plate

The cartridge clamping plate as shown here in this sketch is attached to the cartridge filter as shown in this picture. This enables it to be clamped into the tube sheet with the cartridge clamp assembly.



#### 5.2.3.1.4 Typical Cartridge Filters w/o Clamping Plate

The dust collector cartridge filter as shown here is composed of cellulose pleated filter with reinforced polyester screen inside and outside encasement.

#### 5.2.3.1.5 Compressed Air Reservoir

The compressed air reservoir stores compressed air to insure minimum pressure drop and maximum air storage for each valve.

#### 5.2.3.1.6 Air Manifold

The air manifold distributes the air from the compressed air reservoir evenly to the multi-stage nozzles to clean the filter bags.

Note: Similar to Figure 6-3.

#### 5.2.3.1.7 Nozzles

A controlled blast of compressed air is released from the nozzle into the throat of the Venturi nozzle. The volume of air is magnified by the addition of the secondary and tertiary air being drawn into the dust-laden cartridge filter.

#### 5.2.3.1.8 Typical Venturi

The Venturi shown here helps funnel the pulsed air from the cartridge header into the center of the cartridge filter element. The Venturi is dropped into the filter element before clamping and installing the filter element into the tube sheet in the dust collector chamber.

#### 5.2.3.1.9 Fan Outlet Vent

The cleaned air from the dust collector is exhausted through the fan outlet vent to the atmosphere.

## 5.3 Diaphragm Valve used on Pulse Bag and Cartridge Style

The reverse pulse diaphragm valve delivers a short high pressure pulse of compressed air, reversing the air flow through a cartridge filter or filter bag. This action removes particulate from the filter surface, allowing the dust to fall towards the dust hopper.

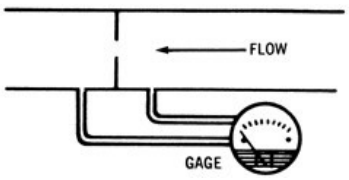
The valve relies on system pressure acting on a flexible diaphragm membrane to maintain a closed condition against the valve seat. The pressurized cover chamber above the diaphragm is exhausted when an electrical signal is supplied to the solenoid operator of the direct pilot operator (CA). This lowers the pressure differential about the diaphragm and allows the diaphragm to lift off the valve body seat. Compressed air is discharged through the valve outlet. When the electrical signal is switched off the valve exhausts are closed, the pressure differential is balanced by air bleeding from the body to cover the chamber and the diaphragm membrane moves back onto the valve body seat shutting down the sir flow.

## 5.4 Pressure Gages used on All Three Styles of Collectors

### 5.4.1 Manometer Unit

The manometer is a U-tube type to measure air pressure drop across the dust collector filter elements and indicates a need for cleaning or replacement of filter elements. The manometer should be mounted at a convenient height for reading vertically on dust collector and it must be level.

### 5.4.2 Magnehelic® Differential Pressure Gage




The Magnehelic gage gives a continual reading of the differential air pressure across the dust collector filter elements for monitoring the buildup of dust and the need for cleaning or replacement of filter elements.


### 5.4.3 Photohelic® Differential Pressure Gage

The Photohelic pressure cage gives a continual reading of the differential air pressure across the dust collector filter elements and electronically controls the cleaning cycle for the dust collector


## 5.5 Exhaust Piping Construction

The gauge/thickness of material used to fabricate vent piping is critical to the effective life and performance of the vent piping system. Duct routing and intersecting duct construction methods must be compatible with the highly abrasive particulates being carried in the air stream. Follow appropriate guidelines for construction of your exhaust piping system.

Contact your blast equipment supplier for copies of the recommended exhaust piping construction information.

**Class 2 – Medium Duty**

This classification includes applications using moderately abrasive particulates in light concentrations. Typical medias would be Agra shell, plastic, granule (aluminum) and steel shot or soft (<50Rc) grit. This classification is found in non-foundry (0% sand) application.

**Class 3 – Heavy Duty**

This classification includes applications with highly abrasive particulates in low concentrations. Typical Medias would be steel shot or grit in all hardness's. This classification is usually applicable in a foundry operation with low sand loading from surface sand present after shake out and before cleaning.

**Class 4 – Extra Heavy Duty**

This classification includes applications with highly abrasive particles in high concentrations. Typical Medias would be steel shot or grit in all hardness's. This classification is usually applicable in a foundry operation with high sand loading from core and mold sands introduced in cleaning and/or sand reclamation systems.

### 5.5.1 General Exhaust Piping Instructions

#### 5.5.1.1 General

The exhaust system shall be constructed with materials recommended below, and shall be installed in a permanent manner. The interiors of the pipes and fittings shall be smooth and free of obstructions to minimize the resistance to air flow, and reduce wear. The system shall be as air tight as possible, except where air is intended to be drawn in or out.

#### 5.5.1.2 Duct Gauge Requirement – By Class

**CLASS 2 – MEDIUM DUTY**

| Duct Size | Straight | Elbows | Material |
|---|---|---|---|
| 4” to 18” | 18 GA. | 16 GA. | Steel / Galvanized |
| Over 18” | 16 GA. | 14 GA. | Steel / Galvanized |

**CLASS 3 – HEAVY DUTY**

| Duct Size | Straight | Elbows | Material |
|---|---|---|---|
| 4” to 30” | 16 GA. | 14 GA. | Steel / Galvanized |
| Over 30” | 12 GA. | 10 GA. | Steel / Galvanized |

**CLASS 4 – EXTRA HEAVY DUTY**

| Duct Size | Straight | Elbows | Material |
|---|---|---|---|
| 4” to 30” | 14 GA. | 12 GA. | Steel / Galvanized |
| Over 30” | 12 GA. | 10 GA. | Steel / Galvanized |

**Note: Wheelabrator will select appropriate duty class for systems to be installed by Wheelabrator.**

**Customer should advise their contractor of appropriate duty class based on expected operating conditions.**

#### 5.5.1.3 Line Traps (Optional)

Piping from blast chamber to baffle type abrasive trap in horizontal line, shall be of a heavier gauge sheet metal than is used in the standard piping. The gauge of metal should be based on Class 4 requirements (extra heavy duty). Reference Figure 6-7.

**a.** The piping from the blast chamber to the abrasive trap is standard construction and as noted, is of a heavier gauge metal than standard pipe. This includes straight runs, elbows, and tapered transitions.

**b.** The inlet diameter size of the baffle type trap shall be twice the diameter of the blast chamber outlet pipe, unless otherwise specified.

**c.** Locate blast gate in the outlet pipe from the baffle type trap. Do not locate the blast gate between the trap and blast chamber.

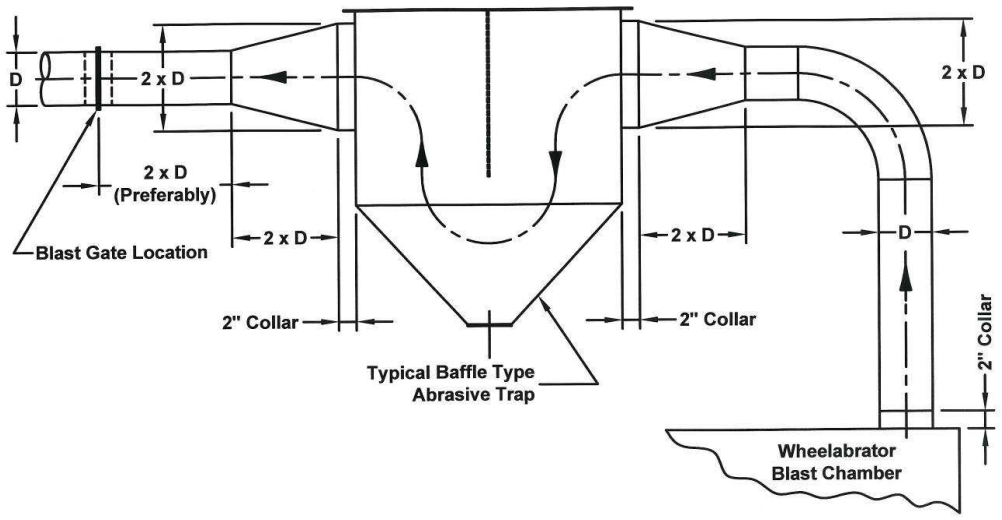



**Figure 6-7**

### 5.5.1.4 Blast Gates

The air volume requirements for blast cleaning equipment must be properly balanced for effective ventilation and operation. Blast gates are required as a control device.

1. Blast gates Figure 6-8 are required for the blast cabinet, elevator, separator and any other exhaust vent lines from the equipment.
2. Full gates are recommended for the high wear environment and ease of adjustment, inspection, and repair. Butterfly dampers should not be used in this type abrasive application.
3. Gates should be located in straight sections of the event piping, preferably (2 x D) two times the duct diameter away from any pickup point, elbow or transition to maintain smooth air flow, consist air velocity and reduce piping wear.
4. Gates should have a method of securing the slide plate in position and be positioned with their slide plate horizontal to prevent accidental full open or full closed operation.
5. See page 16 for standard blast gate sizes and Wheelabrator part numbers.

Figure 6-8

#### 5.5.1.5 Flat Back Elbows (Optional)

In addition, "Flat Back Elbows" may be used at points of heavy wear. Reference Figure 6-9.

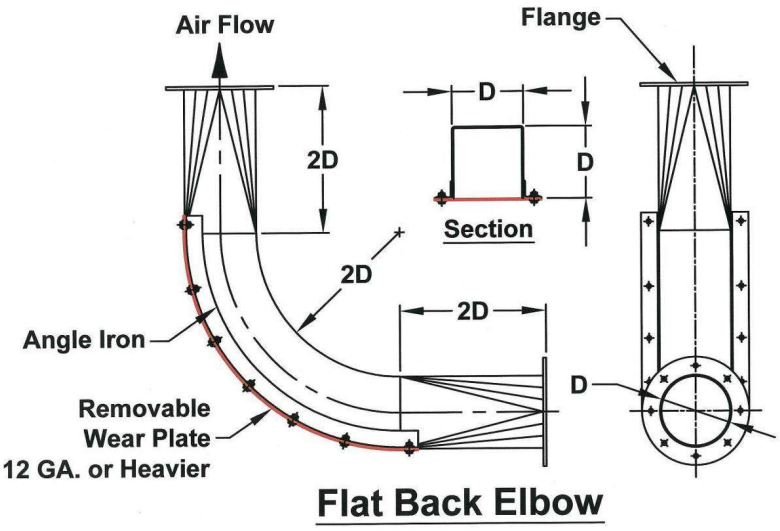



Figure 6-9

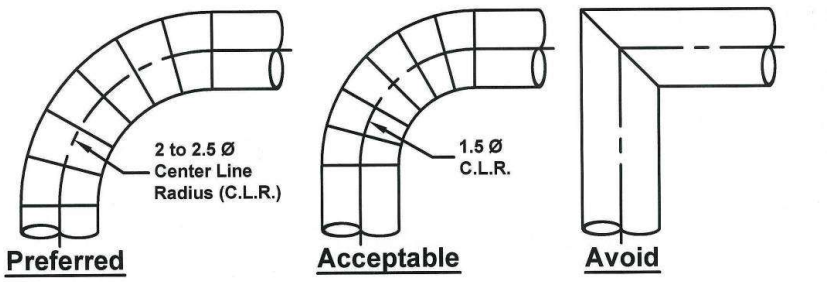
**NOTE: WEAR PLATE MAY ALSO BE LINED FOR ADDITIONAL PROTECTION.**

#### 5.5.1.6 Pipe Construction

Exhaust systems should be constructed with materials suitable for the conditions of service and installed in a permanent and workmanlike manner. To minimize friction loss and turbulence, the interior of all ducts should be smooth and free from obstructions- especially at joints. Ducts usually are constructed of steel which has been welded, flanged, and gasketed, or of welded galvanized sheet steel.

