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Operating Instructions for the ProFormer™ Cabinet System Pressure and Suction



 **EMPIRE**
ABRASIVE EQUIPMENT
2101 West Cabot Boulevard
Langhorne, PA 19047-1893
www.empire-airblast.com



Model Number: _____ **Serial Number:** _____

Date of Purchase: _____ **Date of Installation:** _____

Distributor Purchased From:

Name: _____

Address: _____

Phone: _____

* * * * *

Manufactured by: EMPIRE ABRASIVE EQUIPMENT COMPANY
2101 West Cabot Boulevard
Langhorne, PA 19047-1893
Phone: 215-752-8800, Fax: 215-752-9373

Empire equipment should be properly maintained per the operating instructions. For peak performance of your equipment, use only genuine Empire replacement parts; accept no substitutes! **The use of non-Empire parts will void the warranty.**

PARTS AND SERVICE
1-800-497-4543

To order Empire replacement parts, contact your local authorized Empire distributor. For the name of your local distributor, call Empire Customer Service, 1-800-497-4543, or fax us at 215-752-9373, or e-mail us on our website www.empire-airblast.com and we will call you back.

CAUTION
Never use silica-based abrasives
in Empire blast systems.

***Operating Instructions
for the
ProFormer™ Cabinet System
Suction and Pressure
Empire Abrasive Equipment Company***

10/06/06

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Introduction

Congratulations on your selection of the ProFormer™ Cabinet System from Empire Abrasive Equipment Company. This manual is provided to assist you with the unpacking, assembly, use, and maintenance of your ProFormer™ Cabinet System.

Please read this manual carefully and keep it in the handy plastic pouch attached to your system for future reference. If you have any questions about the operation or maintenance of your equipment, contact your Empire distributor.

Empire: The leader in air-blast technology.

Empire specializes in the design and manufacture of air-blast equipment, and has continued as an industry leader of more than 50 years. Today, Empire produces the most extensive line of air-blast products in the world. In addition to ProFormer™ systems, our product line includes Pro-Finish® Cabinets, ECON-O-FINISH™ Cabinets, Modified Systems, Automated Blast Systems, Blast Rooms, and SuperBlast™ Portable Blasters.

Empire Abrasive Equipment Company's reputation as a leader in air-blast technology is the result of meeting our customer's demand for quality equipment and systems that deliver increased productivity. We support our equipment with training, service, and testing programs. When you need advice, assistance, or equipment on short notice, our national network of distributors assures that help is nearby.



Figure 1. ProFormer™ Cabinet System

1.0 Installation

1.1 Hand Tools Required

The following tools are recommended for the mechanical installation of your ProFormer™ Cabinet system:

- 6" adjustable wrench
- 9/16" wrench or socket
- 14" Pipe wrenches
- Channel Lock Pliers
- medium Phillips head screwdriver
- medium flat-blade screwdriver

1.2 Preparing for Installation

Your ProFormer™ system is fully assembled. Compressed air, earth ground, and electric power are all that need to be connected. The equipment must be placed on a level surface. **Do not** install your ProFormer™ system on a floor subject to wet conditions.

1.3 Getting Started

Step 1: Unwrap and remove the cabinet from the pallet.

Step 2: Using the built-in forklift channels at the bottom of the cabinet, move the system to the installation location.

Step 3: Insure there is adequate space on both sides of the cabinet for full opening of part loading/unloading and maintenance access doors. PF3642 cabinets require 37 inches and PF 4652 cabinets require 44 inches on each side of the cabinet.

1.4 Positioning the ProFormer™ System

Step 1: Place the cabinet and stabilize it by adjusting the leveling bolts to compensate for any unevenness in the floor.

Step 2: Insure that there is adequate space at both sides of the system for easy access to components such as the reclaimer on the left hand side and the dust drum and dust collector on the right hand side. There must be adequate space for work pieces to be easily loaded and unloaded through the cabinet doors.

Step 3: Leave a space of 6 to 8 inches behind the cabinet for the compressed air supply line. There is a 2 ½ inch hole provided on the bottom right side of the system back wall for air supply line access.

1.5 Electrical Connections

IMPORTANT

All electrical connections to the ProFormer™ cabinet should be made by a qualified electrician and must adhere to the codes, standards, and procedures specified by the authority having jurisdiction.

The customer is responsible for providing appropriate disconnecting means adjacent to the equipment for each incoming power circuit.

The standard power supply for the ProFormer™ 600 CFM, 1 ½ HP system is 220-240volts/60 cycle/single phase. Cabinets are also available pre-wired for the optional power supplies listed in section 8.0 *Options and Accessories*.

The standard 220-240 volt single-phase system is supplied with a 10 foot, 4-wire line cord which is connected to the cabinet light box. See Figure 3.

Canadian CSA approved single-phase cabinets have no line cord. Electrical connections are made in the cabinet light box. See Figures 3.

All three-phase systems have no line cord. Electrical connections are made in the transformer/contacter electrical box. See Figure 1.

If your system is a three-phase power supply, wire the system as shown in Figure 5.

Use the adjacent tables for the approximate current draw in amps for the voltage of your system.

SINGLE-PHASE SINGLE SOURCE		
SOURCE	MOTOR	CURRENT
110-120V/60HZ	1 ½ HP	23.0 A
220-240V/60HZ	1 ½ HP	13.0 A
220-240V/50HZ	1 ½ HP	15.0 A

THREE-PHASE SINGLE SOURCE		
SOURCE	MOTOR	CURRENT
208V/60HZ	1 ½ HP	9.3 A
220-240V/60HZ	1 ½ HP	8.1 A
440-480V/60HZ	1 ½ HP	4.0 A
550-600V/60HZ	1 ½ HP	3.2 A
380V/50HZ	1 ½ HP	3.9 A

THREE-PHASE & SINGLE-PHASE DUAL SOURCE		
SOURCE	MOTOR	CURRENT *
208V/60HZ	1 ½ HP	6.9 A
220-240V/60HZ	1 ½ HP	6.0 A
440-480V/60HZ	1 ½ HP	3.0 A
550-600V/60HZ	1 ½ HP	2.4 A
380V/50HZ	1 ½ HP	2.6 A

- The approximate single-phase current draw for all dual source systems is 3 amps at 110-120 VAC.

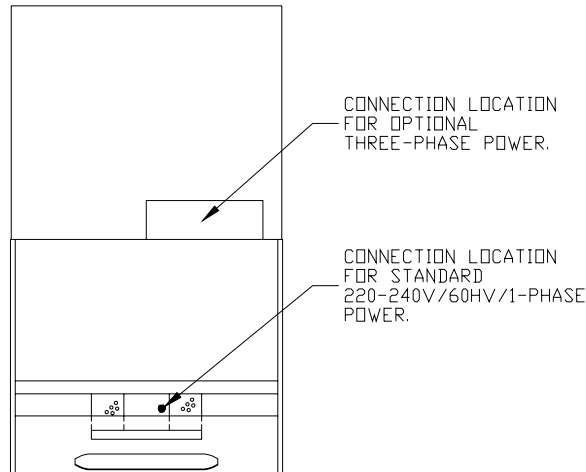


Figure 2. Electrical Connection Locations

The three-phase schematic shown in Figure 5 also appears on the back of the transformer/contactor electrical box cover.

The 10 foot, 4-wire line cord is located above the cabinet light box. The single-phase schematic shown in Figure 4 also appears on the back of the light box cover.

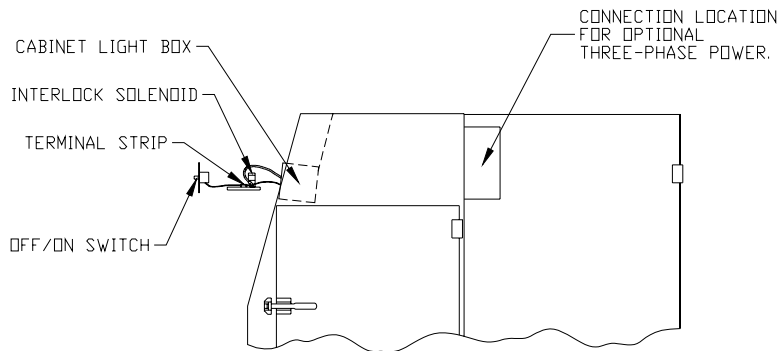


Figure 3. Single-Phase Terminal Board Access

For Canadian CSA approved single-phase cabinets, remove the four screws from the cabinet light box cover. Move the cover to the side and pull the attached terminal board plate from the light box as shown in Figure 3.

IMPORTANT

Before connecting power, check that the voltage requirements of your ProFormer system are consistent with the voltage available at the installation site.

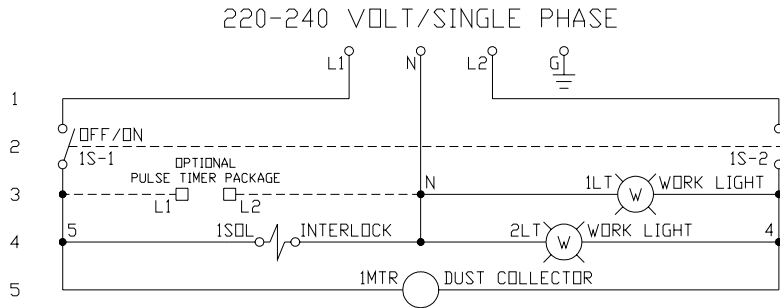


Figure 4. 220-240 Volt Single-Phase

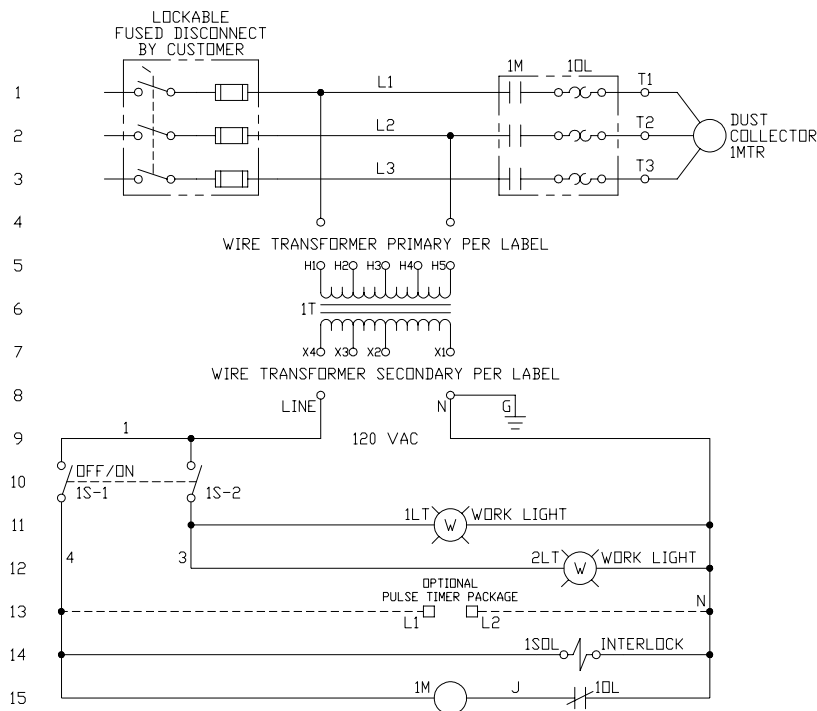


Figure 5. Three-Phase Option

Note: The transformer is not included with dual-source systems.

1.6 Compressed Air Connection

IMPORTANT

To operate properly, your ProFormer™ system requires clean, dry air. Moisture or oil in the compressed air supply can contaminate the abrasive, which can prevent it from flowing freely and cause inefficient blasting. Though your system is equipped with a general-purpose filter to remove small amounts of condensed water and oil from compressed air supply, this filter is not designed to clean grossly contaminated air.

Step 1: Using the following two charts, determine the proper air volume needed for your ProFormer™ system.

Step 2: The volume of air required for efficient operation of your system depends on the size of the nozzle you are using and the desired blast pressure. The chart lists the minimum air requirements in SCFM for various nozzles and pressures.

AIR REQUIREMENTS (SCFM) FOR SUCTION BLAST

	40 psi	60 psi	80 psi	100 psi
1/4" nozzle, 1/8" air jet	12	17	21	26
5/16" nozzle*, 5/32" air jet	19	27	34	42
3/8" nozzle, 3/16" air jet	29	39	50	62
7/16" nozzle, 7/32" air jet	38	52	66	80

AIR REQUIREMENTS (SCFM) FOR PRESSURE BLAST

	40 psi	60 psi	80 psi	100 psi
1/8" nozzle	10	14	17	20
3/16" nozzle*	22	30	38	45
1/4" nozzle†	41	54	68	81

* Standard nozzle

† 3/4" blast hose option is recommended to reduce blast hose wear.

Step 3: Use the chart below as a guide to determine the size of the compressed air line needed for your ProFormer™ system. Even when there is sufficient compressed air available, the supply air line to the system must be large enough to prevent friction losses that create pressure drops which will reduce blast pressure and efficiency.

Step 4: The customer is to provide and install an air supply shut off valve. This should be a three-way valve that will bleed off all trapped down stream compressed air from the cabinet. The valve must also be able to be locked when closed.

Line Size (in)	Length of Air Line (ft)	Air Volume (SCFM)
3/4	Up to 95	13 to 38
1	95 to 190	38 to 59
1-1/4	190 to 350	59 to 85

1.7 Earth Ground

An Earth Ground stud is provided at the bottom right side on the enclosure back wall. It is important to connect the ProFormer™ system to an Earth Ground to bleed off static electricity which may be generated while blasting. The Earth Ground may also reduce the discomfort an operator may experience when static electricity is discharged.

The Earth Ground conductors may be insulated or bare. Note that defects are more easily detected during visual inspections of bare conductors.

The minimum wire size is dictated by mechanical strength rather than current carrying capacity. Flexible conductors should be used when frequent connecting and disconnecting of the Earth Ground is anticipated.

1.8 Installation Check

Step 1: Check that all pipe and hose connections are tightly fastened and air tight. Check that all safety pins are properly installed in all quick couplings.

Step 2: Check that all electrical box covers are securely installed. Turn on the plant compressed air supply to the system.

Step 3: Check that the dust drum under the dust collector has been installed properly. It must be sitting squarely on the dust drum platform and centered under the cover. Set the dust collector pulse pressure regulator to 40 psi. Check that the optional fan silencer is fully opened.

Step 4: Turn the cabinet snap switch to the On position. The cabinet lights will illuminate and the dust collector fan will start. Check that the fan is rotating in the correct direction.

CAUTION

Disable and lock out power sources before performing service or maintenance work. Do not look into the fan outlet to determine the correct motor rotation. Check that the fan exhaust is clear of tools and free of debris before checking fan rotation. To avoid personal injury, stay clear of the fan exhaust.

Step 5: Set the blast air pressure regulator to the desired pressure. The blast pressure may be set as low as 20 psi, but **do not exceed 125 psi.**

Step 6: Insert both hands into the cabinet gloves and firmly grasp the suction gun or pressure nozzle. Step on the foot treadle. The blast should start. After a few seconds, the airflow from the nozzle will stabilize. Blast will stop when the foot treadle is released.

Step 7: If applicable, press each dust collector pulse button once with the dust collector on to insure pulse function.

The optional Photohelic control pulsing of the dust collector filters is automatic. Adjust both red needles to below zero psi. The black needle must rise above both red needles to activate the pulse. An increase in the gauge zero adjustment may be required to test this function. After a successful test, the gauge setpoints should be

set at a value of 2 psi for minimum, and 4 psi for the maximum pressure. When the system is off, reset this gauge to zero.

Step 8: Turn the cabinet snap switch to the Off position. The cabinet lights will extinguish and the dust collector fan will stop. The ProFormer™ system is now ready for media loading and part processing.

2.0 Equipment Operation

2.1 Loading Media

There are two methods for loading media into the ProFormer™ system. Always check the media level in the system before adding additional media. See section 4.1 for *Media Selection and Use*.

The suction system hopper should be filled to the bottom of the reclaimer screen. The pressure system vessel may be filled to the base of the sealing plunger.

Total media capacity by weight for the suction and pressure ProFormer™ system is shown for popular media in the table below.

Method 1: With the cabinet switch OFF, media may be loaded through the removable reclaimer access door. The reclaimer is located inside the left component access door. After loading the media, reinstall the reclaimer door and insure an airtight seal.

Method 2: With the snap switch ON and the dust collector running, load media through the media load station inside the right cabinet door. Place the appropriate quantity of media between the cabinet cone and media load station baffle. The system will slowly add the new media.

	Glass Beads	Aluminum Oxide	Steel Shot or Grit	Walnut Shells or Plastic
Suction	10 lb.	15 lb.	25 lb.	5 lb.
Pressure	75 lb.	100 lb.	200 lb.	30 lb.

IMPORTANT

Be careful not to overfill pressure systems. Overfilling will cause malfunction and premature wear. See section 5.1 Daily Maintenance.

CAUTION

If your application requires aggressive media, such as aluminum oxide, garnet, or steel grit, it is recommended that you use optional heavy-duty ducting, reclaimer lining, and DI-CARB or BORON nozzles to prevent premature wear.

Empire strongly recommends using boron carbide nozzles when blasting with Aluminum oxide, which is the most abrasive media.

If these options are not included with your system, they can be added. Optional Rubber curtains for interior cabinet surfaces are also available. Consult your Empire distributor for details.

2.2 Start Up

Step 1: Check that all pipe and hose connections are tightly fastened and air tight. Check that all safety pins are properly installed in all quick couplings.

Step 2: Perform maintenance checks per section *5.0 Maintenance*.

Step 3: Check that the dust drum under the dust collector is empty and has been installed properly. It must be sitting squarely on the dust drum platform and centered under the cover. The dust drum and cover must create an air tight seal.

Step 4: Turn on the plant compressed air supply. Turn the cabinet snap switch to the On position. The cabinet lights will illuminate and the dust collector fan will start.

Step 5: Place the parts to be blast treated inside the blast cabinet. The parts must be free of oil, grease, and moisture. Close and latch the cabinet load doors.

Step 6: Set the blast air pressure regulator to the desired pressure. Recommended blast pressure ranges for various media types are listed in the table in section *4.1 Media Selection and Use*. **Do not exceed 125 psi blast pressure.**

2.3 Blasting

Step 1: Insert each hand into a cabinet glove and grip the suction gun or pressure nozzle assembly firmly. Aim the nozzle at the part to be blast treated.

Step 2: Step on the foot treadle to start the blast. After a few seconds the abrasive flow will stabilize and you will be ready for blasting.

Step 3: Do not pump the foot treadle. It will decrease blast efficiency and cause premature wear of system components.

Step 4: Hold the gun or nozzle at a 90-degree angle to the part at a distance that produces the fastest results. This distance may vary from 3 to 18 inches, depending on the work piece and the desired finish. See section *4.2 Blast Pattern*.

Step 5: During the blasting process, periodically check the Minihelic pressure gauge located above and to the right of the cabinet window. This gauge indicates the condition of the filters. If the gauge pressure is 4 psi or greater, clean the filters as outlined in section *2.4 Dust Collector Cartridge Cleaning*.