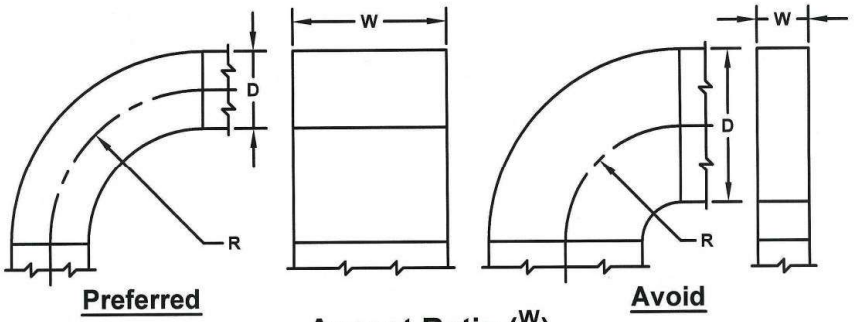
1. Round duct is recommended for blast equipment dust collecting systems.

2. Rectangular ducts should only be used when space requirements preclude the use of round construction. Rectangular ducts should be as nearly square as possible to minimize resistance.
3. Longitudinal joints or seams should be welded. All welding should conform to the standards established by the American Welding Society (AWS) structural code.
4. Elbows and bends should be a minimum of 2 gauges heavier than straight lengths of equal diameter and have a centerline radius of at least 1.5 and preferably 2 times the pipe diameter (see Figure 6-10). Large centerline radius elbows are recommended where highly abrasive dusts are being conveyed.
5. Elbows of 90 degrees should be of a five-piece construction for round ducts up to six inches and of a seven-piece construction for larger diameters. Bends less than 90 degrees should have a proportional number of pieces. Prefabricated elbows of smooth construction may be used.
6. Transitions in mains and sub mains should be tapered. The taper should be at least 5 units long for each 1 unit change in diameter or 30 degree included angle (see Figure 6-11).
7. All branches should enter the main at the center of the transition at an angle not to exceed 45 degrees with 30 degrees preferred. To minimize turbulence and possible particulate fall out, connections should be to the top or side of the main with no two branches entering at opposite sides (see Figure 6-11).



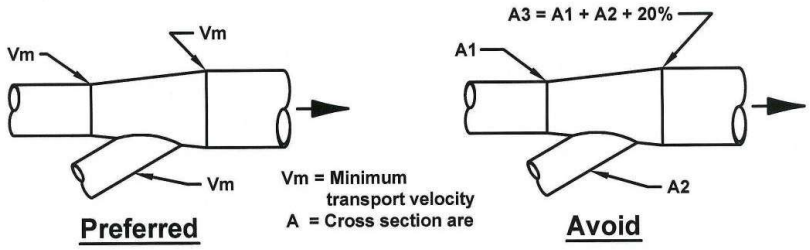

**Elbow Radius**

Elbows should be 2 to 2.5 diameter centerline radius except where space does not permit.




**Aspect Ratio ($\frac{W}{D}$)**

Elbows should ($\frac{W}{D}$) and ($\frac{R}{D}$) equal to or greater than (1).




**Proper Duct Size**

Size the duct to hold the selected transport velocity or higher.

**Figure 6-10**

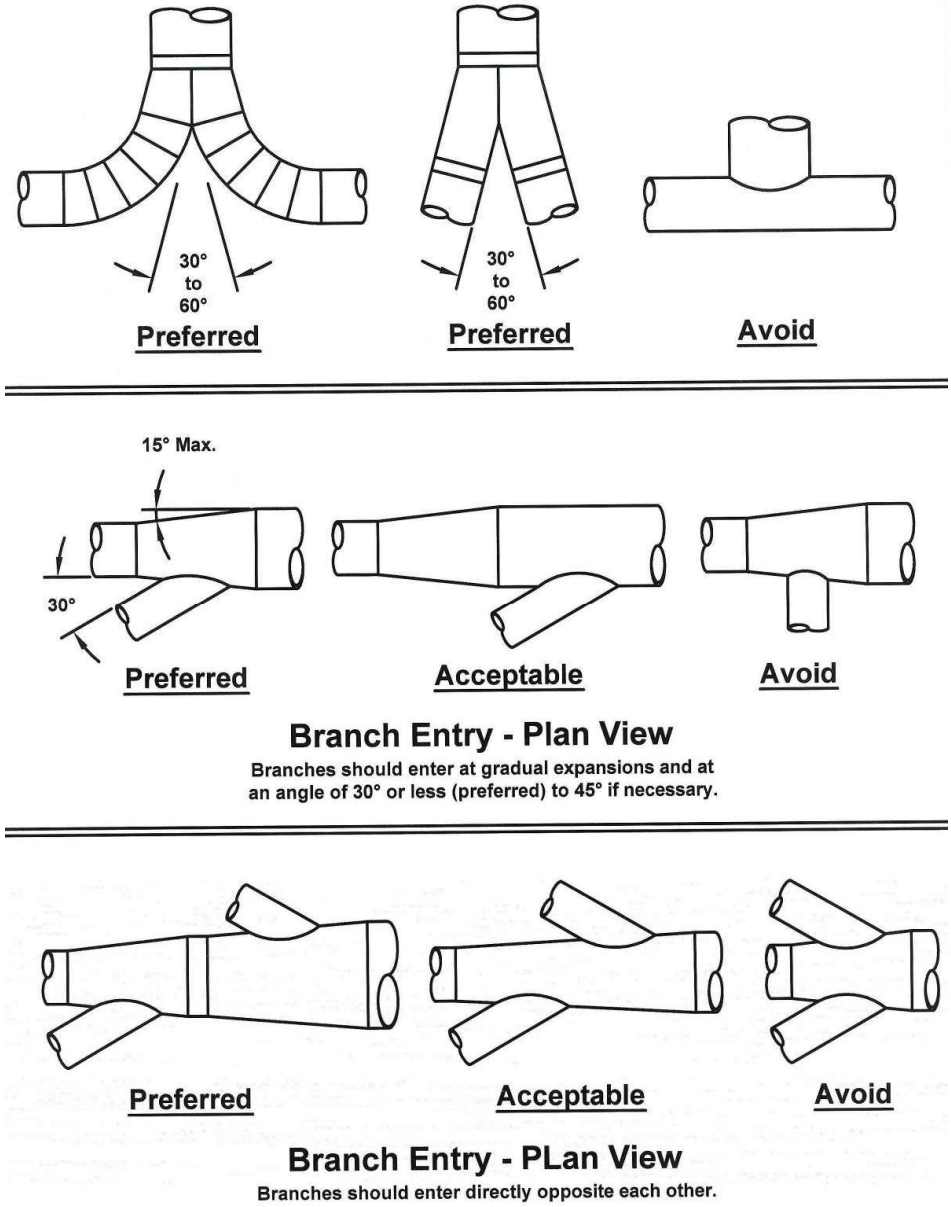



**Figure 6-11**

#### 5.5.1.7 Supports for Piping System

##### 5.5.1.7.1 Horizontal Runs

All headers and horizontal runs of piping shall be supported on not over 22 ft. centers and fastened securely to some substantial portion of the building structure or other permanent support. The supports should be of "V" construction and made from band steel not less in size than the band steel surrounding the piping. The size of the band steel clamped to the piping shall be as follows:

| Diameter or Greatest Dimension of Rectangular Pipe | Size of Connecting Bolts in Pipe Band | Size of Connecting Bolts in Pipe Band |
|---|---|---|
| Up to 12" inclusive | 1-1/4" x 1/8" | 1/4" |

| | | |
|---|---|---|
| Over 12” to 20” inclusive | 1-1/2” x 3/16” | 3/8” |
| Over 20” | 2” x 3/16” | 1/2” |

Each horizontal run of branch pipe extending more than three feet horizontally from the header pipe shall be supported by means of 1” x 3/16” band steel support, preferably of “V” construction and bolted to 1” x 3/16” band steel around the branch pipe. Reference Figure 6-12.

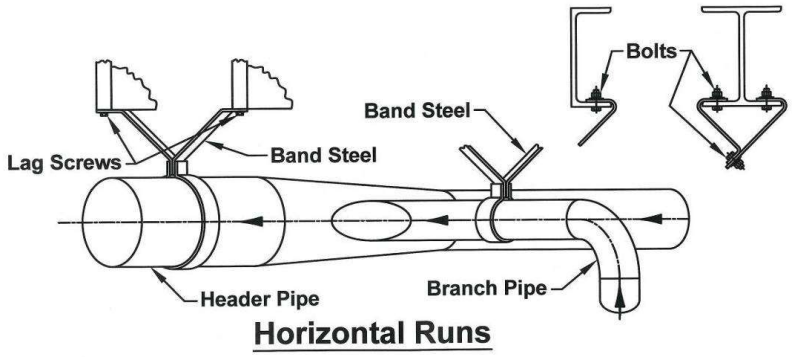



**Figure 6-12**

#### 5.5.1.7.2 Branch Pipe

Branch pipe subject to vibration and movement on account of the equipment being exhausted shall be supported laterally by band steel or rods to prevent displacement.

If the stack is located on the outside wall of the structure, it shall be securely strapped to the structure with heavy band steel not less than 2” x 3/16” in size. Reference Figure 6-13.

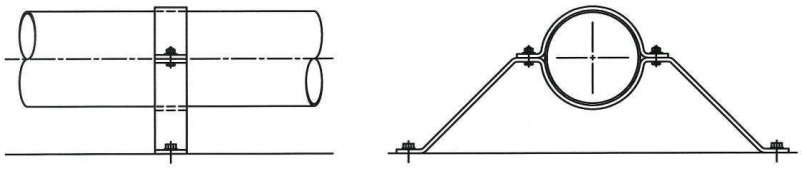


**Figure 6-13**

Discharge stacks located where it is impossible to fasten them to the building structure, shall be guyed to resist wind pressure with heavy galvanized wire or cable provided with galvanized iron turn buckles for adjusting slack and connected to permanent points of anchor or heavy angle iron braces made to substitute for the guy wires or cables providing the braces are permanently attached to a substantial anchorage. The band around the stack for attaching the guy wires or cable braces shall not be less than 2” x 3/16” band steel. Reference Figure 6-14.

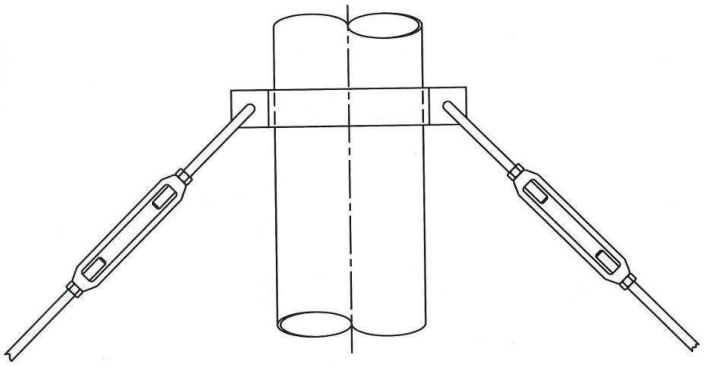


Figure 6-14

#### 5.5.1.7.3 Vertical Runs

Vertical runs of piping through floors shall be set in flanged connections at each floor level. Flanged connections shall be securely fastened to floor. The flange tip shall be made from the same kind of material and two gauges heavier than the connecting pipes. High vertical runs of piping shall be supported laterally to prevent vibration and displacement. Reference Figure 6-15.