Step 6: The reclaimer screen will require periodic cleaning. The frequency of cleaning will depend on the volume of debris produced.

Step 7: For pressure systems, all the media in the pressure vessel will be used up after an extended period of blasting. The operator must release the foot treadle to stop the blast and depressurize the vessel. After a wait of approximately 2 minutes, media will fill the pressure vessel and blasting can resume.

Step 8: When blasting of the part is complete, blast additional parts or follow the instructions in section *2.5 Equipment Shut Down* to shut the system down.

2.4 Dust Collector Cartridge Cleaning

IMPORTANT

Never pulse clean the filters when the system is off. If dust is visible exiting the dust collector fan housing, stop blasting and service the collector.

Pushbutton Control: During the blasting process, periodically check the Minihelic pressure gauge located above and to the right of the cabinet window. This gauge indicates the condition of the filters. If the gauge pressure is 4 psi or greater, the filters must be cleaned. Press and release one pushbutton which will clean one of the cartridges. Wait 10 seconds. Press and release the other pushbutton which will clean the other cartridge. Continue this process alternating pushbuttons until the pressure is reduced to 2 psi.

Photohelic Control Option: This option pulse cleans the dust collector filters automatically when they need cleaning. The gauge high limit red needle must be set at 4 psi as the maximum operating limit. The gauge low limit red needle must be set at 2 psi as the minimum operating limit. The pulse pressure must be set at 40 psi.

IMPORTANT

Always use proper safety and protective equipment when disposing of collector waste. Dispose of this waste properly.

WARNINGS

Explosive Dust: Explosive dust is generated from blast media, removed coatings and substrates. An extreme concentration of dust may combust if ignited by spark or flame. As a precaution, clean the system and empty the dust collector often. Change media that has excessive dust concentration.

Emptying the Dust Collector: Always wear an appropriate dust mask when emptying the dust collector and changing filters. Empty the dust collector daily.

2.5 Equipment Shut Down

Step 1: Release the foot treadle. The blast will stop. Remove the blast treated parts from the blast cabinet.

Step 2: Check the Minihelic pressure gauge for the condition of the duct collector filters. If the gauge pressure is 4 psi or greater, the filters must be cleaned. Press and release one pushbutton which will clean one of the cartridges. Wait 10 seconds. Press and release the other pushbutton which will clean the other cartridge. Continue this process alternating pushbuttons until the pressure is reduced to 2 psi.

Step 3: Turn the cabinet snap switch to the Off position. Empty the dust collector waste drum. Replace the drum squarely on the dust drum platform and centered under the cover. The dust drum and cover must create an air tight seal.

3.0 Equipment Adjustments

3.1 Suction System Media Flow Adjustment

The ProFormer™ suction blast system is equipped with the SAR-2 media regulator to control the flow of media to the suction blast gun. The regulator is located at the bottom of the storage hopper assembly inside the left component access door.

The amount of media entering the hose is controlled by how far the media hose is inserted into the regulator. For normal operation, approximately $\frac{1}{2}$ of the air inlet port is blocked by the media hose. This may vary slightly when changing media size nozzle size, and/or blast pressure.

To find a uniform media flow, loosen the thumbscrew and slide the media hose into the SAR-2 regulator to increase and withdraw the hose to decrease media flow at the nozzle. To determine if media is flowing, look through the media regulator air inlet while the gun is operating. Listen for the sound of the blast to be smooth and constant.

3.2 Pressure System Media Flow Adjustment

The ProFormer™ pressure blast system is supplied with the patented Sure-Flo® Media Regulator which is installed at the bottom discharge port of the pressure vessel. By rotating the T-handle, media flow through the regulator and out of the blast nozzle may be adjusted.

Step 1: Rotate the T-handle counter-clockwise until there is no resistance. Reverse direction and make three full turns of the handle.

Step 2: As the T-handle is turned clockwise, the media flow through the regulator will be reduced. While the system is blasting, make final adjustments in $\frac{1}{2}$ turn, $\frac{1}{4}$ turn, or $\frac{1}{8}$ turn increments.

IMPORTANT

Optimum and most efficient blast is when the media exiting the blast nozzle is just visible. Sure-Flo® Media Regulator adjustment may vary slightly when media size, nozzle size, and/or blast pressure is changed. There are occasions when blast pressure, media, and nozzle size requirements will not allow the Sure-Flo® Media Regulator to be properly adjusted to the desired media flow rate. Refer to the tag attached to the regulator T-handle for additional instructions and see section 4.0 *Suggestions for Efficient Blasting* for helpful hints.

3.3 Reclaimer Adjustment

All ProFormer™ reclaimers can be adjusted to control the average size of media retained by the reclaimer. The reclaimer is supplied with a “tune-able” secondary air adjustment. When the band is properly adjusted reusable media will be returned to the media storage hopper. Unwanted dust and broken down media (fines) will be removed from the system and conveyed to the dust collector. See Figure 6.

Empire’s reclaimer design has vertical slots with a solid tuning band. The original ProFormer™ reclaimers have horizontal slots in both the reclaimer and tuning band.

Fine tuning adjustments of both reclaimers are similar. Just remember to move the band in the direction of the reclaimer slots; horizontal slots rotate the band, vertical slots slide band up or down.

The tuning band is joined at both ends by a bolt and wing nut that must be loosened before the band can be adjusted. The slot pattern around the reclaimer body has one slot omitted. The joined ends of the tuning band must be located over the area of the omitted slot.

NOTE

Dust collectors require a coating of dust on the filter cartridges to achieve maximum filter efficiency, also known as “seasoning”. The filters are seasoned when the static pressure reading on the collector gauge is 2 or greater.

Step 1: Start with no reclaimer slots visible. Adjust the band in one direction until 1/16” of opening is created between the band and reclaimer slots.

HELPFUL HINT

Place a reference pencil mark on reclaimer body (and a corresponding reference mark on the tuning band if horizontal slots).

Step 2: Operate the blast system for at least one hour.

Step 3: Turn the cabinet snap switch to OFF.

Step 4: Inspect the dust collector waste drum for reusable media.

Step 5: If no media is found in the waste, adjust the tuning band to expose 1/16” more reclaimer body slot area.

Step 6: Make a new reference mark on the reclaimer body.

Step 7: Repeat Steps 2 through 7 until a small amount of media is found in the dust collector waste. Adjustment is complete.

NOTE

As a new system is used, the filters become coated with dust, “seasoned” and the airflow in the recovery system will decrease to the normal operating rate. This will affect previous reclaimer tuning band adjustments.

If visibility becomes poor inside the cabinet when blasting, there is too much dust mixed with the blast media. The reclaimer tuning band should be re-adjusted.

Follow Step 2 through 7.

NOTE

For systems with large quantities of dust mixed with blast media, all dust and media should be removed from the system and new media installed.

Step 8: If more than a small amount of media is found in the dust collector waste, additional reclaimer tuning band adjustment may be required. **Follow Steps 9 through 13.**

Step 9: Adjust the tuning band back to the previous reference mark on the reclaimer body, **reducing the opening** between the reclaimer and the band.

Step 10: After operating the blast system for at least one (1) hour, turn the cabinet power switch OFF. Inspect the dust drum waste for reusable media.

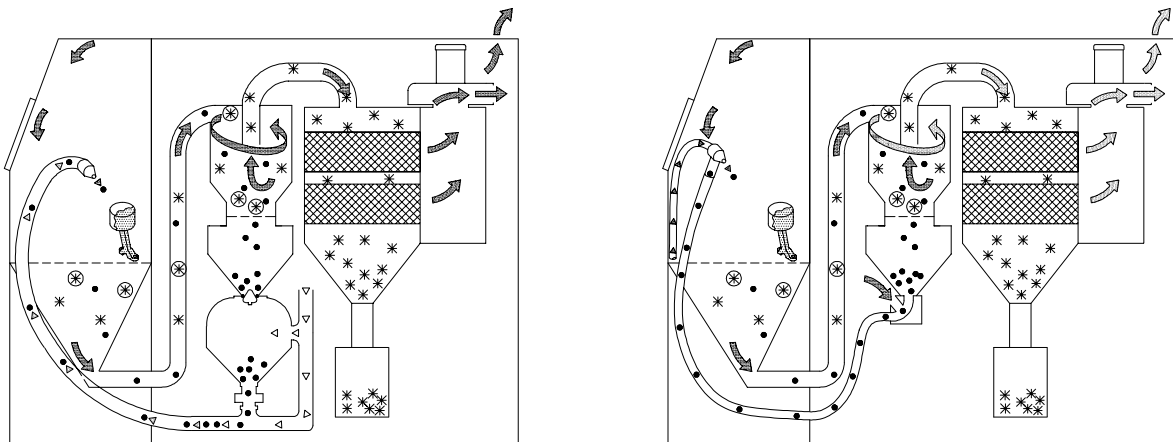
Step 11: If no media is found in the waste, adjust the tuning band to expose 1/16” **less** reclaimer body slot area.

Step 12: Make a new reference mark on the reclaimer body.

Step 13: Repeat **Steps 8 through 13** until a small amount of media is found in the dust collector waste. Adjustment is complete.

The schematic diagrams in Figure 6 illustrate:

- (1) the basic operation of the system.
- (2) the air and media flow before and after blasting.



PRESSURE SYSTEMS

SUCTION SYSTEMS

- ➔ RECOVERY AIR FLOW
- ▷ COMPRESSED AIR
- MEDIA
- * DUST
- ⊗ DEBRIS

Figure 6. Blast and Recovery Operation

IMPORTANT

An insufficient volume of secondary air entering the reclaimer will cause dust to accumulate with the “good” media in the storage hopper or pressure vessel. This accumulation leads to inefficient blasting. Conversely, too much secondary air will cause useful media to be carried to the dust collector and be wasted.

To avoid these conditions, adjust the tuning band to meet your specific blasting requirements. When your system is new, it will be necessary to readjust the tuning band periodically until the filters are “seasoned”.

4.0 Suggestions for Efficient Blasting

4.1 Media Selection and Use

Proper media selection strongly influences the efficiency of your blasting operation. Your choice of media depends on the kind of job to be done (cleaning, deburring, smoothing sharp edges, paint removal, preparation for coatings, etc.) The size of the media depends on the results you need.

Fine media results in more impacts per second over a given area. Therefore, fine media is preferred for easy blasting jobs, such as the removal of light rust from steel.

Large media results in fewer impacts, but each impact has more force, so that large media is more suitable for difficult jobs, such as removal of mill scale. Sometimes large and fine media may be combined for optimum results.

The chart below lists the range of media recommended for each ProFormer™ Blast System. Certain media, such as sand and slag, are *not to be used in ProFormer™ cabinets*, both for health reasons and because they pulverize on impact and cannot be recirculated.

Media Type	Aluminum Oxide or Garnet		Glass Beads		Steel Grit		Steel Shot		Walnut Shells or Plastic
	Media Size	Media Size	Media Size	Media Size	Media Size	Media Size	Media Size	Media Size	
	46 to 80 Mesh	100 to 300 Mesh	25 to 180 Mesh	200 to 300 Mesh	G-16 to G-50	G-80 to G-200	S-390 to S-170	S-110 to S-70	Any Size
Suction	R	R*	R	R*	NR	R	NR	R	R*
Pressure	R	R**	R	R**	NR	R	NR	R	R**

R - Recommended. * Recommended optional vibrating screen for mesh sizes 200 to 300 or when high humidity is a problem. **NR - Not Recommended.** ** Recommended optional vibrating screen and aerated media regulator for mesh sizes 200 to 300.

Spherical media, such as glass beads, are used for general purpose cleaning and finishing where a satin-like finish is desired with little dimensional change. Glass beads are effective when used with pressures in the 20 to 60 PSI range. Above 60 PSI, excessive bead breakdown will occur.

Angular aggressive media, such as aluminum oxide, steel grit, and garnet generally provide faster cleaning and produce a less-polished finish compared to glass beads. Aluminum oxide and steel grit are suitable for use at pressures up to 100 PSI. Garnet breaks down quickly at pressures greater than 40 PSI.

Walnut shells or plastic are sometimes used for delicate parts, paint removal, or when a polished finish is required. Pressures from 20 to 100 PSI may be used with these media, depending on the application.

When changing from one type of media to another, clean the cabinet interior and media hoses thoroughly to avoid cross contamination.

CAUTION

If your application requires aggressive media, such as aluminum oxide, garnet, or steel grit, it is recommended that you use optional heavy duty ducting, reclaimer lining, and DI-CARB or BORON nozzles to prevent premature wear.

Empire strongly recommends using boron carbide nozzles when blasting with Aluminum oxide, which is the most abrasive media.

If these options are not included with your system, they can be added. Optional Rubber curtains for interior cabinet surfaces are also available. Consult your Empire distributor for details.

4.2 Blast Pattern

The size of the effective blasting pattern varies with the size, type and length of the nozzle, blast air pressure, and the nature of the work piece. Use the following chart and diagram as a guide, but be aware that the approximate pattern diameters can only be determined by considering each case individually.

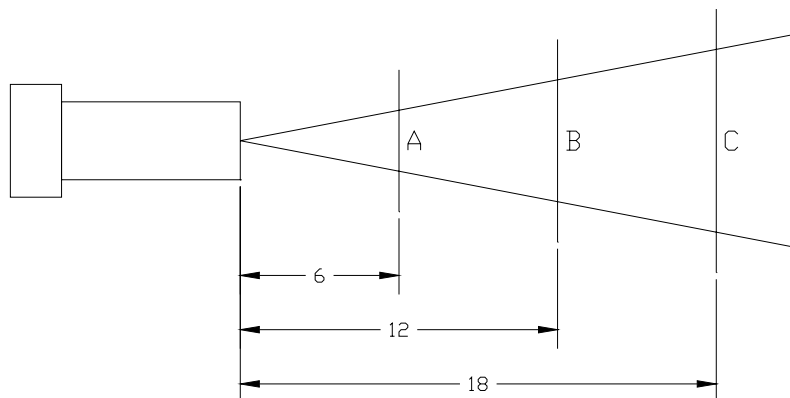


Figure 7. Blast Pattern

Blast Pattern Diameter at Distance Listed				
	Nozzle ID	A	B	C
Suction Blast	1/4	3/4	1 1/4	*
	5/16	1	1 1/2	*
	7/16	1 1/8	1 3/4	*
Pressure Blast	1/8	3/4	1 1/4	2 1/4
	3/16	1	1 1/2	2 3/8
	1/4	1 1/8	1 3/4	2 1/2

Suction Blast at a distance of greater than 12” is usually not effective.

4.3 Changing the Media

When changing from one type or size of media to another, it can be extremely important to clean out the blast and recovery hoses, storage hopper, pressure vessel, and the cabinet interior thoroughly to avoid contamination of the new media.

IMPORTANT

Always use proper safety and protective equipment when disposing of collector waste. Dispose of this waste properly.

Suction System

Step 1: Turn the ProFormer™ system off. Open the left side equipment access door and locate the reclaimer, media storage hopper, and SAR-2 media regulator.

Step 2: Using proper safety and protective equipment, place a container, such as a bucket, directly under the storage hopper and SAR-2 regulator. Loosen (do not remove) the 7/16" nut at the bottom of the regulator plug. Pull down on the plug removing it from the regulator. This will allow the media to empty from the storage hopper into the container.

Step 3: Turn the ProFormer™ system on. Close and latch the part loading doors. Insert each hand into a cabinet glove and grip the suction gun firmly. Aim the nozzle toward the back of the blast cabinet and press the foot treadle. Blast for 30 seconds to remove all media from the suction hose and gun assembly.

Step 4: Release the foot treadle. Using proper safety and protective equipment, open one of the part loading doors and use the Blowoff gun to remove the media from ledges and surfaces into the cone for recovery.

Step 5: Turn the ProFormer™ system off. Clean both reclaimer screens, reinstall the SAR-2 drain plug, and close the reclaimer door. Dispose of all waste properly.

Step 6: The system is ready for new media. Refer to section 2.1 *Loading Media*, section 3.1 *Suction System Media Flow Adjustment*, and section 3.3 *Reclaimer Adjustment*.

Pressure System

Step 1: Turn the ProFormer™ system off. Open the left side equipment access door and locate the reclaimer, media storage hopper, and pressure vessel.

Step 2: Adjust the T-handle of the Sure-Flo® grit valve counter clockwise, fully opening the regulator. Close the 1" ball valve (choke valve) located on the pressure vessel pipe string assembly. Fully open the reclaimer tuning band.

Step 3: Turn the ProFormer™ system on and open a part loading door. Remove the pressure nozzle and nozzle washer from the end of the blast hose. Place a container, such as a bucket, inside the blast cabinet. Place the blast hose inside the container and close and latch the part loading doors.

Step 4: Adjust the blast pressure regulator to 40 psi. Insert each hand into a cabinet glove and grip the blast hose firmly. Aim the hose into the container and press the foot treadle. Blast for 30 seconds to remove all media from the blast hose.

Step 5: Turn the ProFormer™ system off. Clean both reclaimer screens, readjust the Sure-Flo® grit valve, and close the reclaimer door. Dispose of all waste properly.

Step 6: The system is ready for new media. Refer to section *2.1 Loading Media*, section *3.2 Pressure system Media Flow Adjustment*, and section *3.3 Reclaimer Adjustment*.

4.4 Pneumatic Controls

The ProFormer™ system uses a patented pneumatic control circuit to protect workers, workers environment, and activate the blast.

Step 1: Turning the system snap switch on energizes the interlock solenoid valve, permits air to enter the control air line to the foot treadle, illuminates cabinet lights and start the fan motor.

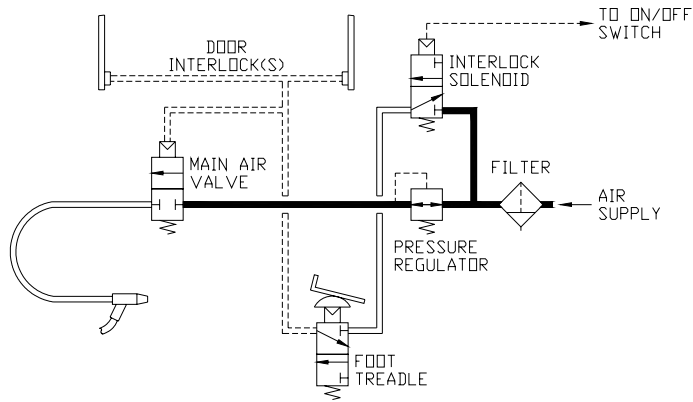
Step 2: The operator steps on the foot treadle opening a three way control air valve. Air enters the door interlock supply tubing continuing to the door air jets. If the part load/unload doors are closed, latched, and door air jets are sealed, the control air lines pressurize and open the main blast air valve (and the pressure systems exhaust valve to close). The opening of the main air valve starts the blast.