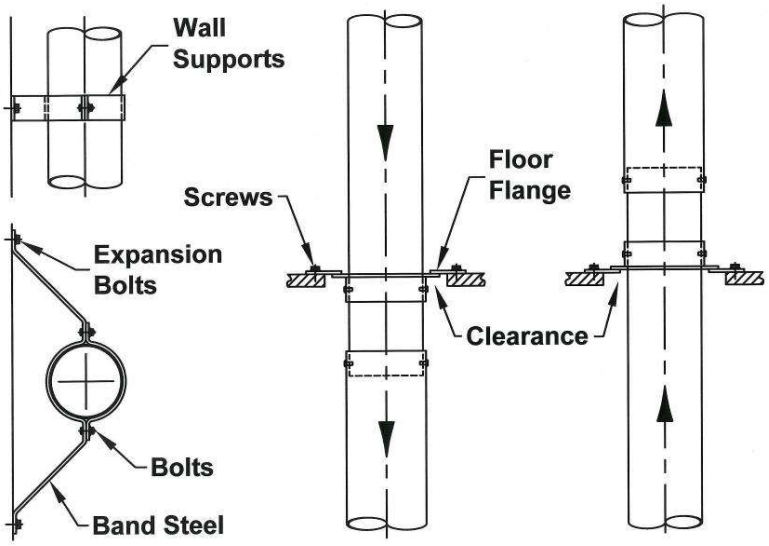



Figure 6-15

#### 5.5.1.7.4 Discharge Stacks

Discharge stacks from dust collection equipment and exhaust fans shall be securely fastened to the building structure. Flanged connections shall be used in the same manner as provided for vertical runs of piping if the discharge stack passes through the floors. Upper and lower roof flanges of the same material and thickness as the stack shall be used at the roof line if the stack passes through the roof. Reference Figure 6-16

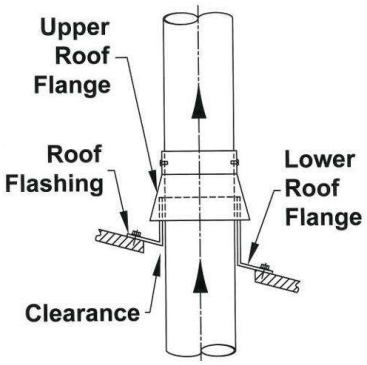



**Figure 6-16**

#### 5.5.1.8 Piping Cleanout Facilities (Optional)

##### 5.5.1.8.1 Cleanout Holes

All horizontal runs of piping may be provided with cleanout and inspection hand holes at approximately every 20 feet. They shall be of a size that will permit ready access to the interior of the pipe. They shall always be located before an elbow going into a vertical run and after an elbow in the horizontal run. Hand holes shall be on the underside of the pipes wherever possible. The holes shall be tightly covered with heavy gauge material of the kind used in the pipes, and should be of the sliding type and shall be close fitting. They must not offer any obstruction on the inside of the pipe. Reference Figure 6-17.

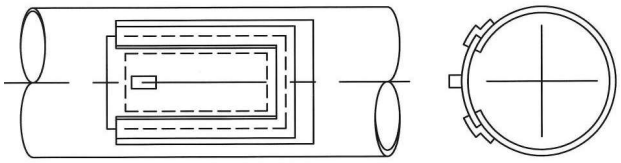


**Figure 6-17**

##### 5.5.1.8.2 Header Caps

The ends of header pipe shall terminate in a cleanout and inspection hole. The cap shall fit tightly into the pipe to prevent air leakage. Ref. Figure 6-18.

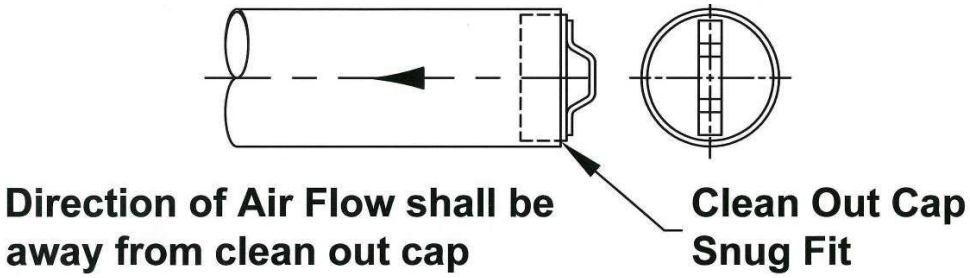



**Figure 6-18**

#### 5.5.1.9 Dampers and Gates

Dampers or gates shall never be permitted in an exhaust system unless provided for the specific purpose of balancing the system and then permanently fastened against further manipulation. However, they (the gates or dampers) may be used for the specific purpose of switching the air from

one branch system to another where branches are not intended to be operated simultaneously.

**NOTE: WHEN DAMPERS ARE USED IN AN EXHAUST SYSTEM AND ONE OR MORE DAMPERS ARE SHUT OFF, THE SYSTEM IS DEPRIVED OF THE VOLUME OF AIR FOR WHICH IT WAS DESIGNED, RESULTING IN MUCH LOWER VELOCITIES IN THE HEADERS, WHICH CAUSES THE DUST AND DIRT TO SETTLE IN THE PIPES AND PLUG UP THE SYSTEM.**

### 5.5.1.10 Pipe Reinforcements

Pipe and duct work shall not be reinforced for any reason internally. If reinforcement is necessary, it shall be located on the outside of the piping. Beads and convolutions shall not be formed or rolled into piping either longitudinally or about the girth.

### 5.5.1.11 Location of Discharge

All types of exhaust systems discharging out of doors shall have the outlet stack at least 10 feet above the roof line of any adjacent buildings.

### 5.5.1.12 Weather Protection for Vertical Discharge Stacks

Where there is a possibility of rain and snow entering the system through the stack outlet, a drain pipe shall be located in the bottom of the fan housing to drain the accumulation of moisture, or a drain may be put in the underside of an elbow. Drain pipes so installed may be water sealed to obtain automatic functioning. Reference Figure 6-19.

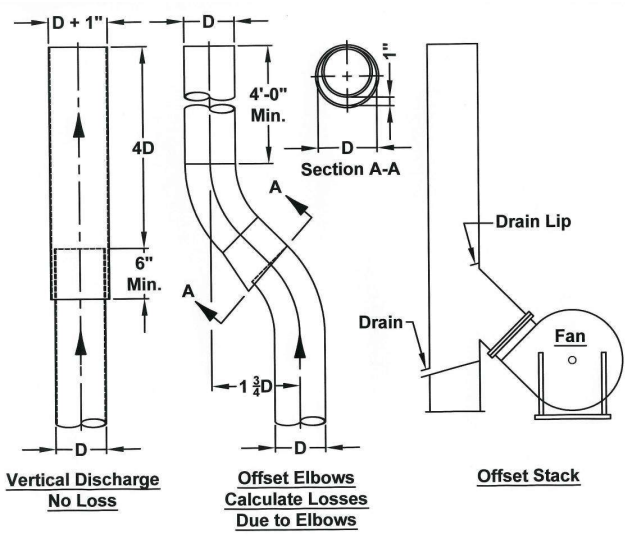



**Figure 6-19**

1. Rain protection characteristics of these caps are superior to a deflecting cap located 0.75D from top of stack.
2. The length of upper stack is related to rain protection. Excessive additional distance may cause “Blowout” of effluent at the gap between upper and lower sections. (86)
3. If horizontal discharge, cut end of pipe at 45 degree angle.

### 5.5.1.13 Fire and Explosion Hazards

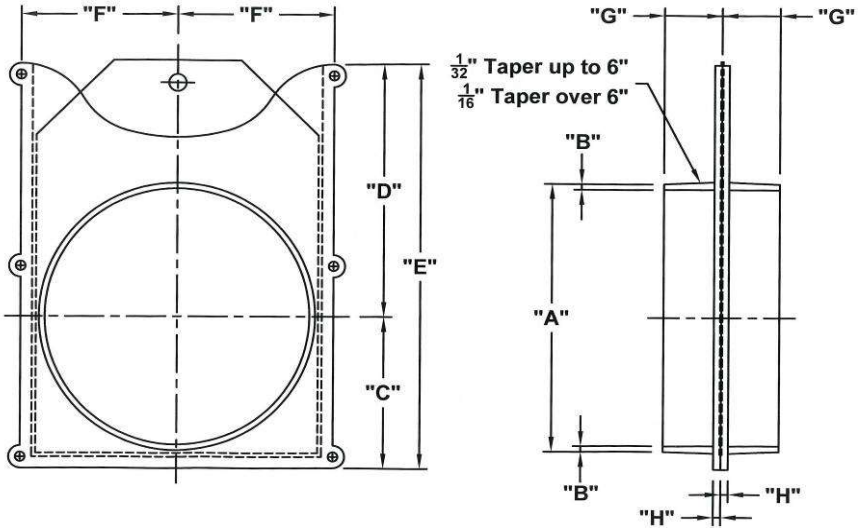
#### 5.5.1.13.1 Electrical Ground

Any exhaust system handling matter of an explosive nature shall have the piping and other equipment permanently grounded through electrical conductors.

#### 5.5.1.13.2 Non-Ferrous Construction

Fan impellers in such installations shall be made entirely of non-ferrous material and in extremely hazardous operations the fan housing shall be constructed of non-ferrous material. In all other respects, the system shall meet the minimum requirements of the code on “blower” systems prepared by the National Fire Protection Association.