Step 3: When the operator removes his foot from the foot treadle, the three way air valve close, shutting off air to the controls, and exhausting all down stream air. The control air line pressure bleeds from the door interlock supply tubing, main blast air valve (and the pressure system exhaust valve). This permits the main blast air valve to close (and the pressure system exhaust valve to open) stopping the blast.

Step 4: When a part load/unload door is opened, the pad covering the door interlock air jet is unseated. When the foot treadle is pressed with a door open, control air bleeds from the door air jet opening, preventing the control circuit from pressurizing. The main blast air valve will not open, and blasting will not occur.

The following schematic diagrams illustrate the pneumatic control circuits for suction systems (Figure 8A) and pressure systems (Figures 8B). For each system type, the cabinets are shown in blasting and non-blasting modes (shaded pipe is pressurized).

SUCTION SYSTEM OFF -



SUCTION SYSTEM ON - FOOT TREADLE PRESSED

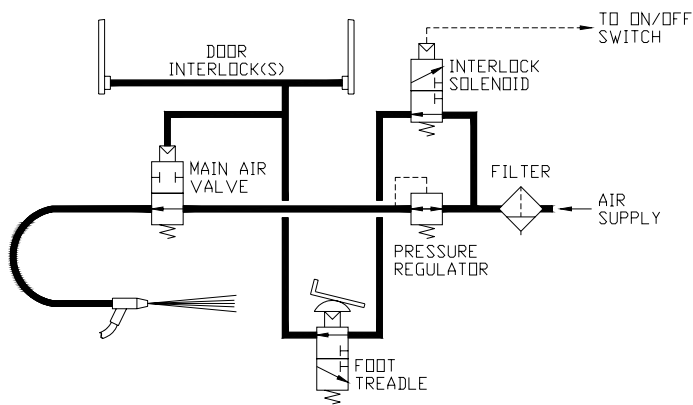
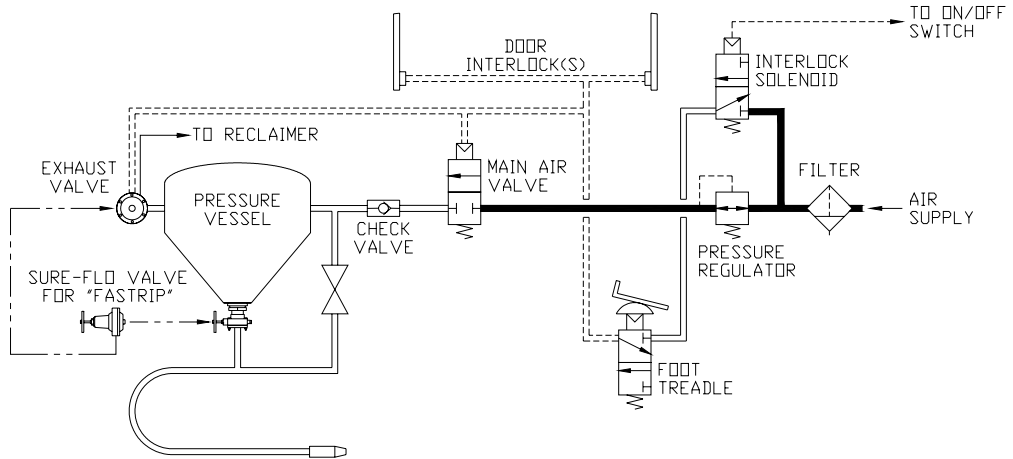


Figure 8A.

PRESSURE SYSTEM OFF -



PRESSURE SYSTEM ON - FOOT TREADLE PRESSED

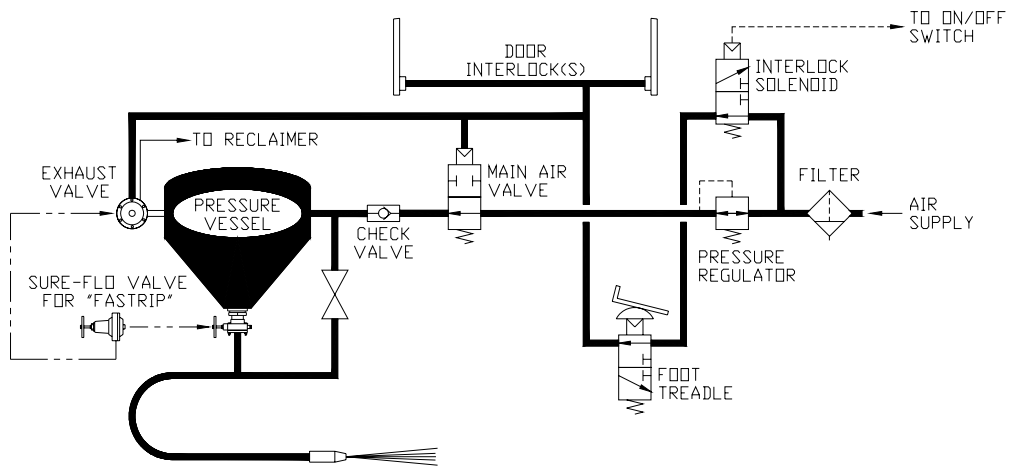


Figure 8B.

The following drawings show media flow through a typical pressure system and are provided to help you understand how to maintain the media at the proper level.

Pictured at right is a fully charged system with the vessel depressurized (no blasting). Note that the media fills the pressure vessel but that there is not media in the storage hopper.

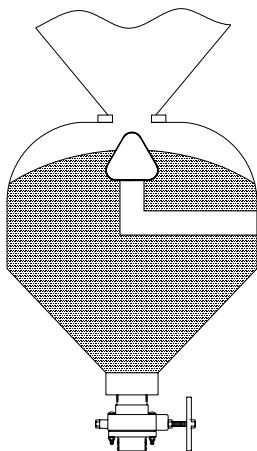


Figure 9. Before Blasting

When blasting starts, the vessel pressurizes, the media impacts the part being blasted, and reusable media is recovered and accumulates in the storage hopper. Continuous blasting time is limited by the type and amount of abrasive in the in the vessel when blasting starts (normally 8 to 15 minutes with a fully charged 1 cubic foot vessel, depending on nozzle size and blast air pressure). Each time the operator stops blasting, the vessel de-pressurizes and the sealing plunger drops. Media in the storage hopper flows into the vessel. If blasting is stopped long enough (usually 1-2 minutes), all media in the storage hopper will transfer into the pressure vessel.

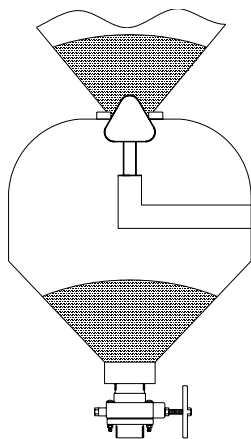


Figure 10. During Blasting

Thus, you can determine the amount of media in the vessel in either of two ways: (1) note how much continuous blast time you can achieve with a fully charged vessel and compare this with your current continuous blast time; or (2) stop blasting, open the reclaimer door, and visually determine the media level by looking into the top of the vessel.

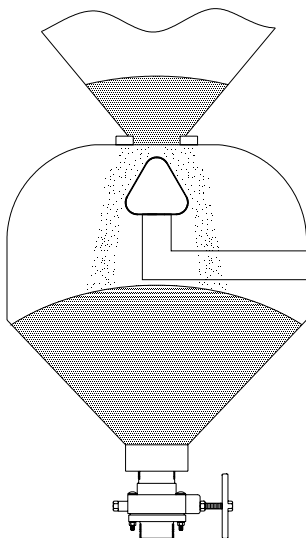


Figure 11. After Blasting

Overfilling pressure vessels will cause improper operation and premature wear. Allow sufficient time after blasting for the pressure vessel to refill (2 minutes). When the pressure vessel is filled, check to see if any media has remained in the storage hopper, indicating that the vessel is overfilled, the sealing plunger may not seat tightly when you start blasting.

See section 5.3 *Storage or Temporary Non-Use* for instructions on how to empty the pressure vessel.

Refer to section 2.1 *Loading Media* for instructions to add media.

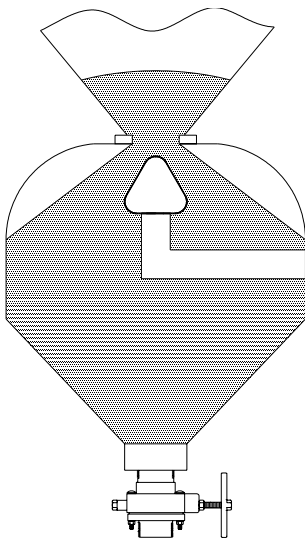


Figure 12. Pressure Vessel Overfilled

4.5 Helpful Hints for More Efficient Blasting

The efficiency of your blasting operation depends on four factors:

- 1) **Equipment selection**
- 2) **Media selection**
- 3) **Operating procedures**
- 4) **Maintenance**

With the help of your Empire Distributor and/or Empire factory representative, you now own equipment that will properly meet your blasting requirements.

You can select the proper media, operating procedures, and maintenance steps by following the recommendations in this manual. If you need more information about any aspect of your machine's operation or the blasting process, contact your local distributor or the factory.

The following measures will also help you improve the efficiency of your blasting operation:

Step 1: To accomplish more in less time, use the largest nozzle practical for your operation. Of course, nozzle diameter may be limited by the amount of compressed air available, but an increased volume of compressed air is often justified by reduced labor costs. Also, if you are blasting small parts, it doesn't make sense to use a big nozzle, as most of the blast pattern will be overspray.

Step 2: For faster cleaning, use the highest pressure practical for your operation. Maximum pressure for a given operation is limited by type of media (e.g. glass beads can break down rapidly above a certain pressure) and amount of material which must be removed from the workpiece.