### 5.5.1.14 Blast Gates (Standard)




| Size | Part Number | "A" | "B" | "C" | "D" | "E" | "F" | "G" | "H" | Approx Weight |
|---|---|---|---|---|---|---|---|---|---|---|
| 3" | 94402 | 2-31/32" | 3/16" | 1-15/16" | 2-13/16" | 4-3/4" | 1-15/16" | 1-3/8" | 3/16" | 2 lbs. |
| 4" | 94403 | 3-31/32" | 3/16" | 2-7/16" | 3-11/16" | 6-1/8" | 2-7/16" | 1-1/2" | 3/16" | 2 lbs. |
| 5" | 94404 | 4-31/32" | 3/16" | 2-15/16" | 4-9/16" | 7-1/2" | 2-15/16" | 1-1/2" | 3/16" | 2.5 lbs. |
| 6" | 94405 | 5-15/16" | 3/16" | 3-7/16" | 5-9/16" | 9" | 3-7/16" | 1-1/2" | 3/16" | 3.5 lbs. |
| 7" | 94406 | 6-15/16" | 3/16" | 4" | 6-1/2" | 10-1/2" | 4" | 1-5/8" | 3/16" | 4.5 lbs. |
| 8" | 94407 | 7-15/16" | 3/16" | 4-1/2" | 7-1/2" | 12" | 4-1/2" | 1-7/8" | 1/4" | 6.5 lbs. |
| 9" | 94408 | 8-15/16" | 3/16" | 5-1/16" | 8-7/16" | 13-1/2" | 5-1/16" | 1/7/8" | 1/4" | 7.5 lbs. |
| 10" | 94409 | 9-15/16" | 3/16" | 5-9/16" | 9-7/16" | 15" | 5-9/16" | 2" | 1/4" | 9.5 lbs. |
| 11" | 94418 | 11-1/16" | 1/4" | 6-9/32" | 11-15/16" | 17-19/32" | 6-9/32" | 1-15/16" | 5/16" | 21.5 lbs. |
| 12" | 94410 | 11-15/16" | 1/4" | 6-11/16" | 11-5/16" | 18" | 6-11/16" | 2-1/2" | 5/16" | 27 lbs. |
| 13" | 94419 | 13-1/16" | 1/4" | 7-9/32" | 13-23/32" | 21" | 7-9/32" | 1-15/16" | 5/16" | 29 lbs. |
| 14" | 94411 | 14-1/16" | 1/4" | 7-25/32" | 14-31/32" | 22-3/4" | 7-25/32" | 2-3/16" | 5/16" | 34 lbs. |
| 15" | 94420 | 15-1/16" | 1/4" | 8-9/32" | 16-3/32" | 24-3/8" | 8-9/32" | 2-3/16" | 5/16" | 39 lbs. |
| 16" | 94412 | 16-1/16" | 1/4" | 9-1/8" | 17-1/16" | 26-3/16" | 9-3/32" | 2-3/16" | 7/16" | 54 lbs. |
| 17" | 94421 | 17-1/16" | 1/4" | 9-7/16" | 18-1/16" | 27-1/2" | 9-7/16" | 2-5/16" | 7/16" | 62 lbs. |
| 18" | 94413 | 18-1/16" | 1/4" | 9-15/16" | 19-1/4" | 29-1/4" | 9-15/16" | 2-5/16" | 7/16" | 76 lbs. |
| 19" | 94422 | 19-1/16" | 1/4" | 10-7/16" | 20-7/16" | 30-7/8" | 10-7/16" | 2-5/16" | 7/16" | 80 lbs. |

| Size | Part Number | "A" | "B" | "C" | "D" | "E" | "F" | "G" | "H" | Approx Weight |
|---|---|---|---|---|---|---|---|---|---|---|
| 20" | 140779 | 20-1/16" | 1/4" | 10-15/16" | 21-9/16" | 32-1/2" | 10-15/16" | 2-9/16" | 7/16" | |
| 22" | 138922 | 22-1/16" | 1/4" | 11-15/16" | 23-13/16" | 35-3/4" | 11-15/16" | 2-9/16" | 7/16" | |
| 24" | 144115 | 24-1/16" | 1/4" | 12-15/16" | 26-1/16" | 39" | 12-15/16" | 2-9/16" | 9/16" | |

# Section 6 Operations

## 6.1 Functions of Control Panel Instruments

### 6.1.1 Wheel RPM

The wheel RPM displays the rotations per minute that the blast wheel is turning.

### 6.1.2 Wheel Amps

The ammeter measures the amperage that the blast wheel motor is drawing. (Amperage is an indicator of amount of abrasive flow)

### 6.1.3 Abrasive Run Hours

The hour meter records blast time usage on the machine. (Preventive and predictive maintenance activity should be scheduled based on hours of blast time)

### 6.1.4 Blast Timer

The blast timer controls the selected blast time for a cleaning cycle. (Parts are blasted for the selected time and then the abrasive and wheel are turned off)

### 6.1.5 Control Power On Light

When the control power light is illuminated, the power is on to the control panel.

### 6.1.6 Master Start Pushbutton

Energizes system and starts the reclaim in proper sequence. The Blast Start Pushbutton controls blast wheel and abrasive control valve.

### 6.1.7 Emergency Stop Pushbutton

The emergency stop pushbutton shuts down the entire machine. (Stops the machine functions immediately)

**Note: This is a push-pull maintained type button, which is pushed for stopping and pulled to reset.**

### 6.1.8 Motor Overload Fault Light

When this light is illuminated, a motor overload has tripped out.

### 6.1.9 Blast Start Pushbutton

Press the Blast Start pushbutton and the following occurs:

- **a.** The door locks and the wheel starts.
- **b.** After a small delay, abrasive begins to flow.
- **c.** Blast timer begins to time.
- **d.** When the timer times out, the wheel stops and abrasive continues to flow to “brake” the wheel and the post tumble timer begins to time.
- **e.** When the post tumble timer times out, the mill stops and the cycle complete pilot light illuminates.
- **f.** The door unlocks.

#### 6.1.10 Auto/Manual Mode Control Selector Switch

This selector switch enables the equipment to run in a manual or automatic mode.

#### 6.1.11 Abrasive Light On

When this light is illuminated, the abrasive will flow to the blast wheel.

#### 6.1.12 Wheel Start Pushbutton

This pushbutton starts the blast wheel running when the equipment is in the manual mode.

#### 6.1.13 Wheel Stop Pushbutton

This pushbutton shuts down the blast wheel when the equipment is in the manual mode.

#### 6.1.14 Blast Test Pushbutton

This pushbutton is used to take a blast pattern test.

#### 6.1.15 Abrasive Control Selector Switch

This selector switch enables or disables the flow of abrasive to the blast wheel.

### 6.2 Sequence of Operations

The machine specific Sequence of Operations which defines how your machine operates can be found in Volume 2 Supplements section of this manual.

### 6.3 Start-Up and Checkout

Before putting the equipment into operation, the following must be performed:

1. Remove all foreign objects that might have been dropped or left in the equipment such as the hoppers, elevator boot, inside the wheel assembly, etc.
2. Make sure that all covers, drive guards, inspection plates, etc. are securely in place.
3. Check oil level of all the gear reducer drives. If required, fill with manufacturer's recommendation listed on the reducer nameplate.

#### 6.3.1 Motor Rotation

Check the motors on the equipment for proper rotation. If any of the motors are not rotating in the proper direction, the change must be made by a qualified electrician.

#### 6.3.2 Charge the Equipment with Media

Before charging the Equipment, the blast gates on vent line from the cabinet, separator and elevator, should be set to one-half (1/2) open position. Final adjustment of the blast gates can be done later when the ventilation system is balanced. Charge the equipment with the desired type and size of media. Load the abrasive material (media) slowly into the equipment.

After the media has been added, operate the blast wheel and abrasive cycling system for 2 to 3 minutes. Stop blasting and let reclaim system return all the

abrasive media to the storage hopper. If required add abrasive media until the level in storage hopper is 6” to 8” below the adjustable lip under the swinging baffle in the separator. As the equipment operates, check to insure that only fines, sand and/or scale is coming out of the dribble valve on the separator refuse spout. If usable abrasive media is coming out of the dribble valve, verify correct (full curtain) operation of the separator and adjust the blast gate in the vent line to reduce the air flow through the separator slightly. Also check for abrasive leakage around the equipment.

### 6.3.3 Blast Wheel

See Section 3 for setting up and operation of the blast wheels.

### 6.3.4 Media Handling System

See Section 4 for setting up and operation of the media handling system.

# Section 7 Operations

## 7.1 Functions of the Control Panel Instruments

### 7.1.1 Wheel RPM

The wheel RPM displays the rotations per minute that the blast wheel is turning.

### 7.1.2 Wheel Amps

The ammeter measures the amperage that the blast wheel motor is drawing. (Amperage is an indicator of amount of abrasive flow)

### 7.1.3 Abrasive Run Hours

The hour meter records blast time usage on the machine. (Preventive and predictive maintenance activity should be scheduled based on hours of blast time).

### 7.1.4 Blast Timer

The blast timer controls the selected blast time for a cleaning cycle. (Parts are blasted for the selected time and then the abrasive and wheel are turned off)

### 7.1.5 Control Power On Light

When the control power light is illuminated, the power is on to the control panel.

### 7.1.6 Master Start Pushbutton

Energizes system and starts the reclaim in proper sequence. The Blast Start Pushbutton controls blast wheel and abrasive control valve.

### 7.1.7 Emergency Stop Pushbutton

The emergency stop pushbutton shuts down the entire machine. (Stops the machine functions immediately)

**NOTE: THIS IS A PUSH-PULL MAINTAINED TYPE BUTTON, WHICH IS PUSHED FOR STOPPING AND PULLED TO RESET.**

### 7.1.8 Motor Overload Fault Light

When this light is illuminated, a motor overload has tripped out.

### 7.1.9 Blast Start Pushbutton

Press the Blast Start pushbutton and the following occurs:

- **a.** The door locks and the wheel starts.
- **b.** After a small delay, abrasive begins to flow.
- **c.** Blast timer begins to time.
- **d.** When the timer times out, the wheel stops and abrasive continues to flow to “brake” the wheel and the post tumble timer begins to time.
- **e.** When the post tumble timer times out, the mill stops and the cycle complete pilot light illuminates.
- **f.** The door unlocks.

#### 7.1.10 Auto/Manual Mode Control Selector Switch

This selector switch enables the equipment to run in a manual or automatic mode.

#### 7.1.11 Abrasive Light On

When this light is illuminated, the abrasive will flow to the blast wheel.

#### 7.1.12 Wheel Start Pushbutton

This pushbutton starts the blast wheel running when the equipment is in the manual mode.

#### 7.1.13 Wheel Stop Pushbutton

This pushbutton shuts down the blast wheel when the equipment is in the manual mode.

#### 7.1.14 Blast Test Pushbutton

This pushbutton is used to take a blast pattern test.

#### 7.1.15 Abrasive Control Selector Switch

This selector switch enables or disables the flow of abrasive to the blast wheel.

### 7.2 Sequence of Operations

Please refer to Sequence of Operations document attached.

### 7.3 Start-Up and Checkout

Before putting the equipment into operation, the following must be performed:

1. Remove all foreign objects that might have been dropped or left in the equipment such as the hoppers, elevator boot, inside the wheel assembly, etc.
2. Make sure that all covers, drive guards, inspection plates, etc. are securely in place.
3. Check oil level of all the gear reducer drives. If required, fill with manufacturer's recommendation listed on the reducer nameplate.

#### 7.3.1 Motor Rotation

Check the motors on the equipment for proper rotation. If any of the motors are not rotating in the proper direction, the change must be made by a qualified electrician.

#### 7.3.2 Charge the Equipment with Media

Before charging the Equipment, the blast gates on vent line from the cabinet, separator and elevator, should be set to one-half (1/2) open position. Final adjustment of the blast gates can be done later when the ventilation system is balanced. Charge the equipment with the desired type and size of media. Load the abrasive material (media) slowly into the equipment.

After the media has been added, operate the blast wheel and abrasive cycling system for 2 to 3 minutes. Stop blasting and let reclaim system return all the abrasive media to the storage hopper. If required add abrasive media until the level in storage hopper is 6" to 8" below the adjustable lip under the swinging baffle in the separator. As the equipment operates, check to insure that only

fines, sand and/or scale is coming out of the dribble valve on the separator refuse spout. If usable abrasive media is coming out of the dribble valve, verify correct (full curtain) operation of the separator and adjust the blast gate in the vent line to reduce the air flow through the separator slightly. Also check for abrasive leakage around the equipment.