Step 3: If you are blasting small parts, it may be more efficient to manipulate the part with tow hands and use an optional fixed nozzle holder.

Step 4: *Never underestimate the importance of clean, dry air.* More operational problems are traceable to the lack of clean dry air than any other single factor. If the supply air is not clean and dry, media quickly becomes contaminated, causing flow problems, which wastes media and leads to excessive operator downtime.

4.6 Cartridge Dust Collector Model SEM-2

Additional information about the operation of the ProFormer™ Cartridge Dust Collector can be found in the collector Installation and Operation Manual. This manual can be found inside the left maintenance access door in an envelope attached to the inside left rear wall of the system.

5.0 Maintenance

5.1 Daily Maintenance

Step 1: Turn the cabinet snap switch on.

Step 2: Remove the accumulated dust from the dust collector drum and the debris from the reclaimer screen.

Step 3: Check the condition of the media. If the media is contaminated or broken down into dust, thoroughly clean the inside of the cabinet and recovery system and reload with new media. See section *2.1 Loading Media*.

Step 4: Adjust the reclaimer tuning band if you observe a dusty condition when blasting. See section *3.3 Reclaimer Adjustment*.

Step 5: Check the media level. For optimal operation, the media level should not drop below one-half the recommended capacity.

- A. The media level in **suction systems** can be observed in the media storage hopper.
- B. The media level in **pressure systems** can be observed by looking through the optional sight glasses or the reclaimer door down into the top of the vessel. When the vessel is de-pressurized, the sealing plunger must be visible. Add media until just visible below the sealing plunger.

Step 6: Check light bulbs and gloves. Replace as required.

Step 7: Open the manual drain on the general-purpose filter in the cabinet pipe string and drain any accumulated moisture and oil. Close the drain and dispose of the waste properly.

Step 8: All quick coupling connections **must** be equipped with safety pins. Inspect all couplings and blast hoses daily for splits, bubbles, soft spots, etc. Screws should be flush with coupling surfaces. Tighten screws, if necessary.

5.2 Weekly Maintenance

CAUTION

If your application requires aggressive media, such as aluminum oxide, garnet, or steel grit, it is recommended that you use optional heavy duty ducting, reclaimer lining, and DI-CARB or BORON nozzles to prevent premature wear.

Empire strongly recommends using boron carbide nozzles when blasting with Aluminum oxide, which is the most abrasive media.

If these options are not included with your system, they can be added. Optional Rubber curtains for interior cabinet surfaces are also available. Consult your Empire distributor for details.

Step 1: Repeat the daily maintenance procedures.

Step 2: Inspect all media-carrying hoses for wear by feeling along the length of the hose for soft spots. Hoses with soft spots should be replaced.

Step 3: Check the nozzle for wear. When the nozzle is worn 1/8" oversize, replace it. A drill bit can be inserted into the nozzle to check its size.

Step 4: On suction systems, check the air jet for wear.

Step 5: Loosen the set screw in the side of the gun body and remove the air jet. See Figure 13.

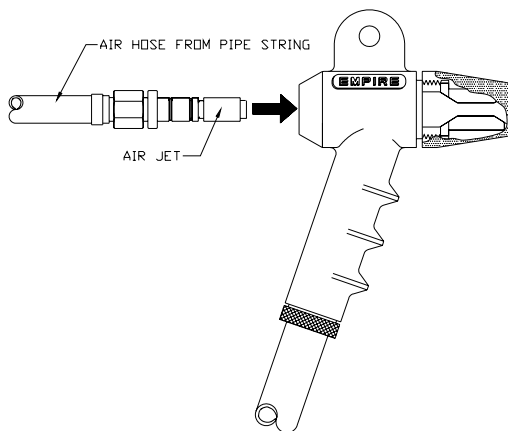


Figure 13. Air Jet

Step 6: If the air jet shows wear, rotate it 90° and reinsert it into the gun.

Step 7: Re-tighten the set screw.

IMPORTANT

If an air jet is allowed to wear completely through, it will cause premature wear of the gun body and nozzle.

Step 8: Check the nozzle adapter and gun body for wear. Replace if necessary.

Step 9: Check the window gaskets for leaks. Replace if necessary.

Step 10: Check your spare parts inventory. Ensure that you have an adequate supply of replacement items.

5.3 Storage or Temporary Non-Use

If your ProFormer™ system will not be used for several days (or more), follow these steps to remove media and prevent media from caking inside the system:

Step 1:

- **Suction systems:**

Empty media from the cabinet and storage hopper. To remove the media from the storage hopper: remove the rubber plug from the bottom of the SAR-2 regulator.

- **For pressure systems:**

- A) Reduce blast pressure to 40 PSI.
- B) Close the choke (ball) valve on the pressure vessel pipe string. (See Figure 14).

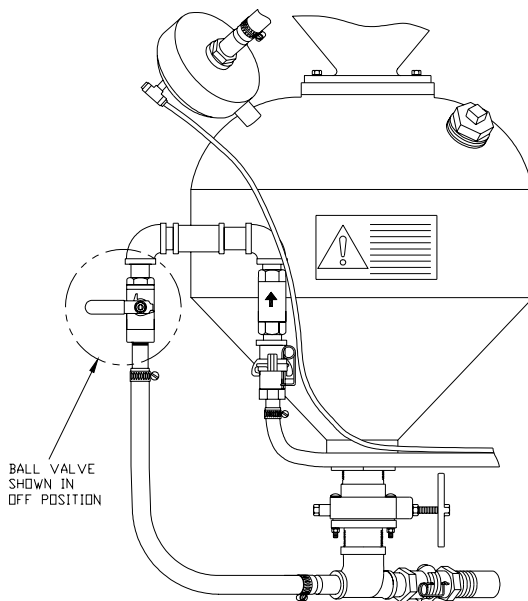


Figure 14. Closed Choke Valve

Remove the blast nozzle and washer from the blast hose.

- C) Pressurize the vessel as if to blast.

These steps will cause the media to flow from the open end of the blast hose in a controlled manner. The media can now be directed into a suitable container or receptacle.

After the pressure vessel is empty:

- D) Open the choke valve.

E) Replace the nozzle washer and nozzle.

F) Return the blast pressure setting to normal.

Step 2: Drain the general purpose filter. Close the drain valve.

6.0 Troubleshooting

6.1 Troubleshooting Chart

Problem: Good media is being carried to the dust collector.

	Probable Cause	Remedy
	New filters.	Continue use until filter “cake” forms (approximately eight hours of operation).
	Tuning band is open too far.	Adjust tuning band.
	Insufficient media in suction hopper allows secondary air to enter.	Add media to recommended media level.
	Media too fine.	Use more coarse media.
	Pressure systems: Worn plunger or sealing ring leaking air into reclaimer.	Replace plunger and/or sealing ring.

Problem: Media is escaping into the work area from the dust collector.

	Probable Cause	Remedy
	Hole in dust filter(s) or loose filter(s).	Replace leaking filter(s) or refasten filter(s).

Problem: Poor visibility during blasting.

	Probable Cause	Remedy
	Reclaimer not adjusted properly.	Adjust reclaimer air inlet settings See section 3.0 <i>Equipment Adjustments</i> .
	Clogged dust bag(s).	Shake dust bag or dust collector bags.
	“Blinded” filters (reduced air flow due to age of the filters).	Over a period of years dust may penetrate the dust filter to the extent that normal air flow is restricted even when filters are pulsed regularly. When this condition is reached, replace the filters.
	Fan rotation backwards.	Reverse the fan rotation.
	Media has high dust content.	Replace media and adjust reclaimer tuning band.
	Recovery hose blocked.	Remove hose, inspect and remove obstruction.
	Cabinet air inlet plugged.	Blow filter clean with air line.
	Dust collector door leaks air.	Tighten door, replace gasket if necessary.
	Blast nozzle or air jet too large.	Replace worn nozzle with recommended size: maximum 1/4” diameter pressure, maximum 7/32” air jet for suction.
	Operating air pressure too high.	Decrease pressure to within recommended range.

Problem: No air or media flow from the nozzle.

	Probable Cause	Remedy
	Compressed air line shut off.	Open all air valves from compressor.
	Cabinet Doors not tightly closed.	Close cabinet doors sealing door interlock.
	Regulator adjusted to zero.	Adjust regulator.
	Nozzle clogged.	Disassemble and clean nozzle.
	Door interlock air hose leaking.	Replace hose. If problem continues, see section 6.2 <i>Troubleshooting the Pneumatic Control Circuit</i> .

Problem: Poor production rate.

	Probable Cause	Remedy
	Low blast air pressure.	Increase pressure within the specified range.
	Nozzle too small (the smaller the nozzle, the smaller the blast pattern).	Install a larger nozzle (and air jet on suction systems) to accommodate your production needs.
	Improper media.	See section 4.1 <i>Media Selection and Use</i> .
	Improper media flow.	See section 3.0 <i>Equipment Adjustments</i> .
	Low media level.	Add media to maintain recommended level.
	Parts to be blasted are oily or wet.	Parts to be processed must be absolutely dry and free of oil, grease, etc.
	Media has high dust content (Blast media breaks down and must be replaced on a regular basis).	Remove old media from system and replace with new. Adjust reclaimer tuning band. See section 3.3 <i>Equipment Adjustments</i> .

Problem: Static charge build-up and discharge irritates the operator.

	Probable Cause	Remedy
	Low quality blast hose (poor conductor of static charge).	Replace blast hose with one of high quality. Static charges are created and build up by the air and media moving at high velocity through the blast hose.
	System grounded improperly.	Earth ground the system.
	Part insulated, resting on rubber mat.	Place part on metal surface, i.e. cabinet floor or turntable top.
	Low compressed air and ambient humidity.	Install Empire Anti Static Strap, part 510411.

Problem: There is blast air flow, but intermittent or no media flow.

	Probable Cause	Remedy
	Blast air pressure too low.	Adjust and maintain pressure within recommended range.
	Clogged nozzle.	Disassemble and clean nozzle.

	Damp media (If media stays formed in a ball after squeezed in the palm of the hand, it is too damp to flow properly).	Remove damp media from system and replace with new, dry media. Check compressed air supply filters. Do not blast wet or oily parts.
	Suction System: Improper air jet nozzle combination.	Nozzle orifice size must be twice the air jet orifice size 1/8" diameter air jet requires minimum 1/4" diameter nozzle.
	Suction System: Media hose improperly installed.	Adjust media hose in media regulator. Check media hose at entry to the suction gun body, hose clamp nut, o-ring, and hose must create an air tight seal.
	Suction System: Clogged media hose.	Remove media hose from media regulator at the bottom to the media storage hopper, bring that end of the hose through an open door and into the cabinet. Remove the nozzle from the suction gun, insert the blow-off gun nozzle in the open end of the media hose, and blow accumulated media and/or debris out through the suction gun.
	Pressure System: Sure-Flo media regulator closed.	Adjust media regulator.
	Pressure System: Leaking sealing plunger and/or exhaust valve.	Check for compressed air leaks and repair.
	Pressure System: Sure-Flo media regulator obstructed.	Open Sure-Flo media regulator to full open, close the choke valve, remove blast nozzle, set blast pressure at 70-80 PSIG and attempt to blast. All air will be forced through the media regulator clearing the obstruction. If media flow problems persist, shut off and lock out compressed air supply, disassemble media regulator and clear obstruction.

6.2 Troubleshooting the Pneumatic Control Circuit

Hand Tools Required:

The following tools are required to troubleshoot the pneumatic control circuit:

- Pressure tester (P/N 140382)
- 7/16" open end wrench
- Flat-blade screwdriver

Step-by-Step Procedures:

Refer to the control circuits shown in Figures 15 and 16 and the troubleshooting procedures listed on the pages that follow.

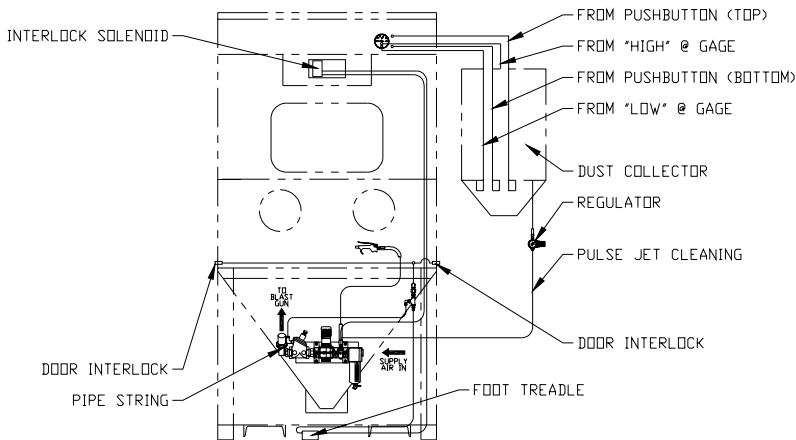


Figure 15. Pneumatic Circuit – Suction

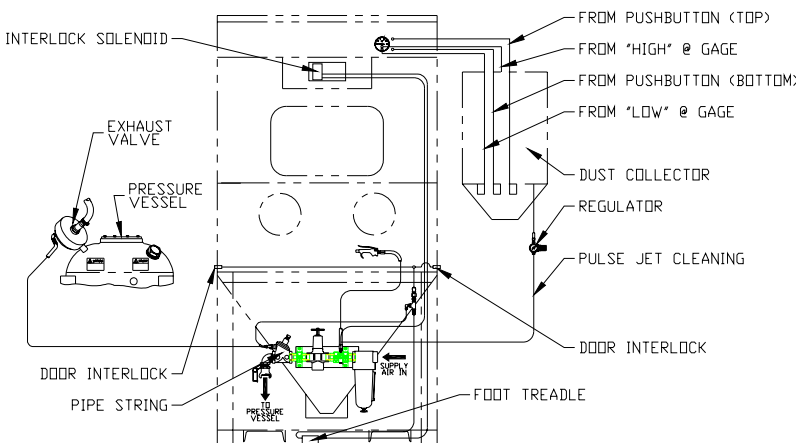


Figure 16. Pneumatic Circuit - Pressure

Problem: Switch is on. The lights and dust collector motor work, but blast will not activate.

Probable Cause	Test	Remedy
Step 1: The compressed air supply to the system is off.	Confirm that the compressed air is on by activating the dust off gun inside the blast cabinet.	If there is no air from the dust off gun, turn the air supply to the system on.
		If there is air from the dust off gun, go to Step 2 .
Step 2: The blast pressure regulator is set to zero.	Observe the blast pressure gauge. If the gauge is at zero, adjust the handle clockwise until the pressure is greater than 20 psi.	If there is no pressure, replace the gauge and or regulator.
		If the gauge shows that there is pressure and still no blast, go to Step 3 .
Step 3: Failed interlock solenoid or foot treadle valve.	With the system on, open a cabinet door and step on the foot treadle. High pressure air should exit the door interlock air jet.	If there is no air, go to Step 4 .
		If there is air, go to Step 5 .
Step 4: Failed foot treadle valve.	Turn the snap switch off and disconnect the air supply hose on the left side of the foot treadle. Hold the loose hose end away from personnel, and switch the system on. High pressure air should exit the hose.	If no air exits the hose, the interlock solenoid or snap switch is defective. Replace the switch before replacing the valve.
		If air exits the hose, the foot treadle valve has failed. Repair or replace the valve.
Step 5: The door air jets are leaking.	With both cabinet doors closed, step on the foot treadle. Listen and feel for air leaking at each door interlock air jet.	If leaking, the cabinet access door must be closed tightly so that the air jets are sealed air tight.
		Check and replace worn or damaged urethane bumpers in the doors.
		If the door interlock air jets are sealed with no leaks, go to Step 6 .
Step 6: The control tubing is leaking.	Disconnect the control tubing at the pipe string air valve. Install a pressure gauge on the open end of the tubing and step on the foot treadle. The gauge should indicate the line (supply) pressure to the system.	If the gauge is reading the line (supply) pressure, go to Step 7 .
		If the gauge reading is not the line (supply) pressure, go to Step 8 .
Step 7: The blast air valve is defective.	Reconnect the control tubing at the pipe string air valve. Install a pressure gauge on the control line and step on the foot treadle. Observe the gauge pressure.	If the gauge is reading below the line (supply) pressure, the blast air valve diaphragm has failed. Repair or replace the air valve.

	Check the vent in the blast air valve diaphragm cover spring retainer nut for leaking air.	Confirms that the blast air valve diaphragm has failed. Repair or replace the air valve.
Step 8: There are media problems.	Improper media.	See section <i>4.1 Media Selection and Use</i> .
	Improper media flow.	See section <i>3.0 Equipment Adjustment</i> .

Problem: There is excessive delay between stepping on the foot treadle and the blast activation. Normally this delay should be between ½ and 1 second for suction systems and 1 to 2 seconds for pressure systems.

Probable Cause	Test	Remedy
Step 1: Restricted flow in control lines.	Disconnect the control tubing at the pipe string air valve. Install a pressure gauge on the open end of the tubing and step on the foot treadle. The gauge slowly reaches the full line (supply) pressure.	Check for kinks or crimps in the control air lines.
Step 2: Leak in control lines.	Disconnect the control tubing at the pipe string air valve. Install a pressure gauge on the open end of the tubing and step on the foot treadle. The gauge never reaches the full line (supply) pressure.	Trace leaks by moving the gauge up stream until the full line pressure is observed.
		For pressure systems only, if the gauge at the exhaust valve pressurizes rapidly to full line pressure, the exhaust valve has a leak or a ruptured diaphragm.

7.0 Recommended Spare Parts

The following chart lists the parts you should maintain in inventory to ensure continuous operation of your ProFormer™ system.

Qty	Part No.	Description	Pressure	Suction
1	501331	¼" Di-carb nozzle (suction) or		
	501341	5/16" Di-carb nozzle (suction) or		X
	501351	7/16" Di-carb nozzle (suction)		
1	501272	1/8" Di-carb nozzle (pressure) or		
	501282	3/16" Di-carb nozzle (pressure) or	X	
	501292	¼" Di-carb nozzle (pressure)		
2	532701	Floodlights	X	X
20'	524441	Door gasket	X	X
1	290182	Exhaust valve	X	
25'	520792	½" blast hose	X	
10	524802	5/8" blast hose		X
10	520802	NW-5 nozzle washer for ceramic nozzles	X	
10	524101	QC washer	X	
1	518661	Foot treadle valve	X	X
2 pair	509891	Rubber gloves	X	X
1	524451	Window gasket	X	X
1	510401	Window safety glass	X	X
1	519001	Interlock solenoid	X	X
2	523523	Filter	X	X
1	523942	Sealing ring	X	
1	510431	Plunger, for 1 cu. ft. pressure vessel	X	
1	522351	4 x 8 return hose or	X	X
	516103	6 x 3 Recovery hose		
1	753551	MH-2 Gun Body		X
2	505651	3/32" air jet or		
	505661	1/8" air jet or		
	505671	5/32" air jet or		X
	505691	7/32" air jet		
6'	520822	Exhaust hose	X	
2	520252	Tubing fittings	X	
1	523592	Sure-Flo metering tube ¾"	X	

8.0 Options and Accessories

A variety of standard accessories are available for any ProFormer™ system. These accessories can be either factory installed or customer installed with a minimum of cabinet modification.