### 7.3.3 Blast Wheel

See Section 3 Blast Wheel, for setting up and operation of the blast wheels.

### 7.3.4 Media Handling System

See Section 4 Media Handling System, for setting up and operation of the media handling system.

# Section 8 Maintenance

## 8.1 Inspection, Repair/Replacement of Parts & Components

For the blast equipment to perform efficiently, periodic inspection and preventive and predictive maintenance must be accomplished through a regular maintenance program, “Have a Good program and Practice It.” The purpose of this program is:

1. To detect minor necessary repairs and prevent major ones.
2. To anticipate repairs by locating probable causes – i.e., preventive maintenance.
3. To plan repairs for convenient times (predictive maintenance).
4. To prevent breakdowns.
5. To be certain that the machine is being operated safely and at the highest possible efficiency level.
6. To keep an accurate record of maintenance activity and replacement parts usage in order to manage the spare parts inventory and monitor operating and maintenance costs.

**CAUTION: When performing inspection and maintenance on the machine, electric power must be disconnected and safety glasses and gloves should be worn.**

The components of the machine which require periodic inspection and eventual repair/replacement include, but are not limited to, the following:

### 8.1.1 Blast Wheel Assembly

A basic inspection of the wheel assembly can be made by removing the top cover and top liner and then looking inside the assembly while slowly rotating the bladed-wheel manually. Removing the components from the housing will permit a more detailed inspection. Refer to Section 9.1 Troubleshooting for blast wheel assemblies malfunctions and suggested remedies.

#### 8.1.1.1 Liners

The liners should be inspected and replaced before any holes are worn through. All liners are easy to replace. When installing liners in the wheel housing, it is vitally important that the liner pieces fit up against one another as tightly as possible to minimize housing wear from the blast.

#### 8.1.1.2 Wheel Housing

During replacement of liners, the housing should be inspected for wear. A defective housing should be repaired or replaced promptly to prevent the escape of abrasive media.

#### 8.1.1.3 Wheel Blades, Control Cage & Impeller

The wheel parts should be inspected at the same time that liner inspection is made. Parts should be replaced when worn in accordance with the following criteria:

One of the main objects of wheel assembly inspection and maintenance is to keep the wheel in balance. Severe vibration can be a major cause of motor bearing failure.

The most frequent cause of vibration is worn, chipped, or broken wheel blades. Wear on the wheel blades varies greatly from one installation to another. Blade life is dependent on various operating conditions. Although the wheel blades may be wearing evenly and may not be causing any abnormal vibrations, blades should be replaced before wearing half-way through. Holes in the wheel blade surfaces will cause wear on other parts and disrupt the blast pattern.

The edge of the control cage opening and impeller openings will eventually wear and this wear must not be allowed to exceed 1/8" for the impeller and 1/4" for the control cage before replacement. The effect of wear will move the blast pattern and this in turn will cause wear on the machine structure and reduced cleaning of the work.

To replace the control cage and impeller, remove the feed spout and control cage clamps. Remove impeller cap screw and impeller. Withdraw the control cage and fit the new one, make sure that the opening of the new control cage is replaced in exactly the same position as the old one. Re-clamp and replace the impeller and feed spout.

#### 8.1.1.4 Removal and Replacement of Blast Wheel Impeller Bolt

When removing and/or replacing the impeller cap screw, it is very important that the following procedure be implemented to prevent wheel parts from coming loose and a wheel failure from occurring. This pertains to all blast wheels containing a threaded insert in the wheel shaft.

After removing impeller cap screw from the wheel assembly, check the threaded insert in the wheel shaft to assure that it is fully seated (below the surface of the end of the shaft). If the insert screws out of the shaft when removing the impeller cap screw, **REPLACE BOTH THE CAP SCREW AND THREADED INSERT. DO NOT REUSE THE THREADED INSERT THAT HAS BEEN REMOVED FROM THE SHAFT.** If the threaded insert must be reused, apply LocTite #242 thread locker (or equal) to the external threads of the insert prior to reinserting.

It is very important that the threads of the cap screw and the threaded insert be clean and free of abrasive contaminants. Prior to reinserting cap screw, use an air hose to remove contaminants. (Comply with O.S.H.A. regulations for use of compress air for cleaning.)

Make sure the centering plate is correctly positioned on the hub/wheel drive pins and the impeller is securely locked in the centering plate slots when assembled. Use **only** the special impeller bolt hi-collar lock washer, listed on your wheel assembly drawing. **Do not** assemble with a standard lock washer. Tighten the impeller cap screw to 100 ft/lbs of torque.

Ez-lock insert number 329-12 Wheelabrator part number 294212.

### 8.1.2 Cabinet Assembly

At regular inspection intervals, the inside surfaces of the cabinet should be inspected to detect any wear points that could lead to structural damage or abrasive leakage. If abnormal wear occurs, immediate action should be taken to determine the cause and make necessary repairs/replacement. All liners should be inspected and replaced before any holes are worn through. Any

worn or damaged components should be replaced to prevent structural damage and leakage of abrasive.

### 8.1.3 Work Conveyor Assembly

Regular inspection should be given to the work conveyor structure, bearings, and alignment.

### 8.1.4 Work Conveyor Drive Assembly

The work conveyor drive should be checked for alignment and proper operation. The gear motor should be checked for oil level. If required, refer to gear motor's instruction sheet in Commercial Parts Manuals, Section 10 for proper lubricant. Refer to Section 8, Paragraph 8.2 for recommendations on lubricating machine components.

### 8.1.5 Abrasive Recycling System

The abrasive recycling system, cleans the media, removes fines from the abrasive, conditions and returns the reusable abrasive to the wheel, and is designed to adequately handle the abrasive load requirements of the machine.

The components of the abrasive recycling system are subjected to wear and damage due to their contact with abrasive material. Regular inspection of the abrasive recycling system components will help detect any wear, physical damage, or component failures. Check the following frequently:

#### 8.1.5.1 Abrasive Hopper

Inspection of the sloping sides of the hopper should be made at regular intervals to detect any wear points. Immediate repair/replacement of sections worn away or damaged is necessary to minimize loss of abrasive and any disruption in cycling of the abrasive. Periodically, clean the hopper screen of accumulated objects and debris.

#### 8.1.5.2 Elevator Belt Assembly

The elevator belt assembly should be checked for wear or damage to the belt, worn or damaged buckets, proper tension of the belt and proper alignment on the head pulley. Normally, a new belt assembly is required to replace a worn or damaged elevator belt assembly.

**DANGER: Before initiating maintenance procedures, be sure that all power sources are disconnected from the machine and accessories to avoid personal injury from electrical power or from rotating parts.**

Buckets are the bolt-on type and easily replaced. Check condition of bolt heads for damage and wear. Badly worn bolt heads can lead to the buckets pulling off of the belt. All buckets should be inspected periodically for wear or damage. They should be replaced when the front lip of the buckets wear down 3/4 inch.

After a long period of use, the stretching of the rubber belt may cause the belt take-up arrangement to become ineffective, making it necessary to shorten the belt. Remove the side panel located at the bottom section of the elevator in front of the boot pulley for access to the belt and its splice. Make sure that the head pulley is lowered to its lowest position. Undo the belt splice. By measurement, cut off the excess length and punch new holes in the belt for

reconnection. Use a belt puller while making the splice. This will result in a tight belt and allow ample take-up for future needed belt tension. Retighten the belt by the take-up screw at the head section.

When a worn elevator belt needs replacement, remove the elevator side panel at the boot of the elevator to undo the splice and carefully take out the old belt. You may use the old belt to help pull in the new belt if desired. See note below. Since every belt is “tailor” fitted to each individual elevator assembly, the new belt supplied will probably be 4” to 8” longer than needed. To determine the correct belt length required, measure the distance of the path of the belt around both top and bottom pulleys. Make sure that the head pulley is lowered to the lowest position at the time of measurement. Cut-off must be square. This will result in a tight belt to begin with and allow ample take-up for future needed tension. After the belt is cut, punch in the holes for the splice and bolt the splice on one end of the belt only.

**Note:** While the belt is out of the machine, inspect the boot pulley and head pulley and bearings for wear or damage. Replace any defective parts. The belt assembly can be fed into the elevator housing through the bottom panel opening and pulled up and over the top pulley (use the old belt or rope wrapped over the top (head) pulley), making sure that the buckets are headed in the proper direction for discharge of abrasive into the elevator from the top and fed down the sides of the head pulley. After the belt is “hung” on the top pulley, pass one end of it under and around the boot pulley and complete the belt splicing by using a belt puller while making splices.

Proper belt tension can be judged by making the following observations:

**a.** The boot pulley should rotate constantly without slipping or hesitation.

**b.** The unloaded belt should run generally on the center of the elevator pulleys with a minimum of movement from side to side. The elevator buckets should not strike the sides of the housing.

**c.** It should be difficult to manually slide the elevator belt back and forth across the face of the boot pulley when the elevator is stopped. The tension of the elevator belt, however, should not be so great that there is danger of tearing out the splice. Belt tension can be adjusted by the screw take-up arrangement at the head section of the elevator. The head pulley can be raised or lowered, within the mechanical take-up limits, by the take-up bolts.

Inspection of the elevator belt alignment is very important. If the belt is permitted to run off center and rub against the elevator housing, the abrading action will eventually damage the elevator housing and belt. Also, an overload is put on the drive motor, which may cause the overload relays to kick out. A take-up screw is provided on each side of the head shaft for maintaining proper alignment. When aligning the elevator belt, make only a slight adjustment at a time, raising the head shaft on the side toward which the belt is riding. Using caution and keeping hands away from top opening, the top cover plate can be removed to permit viewing the belt alignment on the head pulley while the belt is running. Refer to Section 9 “Troubleshooting” for elevator malfunctions and suggested remedies.

#### 8.1.5.3 Elevator Drive

The gear motor for the elevator drive should be checked for oil level. If required, refer to gear motor's instruction sheet in Commercial Parts Manuals, Section 10 for proper lubricant. Refer to Section 8, Paragraph 8.2 for recommendations on lubricating machine components.

#### 8.1.5.4 Elevator Casing, Dribble Valve & Refuse Tubing

Regular inspection of the above parts should be made to detect any wear conditions, physical damage, missing parts, or component failure. Repair or replace components as required.

#### 8.1.5.5 Slide Valve Assembly, Control Valve & Feed Hose

Regular inspection of the above parts should be made to detect any wear conditions, physical damage, or component failure. Repair or replace components as required.

#### 8.1.5.6 Bearings

The bearings should be checked for wear. If serious bearing wear is evident the bearings should be replaced. Most bearings are **LUBRICATED FOR LIFE** and **DO NOT REQUIRE LUBRICATION**.

#### 8.1.5.7 CFS Separator Assembly

The purpose of the separator is to remove scale, dust and other fine materials from the usable shot (media). This separation is extremely important, since failure to remove these contaminants from the media will not only decrease the productivity (cleaning capability) of the machine, but will also increase the rate of wear on the machine and may cause dust build up on parts.

The satisfactory performance of the machine is dependent on the proper adjustment and maintenance of the separator. It is of utmost importance that the operation be constantly checked. Particular attention should be given to the flow of abrasive as it passes through the separator baffle assembly. The separator assembly should be adjusted so that a uniformly thick falling stream of abrasive material is spread across the full width of the separator. This insures that the abrasive material will be properly exposed to a uniform flow of air through the separator for the air wash separation.

**NOTE: A FULL WIDTH UNIFORMLY THICK CURTAIN MUST BE MAINTAINED IN THE SEPARATOR AT ALL TIMES FOR PROPER CLEANING OF THE MEDIA.**

To maintain a uniformly thick full curtain of media across the full width of the separator, the swinging baffle must be properly balanced. This can be accomplished using the counterweight system supplied for the swinging baffle.

Be sure the swinging baffle and adjustable lip are straight and have not been damaged in shipment. The blast gate, at the air outlet vent on the separator, can be adjusted to accurately control the size of the abrasive material that will be removed from the good shot (media).

The components of the separator are subject to very little wear. However, they should be inspected periodically and any damaged components should be repaired or replaced.

Refer to Section 9 “Troubleshooting” for separator malfunctions and remedies.

**WARNING: If tramp metal or large particles fall into the storage hopper and enter the wheel, the wheel components may shatter and clause severe damage or possible injury.**

### 8.1.6 Ventilation System – Provided by customer or as an option

The ventilation system requires regular inspection of parts and components to insure design performance, and to insure that an adequate flow of air exists and is maintained.

The vent piping from the machine to the dust collector should be checked periodically for wear and leaks. Replace or repair defective parts. The blast gates that adjust machine ventilation should be inspected regularly and replaced as required.

### 8.1.7 Electrical

**DANGER: Before initiating maintenance procedures, be sure that all power sources are disconnected from the machine and accessories to avoid personal injury from electrical power or from rotating parts.**

For the machine to perform efficiently, the electrical equipment must undergo periodic inspection to detect any wear conditions, physical damage, loose connections, or component failure. Refer to Section 9 “Troubleshooting” for electrical equipment malfunctions and remedies. Regular maintenance inspections should be performed with particular emphasis on the following:

#### 8.1.7.1 Control Panel

Check out electrical wires and connections for looseness, damage, and proper insulation. Tighten, repair, or replace.

#### 8.1.7.2 Electric Motors

Periodically inspect the motors for excessive dirt, vibration, or abnormal conditions. Clean, correct, or replace as necessary. Keep the ventilation openings of the motor clear to allow free passage of air.

If excessive friction and overheating of bearings is noted, it is usually caused by the following factors:

1. Bent motor shaft
2. Poor alignment
3. Lubrication – over/under

The bearings of these motors are pre-lubricated with grease by the Manufacturer and should be lubricated after one year of operation. Refer to the Manufacturer’s nameplate for type of lubricant. An accurate greasing program should be followed when greasing motors for it has been determined that the greatest cause of bearing failure in motors is over greasing rather than under greasing. Refer to Section 8, Paragraph 8.2 for recommendations on lubricating machine components.

## 8.2 Lubrication-Oil & Grease

The life and performance of many components of the equipment are dependent on proper lubrication of components. Most bearings are

LUBRICATED FOR LIFE and DO NOT REQUIRE LUBRICATION. Only electric motors and reducers will require lubrication. Thorough lubrication, performed at regular intervals will aid greatly in prolonging the life of the machine components and in improving efficiency of operation.

NOTE: THE INTERVALS OF LUBRICATION ARE BASED ON NORMAL OPERATING CONDITIONS. IF SEVERE OPERATING CONDITIONS EXIST, SUCH AS EXTREMELY DUSTY CONDITIONS OR AN ABNORMAL AMOUNT OF STOPPING AND STARTING, IT MAY BE NECESSARY TO PERFORM THE LUBRICATION MORE FREQUENTLY.

While lubrication of the required components is essential, lubrication of some drive components of blast cleaning equipment can be detrimental. For example, chains and sprockets should not be lubricated with petroleum base material because the lubricant tends to accumulate metallic dust in the environment. This causes excessive wear on the chains and sprockets.
The following recommendations should be followed when lubricating machine components:

1. Shut off power to machine during lubrication.
2. Clean dust and contaminants from the points of lubrication.
3. Clean up excessive or spilled lubricants from the equipment.
4. Use clean lubricants.
5. Do not over lubricate. This could result in overheating and possible damage of the components.
6. The oil in oil-lubricated devices should be changed if the oil shows traces of dirt or shows the effects of high temperature operation, which is evident, by the discoloration of the oil or odor.
7. Drain dirty oil while the unit is still warm, examining for contamination by metal particles.
8. KEEP IT CLEAN & MAINTAIN CLEANLINESS.

## 8.3 Inspection Checklist

**LOCK IT OUT – THE LIFE YOU SAVE MAY BE YOUR OWN**

### Daily Inspection Checklist

| Date: | Checked by: | Wheel Hour Meter: |
|---|---|---|

| Inspection Item | *Sun* | *Mon* | *Tue* | *Wed* | *Thu* | *Fri* | *Sat* | *Remarks* |
|---|---|---|---|---|---|---|---|---|
| **Pre-Production** | | | | | | | | |
| Visual inspection of the machine | | | | | | | | |
| Check abrasive level in adder hopper | | | | | | | | |
| **During Production** | | | | | | | | |
| Blast wheel amperage | | | | | | | | |
| Listen for unusual noises or operation | | | | | | | | |
| Dust collector photohelic gauge | | | | | | | | |
| Dust collector afterfilter magnehelic gauge | | | | | | | | |
| Dust emissions | | | | | | | | |
| Dust collector pulse valves are operating | | | | | | | | |
| Dust collector – drain water from header | | | | | | | | |
| Dust discharge drum | | | | | | | | |
| Separator curtain | | | | | | | | |
| Abrasive control valves | | | | | | | | |
| Abrasive leaks | | | | | | | | |
| Compressed air leaks | | | | | | | | |
| Fines drum | | | | | | | | |
| Trash drum | | | | | | | | |
| Drain water traps | | | | | | | | |
| General machine operation | | | | | | | | |
| Gearbox condition and any leaks | | | | | | | | |
| **Post-Production** | | | | | | | | |
| Check for debris around machine | | | | | | | | |
| Check trash drum | | | | | | | | |
| Check fines drum | | | | | | | | |
| Check dust collector drum | | | | | | | | |
| Check separator screen | | | | | | | | |

**Comments:**

**LOCK IT OUT – THE LIFE YOU SAVE MAY BE YOUR OWN**

## Weekly Inspection Checklist

| Date: | Checked by: | Wheel Hour Meter: |
|---|---|---|
| *Inspection Item* | *Checked* | *Remarks* |
| **Blast Wheels** | | |
| Blades, impellers, control cages | | |
| Blast wheel liners | | |
| **Blast Cabinet Interior** | | |
| Cabinet integrity & general condition | | |
| Cast liner package | | |
| **Reclaim System** | | |
| Elevator belt condition and tracking | | |
| Elevator buckets | | |
| Separator screen – clear of debris | | |
| Feed pipes wear and connections | | |
| Overflow hoses wear and connections | | |
| Abrasive valves and Bimba cylinders | | |
| **General** | | |
| Check for debris in/around machine | | |
| Trash and fines drums – also check daily | | |
| Dust collector photohelic gauge | | |
| Dust collector afterfilter magnehelic gauge | | |
| Dust collector drums – also check daily | | |
| Dust collector header – drain water | | |
| Drain water and oil from filters/water traps | | |
| Gearbox condition – condition and leaks | | |
| Proximity switches | | |

**Comments:**

# Operator's Operation & History Report (example)

| Date | Shift | Blast Hour Meter Reading | Wheel Amperages | | | | DC Filter Readings | | Abrasive Additions In Lbs |
|---|---|---|---|---|---|---|---|---|---|
| | | | Wheel # 1 | Wheel # 2 | Wheel # 3 | Wheel # 4 | Primary | After Filter | |
| | | | | | | | | | |
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# Section 9 Troubleshooting

Before attempting any troubleshooting, maintenance personnel and operating personnel should become thoroughly familiar with the equipment.

**Follow your Lockout / Tagout procedure (See Safety – Warning & Precautions Section)**

Before making any repair or replacement of defective parts, it is very important that the reason for the original failure be determined and corrected. A failure to correct the cause of the problem will inevitably lead to a reoccurrence of the problem, etc.

Blast equipment will often continue to operate and will do an acceptable job even though some of the mechanisms or components are not functioning properly causing a decrease in efficiency. It is important for maximum efficiency, that troubleshooting be performed if either of the following is noted:

1. Increase in abrasive consumption,
2. Decrease in cleaning efficiency.

As an aid to troubleshooting when a deficiency is noted in one of the elements or mechanism of the equipment, the following tables are provided. These tables list the most common troubles, their probable cause, and remedies:

## 9.1 Blast Wheel Assembly

| Potential Problem | Probable Cause | Possible Remedy |
|---|---|---|
| **Excessive vibration** – usually indicates that the Wheel Assembly is out of balance.<br>This condition will eventually cause motor or unit bearing failures. | 😐 Unevenly worn wheel, blades, hub, and/or impeller. | ☺ Replace worn parts and check separator operation for removal of contaminants. |
| | 😐 Broken or chipped blades. | ☺ This condition will throw the wheel permanently out of balance and cause damage to other parts of the unit. Replace broken blades immediately using full set of new blades. Retrieve all broken parts before operating the equipment. |
| | 😐 Improperly mounted wheel. | ☺ Wheel must be squarely mounted and evenly tightened onto hub or motor shaft – check wheel for wobble. |
| **Drop in blast wheel amperage.** | 😐 Not enough abrasive getting to the blast wheel. | ☺ Check the level of abrasive in the storage hopper. If the level is low, add abrasive to the system. If the abrasive level seems adequate, check the abrasive valve & blast wheel feed spout for blockage. |
| **Excessive noise** – besides being undesirable, it may also indicate misalignment of wheel components that cause failures or wear. | 😐 Improper clearances between wheel and feed spout, wheel and wheel compartment liner or control cage and impeller. | ☺ Check alignment and clearance of components in relation to each other. Allow equal clearances between moving parts to avoid pinch points and prevent contact against one another. |

| Potential Problem | Probable Cause | Possible Remedy |
|---|---|---|
| | 😐 Loose bolts or misalignment | ☺ Make certain that all components are firmly secured. |
| | 😐 Defective bearings | ☺ Check the rotation of the unit bearing or the drive motor. Both should rotate freely and smoothly. Repair or replace bad bearings or motors. |
| **Increased Cleaning Time** | 😐 Improper abrasive feed to wheel. | ☺ If an ammeter check indicates a lower ampere reading than the normal full load rating, check:<br>**a.** Quantity of abrasive and add if level is low.<br>**b.** Abrasive control valve adjustment for proper abrasive flow rate.<br>**c.** Abrasive may contain a large percentage of fines and other contaminants, which should have been removed by the separator – check ventilation system, swinging baffle operation, and abrasive screen analysis.<br>**d.** Feed line obstructions may cause reduced flow to the wheel, check and clean out. |
| | 😐 Loss of Directional Control of Blast Pattern. Abrasive will strike sections of the wheel housing, or cabinet components other than work to be blasted. This increases cleaning time, wear, and maintenance. | ☺ Conduct a blast pattern test. Make certain that you have definitely located the usable blast pattern. Adjust control cage accordingly so that the blast pattern is directed onto the work most effectively. |
| **Blast wheel shutdown** | 😐 Abrasive valve worn causing overload. | ☺ Replace the worn abrasive valve parts. |
| **Abrasive Leakage** | 😐 Improper sealing. | ☺ Check wheel housing and motor shaft seal. |

## 9.2 Elevator

| Potential Problem | Probable Cause | Possible Remedy |
|---|---|---|
| **Elevator shutdown** | 😐 Loose belt or boot jam | ☺ Tension the belt or clear the jam.<br>**Follow safety instructions sign when working on elevator. Reference Safety – Warning & Precaution Section** |
| **Elevator Belt Slippage** | 😐 Loose elevator belt. | ☺ Tighten belt by screw take-up arrangement at head section. If belt is stretched so that take-up is ineffective, shorten belt. |
| | 😐 Worn pulleys, travel of belt and rotation of boot pulley are erratic. | ☺ Rubber lagging on pulley may be worn. Replace or re-lag pulley. |
| **Jammed Elevator Belt** | 😐 Foreign objects in elevator boot jam against buckets and casing causing stall. | ☺ Inspect and clean boot section periodically.<br>**Follow safety instructions sign when working on elevator. Reference Safety – Warning & Precaution Section.** |
| | 😐 Worn buckets - Elevator buckets are worn so that they no longer carry the pre-determined load. | ☺ Replace buckets. If belt shows considerable wear, replace complete assembly. |
| | 😐 Excessive abrasive loading | ☺ Make abrasive (media) additions slowly. Check abrasive control valve flow rate adjustment. DO NOT overload wheel above rated capacity. |
| | 😐 Belt rubs casing causing motor overload relays to kick out. | ☺ Check belt alignment to keep elevator belt centered on pulleys. |
| | 😐 Mechanical bind – motor overload relays kick out. | ☺ Check for mechanical binds in motor or gearbox. Check for bad bearings. |
| | 😐 Abrasive control valve leaks abrasive | ☺ Lack of air pressure to keep valve closed. |
| | | ☺ Worn parts. Check and replace worn parts. |
| **Elevator Belt Failure** | 😐 Belt too tight – breakage may occur at splice | ☺ Belt should be adjusted to proper tension. When belt is under proper tension, splice is not overstressed. |
| | 😐 Foreign objects in boot cause sudden jamming, belt stretches and breaks. | ☺ Sudden jams should be avoided. Keep boot section clean; remove foreign objects.<br>**Follow safety instructions sign when working on elevator. Reference Safety – Warning & Precaution Section** |

| Potential Problem | Probable Cause | Possible Remedy |
|---|---|---|
| | 😐 Badly worn belt may suddenly break. | ☺ Inspect belt and splice. Replace when necessary. |
| **Belt does not run at center of head pulley.** | 😐 Improper adjustment of head pulley. | ☺ Realign pulley by means of the adjusting screws on elevator head section. |
| | 😐 Improper splicing results in crooked belt, which rides from side to side on head pulley. | ☺ Be sure that splice and belt are squarely assembled. |
| | 😐 Worn crown on head pulley causes belt to ride on one side or the other. | ☺ Check head pulley. These are crown face pulleys. If crown is worn, replace pulley. |
| | 😐 Belt cannot be aligned properly although all components seem to be in proper condition. | ☺ Check overall alignment of head and boot pulley by dropping plumb line from top to bottom – realign if necessary. |

## 9.3 Separator

To determine if the separator is functioning properly, make a visual analysis of the abrasive after separation and of the material from the separator refuse discharge spout.

| Potential Problem | Probable Cause | Possible Remedy |
|---|---|---|
| **Removing good abrasive** | 😐 Too much air on separator | ☺ Adjust blast gate setting. |
| | 😐 Full curtain is not maintained across separator. | ☺ Check stationary baffle and swinging baffle operation. Adjust baffles as needed to obtain a full curtain. |
| **Reduced air flow** | 😐 Air leaks in metal case or vent piping connections. | ☺ Repair or replace as necessary. |
| | 😐 Air leak from discharge tubing. | ☺ Verify the dribble valve on the fines discharge tube is sealing and in good operating condition. |
| **Contaminated Abrasive.** | 😐 Insufficient flow of air delivered by ventilation. | ☺ Adjust blast gate setting. |
| | | ☺ Check line for blockage. |
| | | ☺ Check fan output. |
| | 😐 Full curtain is not maintained across separator. | ☺ Check stationary baffle and swinging baffle operation. Adjust baffles as needed to obtain a full curtain. |
| | 😐 Fines hopper and tube are plugged. | ☺ Clean out tube and fines hopper. |
| | 😐 Magnets on drum not properly positioned. (This is only on magnetic separator designs.) | ☺ Confirm proper position and secure mounting of magnet assembly using external scribe mark reference guides on shaft end and locking collar. |
| | 😐 Burden Plate not in proper position. (This is only on magnetic separator designs.) | ☺ Verify position of burden plate to insure effective retention of abrasive and sand mixture against rotating drum. |
| **Good abrasive in separator fines discharge.** | 😐 Too much air through separator. | ☺ Adjust slide gate. |
| | | ☺ Check fan output. |
| | 😐 Hopper overfilled. | ☺ Control additions. |
| | 😐 Magnets on drum not properly positioned. (This is only on magnetic separator designs.) | ☺ Confirm proper position and secure mounting of magnet assembly using external scribe mark reference guides on shaft end and locking collar. |

| Potential Problem | Probable Cause | Possible Remedy |
|---|---|---|
| | 😐 Burden Plate not in proper position. (This is only on magnetic separator designs.) | ☺ Verify position of burden plate to insure effective retention of abrasive and sand mixture against rotating drum. |

## 9.4 Ventilation System

Proper maintenance of the ventilation system is just as important as the servicing of other elements of the blast equipment.

The following troubleshooting chart is provided as an aid for maintaining adequate and efficient ventilation.

| Potential Problem | Probable Cause | Possible Remedy |
|---|---|---|
| **Abrasive carryout to dust collector.** | 😐 Too much air. | ☺ Close cabinet vent blast gate slightly. |
| **Fines and contaminants not properly removed from abrasive.** | 😐 Too little air or improper separator adjustments. | ☺ Open separator blast gate slightly.<br>☺ Check for build-up of particles in ductwork, clean out as needed.<br>☺ Check dust collector discharge container – every shift. Empty before container is full. |
| **Contaminated abrasive –** fines and contaminants not properly removed from abrasive. | 😐 Insufficient flow of air through separator to collector. | ☺ Check exhaust fan rotation.<br>☺ Open blower exhaust damper if present.<br>☺ Check Magnehelic reading.<br>☺ Check pulse or shaker operation of collector and increase, if necessary.<br>☺ Replace filters, if necessary. |

## 9.5 Electrical Equipment

**Note: Disconnect all electrical power sources before attempting maintenance or repair.**

### 9.5.1 Motors

| Potential Problem | Probable Cause | Possible Remedy |
|---|---|---|
| **Wheel Motor** | 😐 Overheats and overloads trip out. | ☺ Check for mechanical binds. |
| **Elevator Motor** | 😐 Overheats or motor stops. | ☺ Check tightness of elevator belt and if centered on top pulley. |
| **Electric Motors do not Start** | 😐 Main power cable disconnected at electrical source.<br>😐 Blown Fuses<br>😐 Applicable motor starter overload relay trips out. | ☺ Check main power cable at electrical source. Must be 230, 460 or 575 volt, 60 hertz, 3 phase<br>☺ Check fuses. Replace if defective.<br>☺ Reset starter. |
| **Electric Motors do not Come Up to Speed, Run Slow** | 😐 All phases of 230 or 460-volt supply not connected properly.<br>😐 One fuse blown in disconnect box. | ☺ Recheck wiring for loose or improper connections.<br>☺ Check all fuses. Replace as required. |

### 9.5.2 Starters and Control Panel

| Potential Problem | Probable Cause | Possible Remedy |
|---|---|---|
| **Overload Relay** | 😐 Overloads trip out. | ☺ Do not increase the overload setting; check load with ammeter; compare with overload relay setting. If load is excessive, determine cause and correct. |
| **Contacts and Contact Spring** | 😐 Contacts badly pitted. | ☺ Replace |
| **Fuse Protection** | 😐 Fuses blow. | ☺ For the occasional "blow", fuses may be loose in fuse holders, or temporarily overloaded. If persistent, check for grounded circuit, bare wire. |
| **Overload Relays Trip continuously** | 😐 Overload in circuit low power.<br>😐 Broken, damaged, or loose wiring.<br>😐 Dirt or contaminants at terminals. | ☺ Shut down particular circuit. Check power source for proper voltage.<br>☺ Inspect wiring for broken, cut wires and loose terminals. Replace/repair as required.<br>☺ Clean contacts and terminals. |
| **Wheel Motor Sound Not Continuous** | 😐 Abrasive level low.<br>😐 Loose connectors.<br>😐 Abrasive system clogged or damaged. | ☺ Add abrasive to specified level.<br>☺ Tighten electrical connectors.<br>☺ Clean or replace defective parts. |

### 9.5.3 Control Accessories – Operator's Control Panel

| Potential Problem | Probable Cause | Possible Remedy |
|---|---|---|
| **Pushbuttons** | 😐 Buttons stick.<br>😐 Erratic Operation | ☺ Probable cause – abrasive dust. Remove cover and clean.<br>☺ Check contacts for dirt, springs broken or out of place. |
| **Ammeter** | 😐 Dirty<br>😐 Inaccurate reading<br>😐 Failure | ☺ Carefully clean ammeter with a fine brush.<br>☺ Bent indicator pointer. Replace meter.<br>☺ Replace meter. |

## Section 10 Commercial Parts Manuals

| Commercial Part Model No. | Location on Machine | Web Address for Manual |
|---|---|---|
| Baldor | Blast Wheel | http://www.baldor.com/ |
| Nord | Lower Reclaim | http://www.nord.com/main/index.cfm |
| SEW-Eurodrive | Lower Reclaim | http://www.sew-eurodrive.de/englisch/index.en.html |
| Reliance Electric | | http://www.reliance.com/ |
| Boston Gear | | http://www.bostongear.com/ |
| Browning | | http://www.emerson-ept.com/ |
| Cleveland Gear | | http://www.clevelandgear.com/ |
| Cone Drives | | http://www.conedrive.textron.com/index.htm |
| Dodge | | http://www.dodge-pt.com/ |

# Section 11 General Installation Notes

## 11.1 Rigging Instructions

1. Use all lifting points provided on the unit
2. Use screw pin clevises, not hooks on lifting slings.
3. Use spreader bars to prevent damage to the unit's frame.
4. Refer to Wheelabrator approved drawings for the weight and dimensions of the unit, subassemblies, and accessories to ensure adequate crane capacity.
5. Only qualified personnel should be allowed to lift or rig the equipment.
6. Refer to applicable OSHA regulations and local codes when using cranes, forklifts, and other lifting equipment.
7. Lift the unit and accessories separately, and assemble after the unit is in place.
8. Use drift pins to align holes during assembly.

## 11.2 Fixing the Blast Machine to the Foundations

### Installation without Anchor Bolts

In order to fix the blast machine proceed as follows:

- Ensure the foundation is level and straight. Use a transit to determine the shims required.
- Ensure the equipment is correctly aligned with the center line or datum.
- Ensure the equipment is straight and square with all adjacent equipment and components.
- Ensure the machine has been correctly levelled and aligned and that sufficient shims have been placed to properly support the equipment.
- Ensure all connections have been made and the equipment will not be adjusted further prior to anchoring in place.
- Drill the foundation holes. Take heed of the prescribed hole diameter and depth.
- Thoroughly clean the foundation holes:
- Blow out at least twice. Brush out twice and blow out twice. Poor hole cleanliness = reduced load capacity
- Fill the foundation hole with the fixing mortar ensuring there are no air bubbles (approx. two thirds of depth).
- Push, and simultaneously turn slightly, the anchoring element to the bottom of the foundation hole. Excess mortar should exit the foundation hole when the

anchoring element is in position. If no mortar reaches the surface immediately pull out the threaded rod and inject more mortar into the hole.

- The fixing is only capable of carrying loads after the elapse of the hardening time.

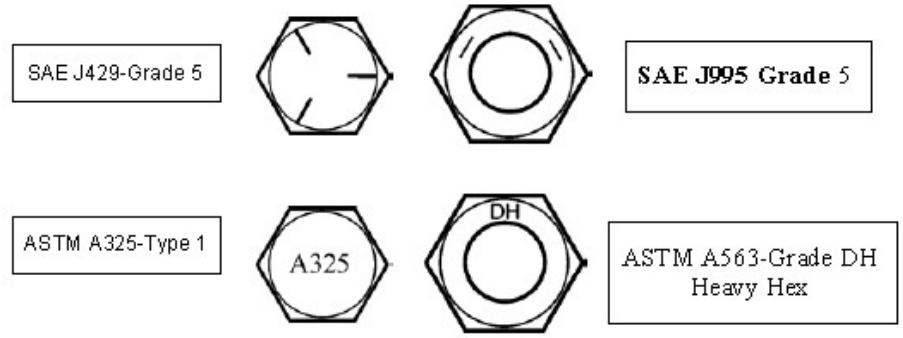
## 11.3 Machine Assembly

1. The customer should mark the center line.
2. The customer should mark the reference points.
3. Determine and mark the axis of lower screw conveyor.
4. Place the machine housing on the center axis. Align and level the machine according to the General Arrangement drawing.
5. Determine the machine housing height from the 0 height (from customer) and level off the housing.
6. Dock machine vestibule housing. Bolt together the connecting joint.
7. Assemble all lower screw conveyor troughs.
8. Assemble all lower screw conveyor to the elevator boot.
9. Bolt the lower elevator to the screw conveyor.
10. Assemble the lower screw conveyor with geared motor.
11. Assemble the lower platform to the blast cabinet.
12. Assemble the platform between the bucket elevator and blast cabinet.
13. Mount the upper and lower blast wheel drive motors (if the blast wheels are not assembled, install these first). Ensure to torque wheel mounting bolts per fastener torque table located later in this chapter.
14. Assemble the upper platform with abrasive storage hopper and abrasive replenisher, together with the abrasive feed valves.
15. Assemble the dust discharge screw conveyor, to the platform.
16. Assemble the abrasive separator.
17. Assemble the upper elevator, with the discharge casing and screw conveyor.
18. Assemble the platform.
19. Assemble the dust collector ducting system.
20. Assemble the rotary blower with ducts.
21. Assemble the upper screw conveyor with geared motor.
22. Install the electrical connection between the elevator drive motor and the local switch. (On and Off as well as the emergency stop switch)
23. Install the elevator belt and assemble the buckets. (Securely tighten the bucket screws)
24. Centralize the elevator belt at the top and bottom.
25. Assemble the compressed air lines.
26. Complete the internal electrical connections to the terminal boxes.
27. Weld the machine feet to the floor plates and secure with foundation bolts.
28. Assemble the noise enclosure (optional).

29. Lay the electric cables in the cable channels and connect the electric motors.

## 11.4 Hardware

All threaded fasteners used on Wheelabrator should be SAE J429 Grade 5 for bolts and SAE J995 Grade 5 Hex Nut. An equivalent to this is an ASTM A325 –Type 1 bolt and an ASTM A563 Grade DH Heavy Hex Nut can also be used. All washers are to be grade 8 SAE, or ASTM F436.




NOTE: **ONLY FLAT WASHERS** are to be **Grade 8**. Lock Washers to be Grade 5 like the rest of the hardware.

### 11.4.1 Imperial

| ES20- Wheelabrator Torque Guide for Common Fasteners - Imperial | | | | | | | |
|---|---|---|---|---|---|---|---|
| Nominal Diameter (in) | Threads per Inch | SAE J429 Grade 5 * | | | SAE J429 Grade 8 ** | | |
| | | Clamp Load (lbs) | Tightening Torque ft-lbs | [Nm] | Clamp Load (lbs) | Tightening Torque ft-lbs | [Nm] |
| Unified Coarse Thread Series | | | | | | | |
| 1/4 | 20 | 2029 | 8 | [ 11 ] | 2864 | 12 | [ 16 ] |
| 5/16 | 18 | 3342 | 17 | [ 24 ] | 4719 | 25 | [ 33 ] |
| 3/8 | 16 | 4940 | 31 | [ 42 ] | 6974 | 44 | [ 60 ] |
| 7/16 | 14 | 6777 | 49 | [ 66 ] | 9568 | 70 | [ 95 ] |
| 1/2 | 13 | 9046 | 75 | [ 102 ] | 12771 | 106 | [ 144 ] |
| 5/8 | 11 | 14408 | 150 | [ 203 ] | 20340 | 212 | [ 287 ] |
| 3/4 | 10 | 21322 | 267 | [ 362 ] | 30101 | 376 | [ 510 ] |
| 7/8 | 9 | 29436 | 429 | [ 582 ] | 41556 | 606 | [ 822 ] |
| 1 | 8 | 38616 | 644 | [ 873 ] | 54517 | 909 | [ 1232 ] |
| Fine Thread Series | | | | | | | |
| 1/4 | 28 | 2319 | 10 | [ 13 ] | 3274 | 14 | [ 19 ] |
| 5/16 | 24 | 3702 | 19 | [ 26 ] | 5226 | 27 | [ 37 ] |
| 3/8 | 24 | 5599 | 35 | [ 47 ] | 7905 | 49 | [ 66 ] |
| 7/16 | 20 | 7568 | 55 | [ 75 ] | 10684 | 78 | [ 106 ] |
| 1/2 | 20 | 10197 | 85 | [ 115 ] | 14396 | 120 | [ 163 ] |
| 5/8 | 18 | 16317 | 170 | [ 230 ] | 23036 | 240 | [ 325 ] |
| 3/4 | 16 | 23776 | 297 | [ 403 ] | 33566 | 420 | [ 569 ] |
| 7/8 | 14 | 32479 | 474 | [ 643 ] | 45853 | 669 | [ 907 ] |
| 1 | 14 (UNS) | 43343 | 722 | [ 979 ] | 61190 | 1020 | [ 1383 ] |

Clamp load estimated as 75% of proof load for specified bolts

Values calculated under assumption of plain and dry conditions

* SAE Grade 5 Values can be used for ASTM A325 hardware

** SAE Grade 8 Values can be used for ASTM A490 hardware

reference: Fastenal Technical Reference Guide s7028

### 11.4.2 Metric

| Wheelabrator Torque Guide for Common Fasteners - Metric | | | | | |
|---|---|---|---|---|---|
| Nominal Diameter (mm) | Pitch | Class 8.8 | | Class 10.9 | |
| | | Clamp Load (lbs) | Tightening Torque (ft-lbs) | Clamp Load (lbs) | Tightening Torque (ft-lbs) |
| 5 | 0.8 | 1387 | 4.5 | 1985 | 6.5 |
| 6 | 1.0 | 1968 | 7.7 | 2816 | 11.1 |
| 7 | 1.0 | 2822 | 13.0 | 4039 | 18.5 |
| 8 | 1.3 | 3580 | 18.8 | 5123 | 26.9 |
| 10 | 1.5 | 5671 | 37.2 | 8115 | 53.2 |
| 12 | 1.8 | 8240 | 64.9 | 11792 | 92.8 |
| 14 | 2.0 | 11289 | 103.7 | 16154 | 148.4 |
| 16 | 2.0 | 15320 | 160.8 | 21924 | 230.1 |
| 18 | 2.5 | 18822 | 222.2 | 26934 | 318.0 |
| 20 | 2.5 | 23938 | 314.1 | 34256 | 449.4 |
| 22 | 2.5 | 29669 | 428.2 | 42457 | 612.7 |
| 24 | 3.0 | 34471 | 542.7 | 49329 | 776.6 |
| 27 | 3.0 | 44924 | 795.7 | 64288 | 1138.7 |
| 30 | 3.5 | 54819 | 1078.8 | 78448 | 1543.8 |
| 33 | 3.5 | 67821 | 1468.2 | 97055 | 2101.0 |
| 36 | 4.0 | 79866 | 1886.1 | 114291 | 2699.1 |

Clamp load estimated as 75% of proof load for specified bolts

Values calculated under assumption of plain and dry conditions

reference: Fastenal Technical Reference Guide s7028

## 11.5 Seals between mating surfaces

### 11.5.1 Flanged surfaces

For Wheel Blast machines, all flanged assembly connections must be sealed using a felt gasket. Wheelabrator has standardized using 1/8” thick x 2” wide felt on joints between cabinets and vestibules, blast wheel mounting, access doors, flange plates and various other removable assemblies around the machines.

1/8” x 2” Adhesive backed Felt Item Number C15000

For field repairs where it is impractical or not possible to dismantle the machine to add a seal, an acceptable gasket material is Butyl caulk material (Silicon is not an option).

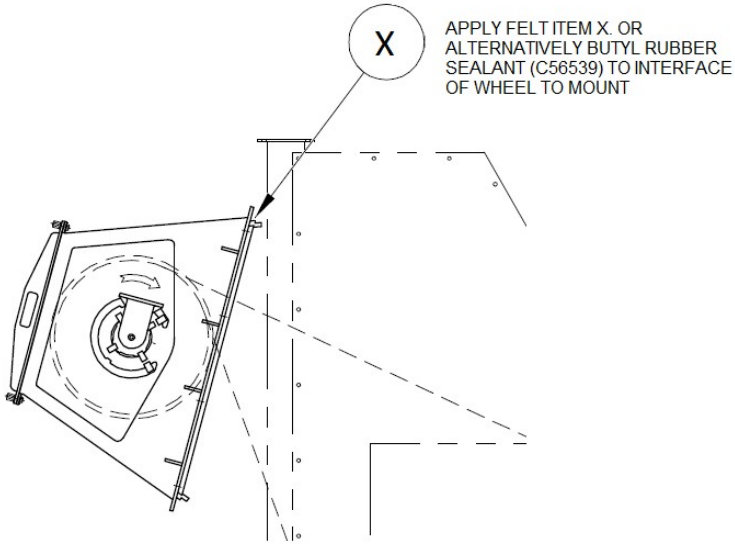
Butyl rubber sealant Item number C56539.

### 11.5.2 Wheel Housings

Felt (C15000) or alternatively butyl rubber sealant (C56539) can be used to seal wheel housing to the cabinet.

Do not use silicon-based sealant as it could negatively affect downstream processes such as paint.

Wheel arrangements can be noted as follows:



### 11.5.3 Ducting

Ducting is to be sealed with sealer not duct tape.

## 11.6 Lubrication-Oil & Grease

The life and performance of many components of the equipment are dependent on proper lubrication of components. Unless otherwise specified in the operating manual all bearings are LUBRICATED FOR LIFE and DO NOT REQUIRE LUBRICATION.