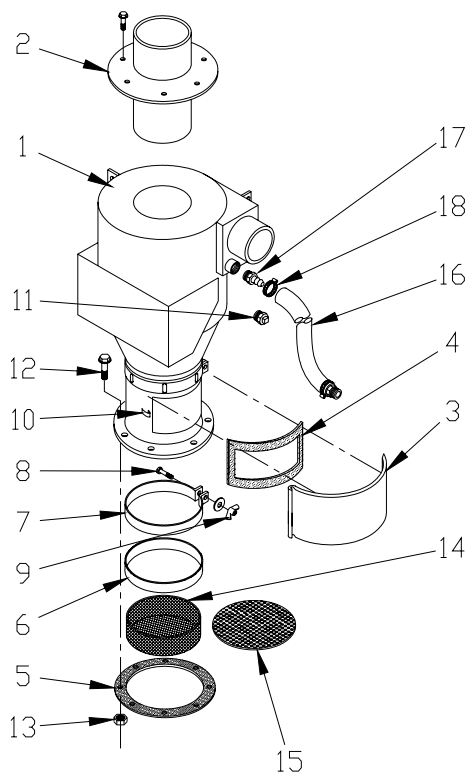
If your production requirements change, you can add the options you need to update your system.

Category	Options	Description
1. Optional Electricals	220-240/50/1 208/60/3 220-240/60/3 380/50/3 440-480/60/3 550-600/60/3	Voltage/Frequency/Phase of power available.
2. Turntables - Stationary or Tracks		Available with Manual, turntables facilitate the handling of heavy parts. The turntable dolly travels on a track, or is fixed inside the cabinet. Most stationary designs feature a low profile that provides operators with easy “over-the-top” access and does not waste interior cabinet space. Turntable size 24” diameter with standard capacities ranging from 300 to 1000 pounds.
3. Fine-Tuning Controls		Pressure blast systems incorporating Empire’s automatic Sure-Flo media regulator, allow the operator to adjust the richness of the air-to-media mixture from the workstation at the front of the cabinet. As a result, dialing in the optimum air-to-media ratio for a particular job is greatly simplified. To further assist the operator, an indicator gauge displays relative media richness.
4. Fine-Tuning with Choke		In applications where media is changed frequently, or where contamination can cause periodic clogging of the media regulator, a push-button choke is available with fine tuning.
5. Fixed-Orifice Media Regulator		In applications such as shot peening, in which very precise metering of media is required, a fixed-orifice media regulator is attached below the Sure-Flo media regulator.
6. Low Media-Level Sensor and Indicator (Factory Installed Option)		The low media-level sensor and indicator warns the operator when the media supply in the pressure vessel is low. The indicator/sensor consists of an electronic probe in the vessel that activates a signal light mounted on the front of the cabinet.
7. Harsh Media and Extended Wear Components		Empire’s extended wear components increase service life in an aggressive or high-use environment. These components are normally very cost-effective because they reduce downtime, repair interval, and maintenance costs. Extended wear components are sold individually so you can tailor features to your application needs and budget
	Reclaimer urethane coating	The urethane coating extends the service life of interior wear surfaces by five times.
	Reclaimer Ultra-Wear lining	The Ultra-Wear lining increases normal service life by a factor of ten.
	Di-Carb® (tungsten carbide) nozzles	Di-Carb nozzles are for use with steel abrasives and glass beads.
	Boron carbide Nozzles	Boron carbide nozzles are for use with aluminum oxide, silicon carbide, and garnet media.
	Rubber curtains	Cabinet life is increased with the use of rubber curtains. Free-hanging curtains are made of black 1/8” neoprene and held in place with rubber knobs for easy replacement. These curtains actually last longer than steel. White curtains are available to brighten the cabinet interior, and it doesn’t degrade with use, as does white paint on steel.
	Window protectors	Window protectors can be provided in clear plastic or as a perforated screen to reduce frosting and pitting of the cabinet window.
Matting	To pad parts and prolong the life of steel support surfaces, mats are offered for turntable tops and cabinet floors.	
8. Fixed Gun (or Nozzle) Holder		<u>Suction blast systems</u> The fixed gun holder is adjustable to position any gun in any orientation so the operator can use both hands to manipulate work pieces in the blast stream. <u>Pressure blast systems</u> The fixed nozzle holder, which bolts anywhere on the cabinet wall, can be adjusted to position the nozzle in any orientation, leaving

Category	Options	Description
9. Fine Media Kits	Vibrating screen and (for pressure systems only) aerated media regulator	both of the operator's hands free to manipulate work pieces. A vibrating screen in the reclaimer (plus an aerated media regulator for pressure systems) overcome flow problems associated with very fine abrasives (200 to 300 mesh range), lightweight blast media (plastics, walnut shells, etc.), and high humidity.
10. Magnetic Reclaim Separator		Magnetic reclaim separator reduces possible damage to delicate substrates by removing steel and other ferrous contaminants from the blast media as it passes through the reclaimer. The separator consists of an industrial magnet that can be removed through the reclaimer door for cleaning.
11. Dust Collector Option NOTE: For more information about options, contact your Empire distributor or the factory.	Photohelic Controlled pulse jet cleaning	Automatically pulse the filters as required.

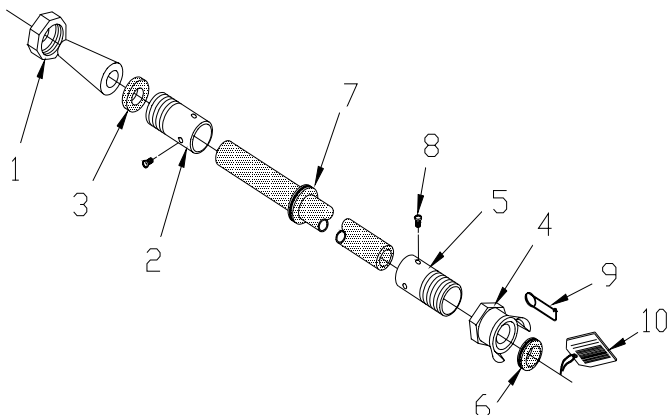
9.0 ProFormer™ Parts

9.1 Reclaimer



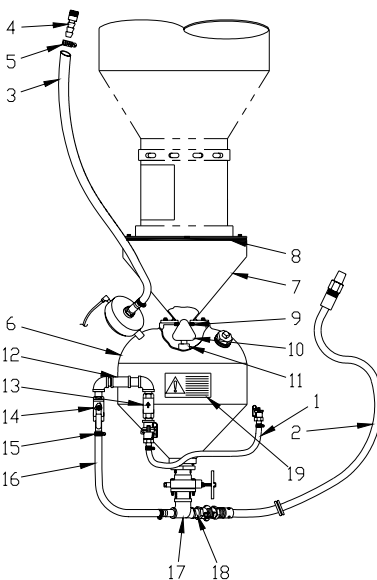
Item	600 CFM	Description
1	140796	Reclaimer Body Assembly
2	766741	Removable top
3	770788	Door, reclaimer
4	524321	Gasket, reclaimer door
5	524371	Gasket, reclaimer to storage hopper
6	524342	Gasket, tuning band
7	767581	Tuning Band (steel part only)
8	551782	Bolt, 1/4"-20 x 2"
9	552392	Wing nut, 1/4"-20
10	509581	Latch and keeper (requires welding)
11	544122	Plug, 1" NPT (Suction systems only)
12	551842	Bolt, 3/8"-16 x 1" (8 required)
13	552542	Nut, 3/8"-16 (1 gun suction systems), 8 required
	522762	Lock Washer 3/8
14	739041	Screen, fine, 11-1/2" OD 8 Mesh
	739051	Screen, coarse, 11-1/2" OD 4 Mesh
15	760711	Screen, flat, 5/16", 13" OD
16	520822	Blast Hose, 1", 5' long
17	520181	Hose Barb, 1"
18	520512	Hose Clamp, 2"

9.2 Pressure Blast Systems



Parts for Blast Hose Assembly – Standard 1/2”

Item	Part Number	Model Number	Description
1	504912	NA-2	Nozzle Adapter
2	505232	NC-1/2	Nozzle Coupling
3	524041	NW-5	Nozzle Washer, Ceramic nozzles, 5/8" ID (10 pack)
	524052	NW-2	Nozzle Washer, Di-Carb/Boron, 1/2" ID (10 pack)
4	505222	QC-1/2	Quick Coupling with washer + screw package item 4, 5, 6
5	505782	UF-100	Tank Coupling, 1" FPT with AHCW
6	524101	AHCW	Coupling Washer (10 pack)
	525102	AHCW	Coupling Washer (25 pack)
7	523931	(1" x 1-3/8")	Grommet, blast hose
8	554242	(#8 x 3/8")	Screws (4 pack)
9	510511		Safety pin
10	564822		Tag, safety, screw/coupling
11	520792	PBH-1/2	Blast Hose (Maximum length: 50')



Blast & Air Hoses

Item	Bulk	3642 Only	4652 Only	Description
1	—	140302	140303	Air hose assembly, 1" ID
	520912	—	—	Air hose, 1" ID
		(5')	(6')	(Air hose length)
2	—	522541	521672	Blast hose assembly, 1/2" ID (see previous chart)
	520792	—	—	Blast hose, 1/2" ID
		(5')	(5')	(Blast hose length, std cabinet)

Exhaust Hose

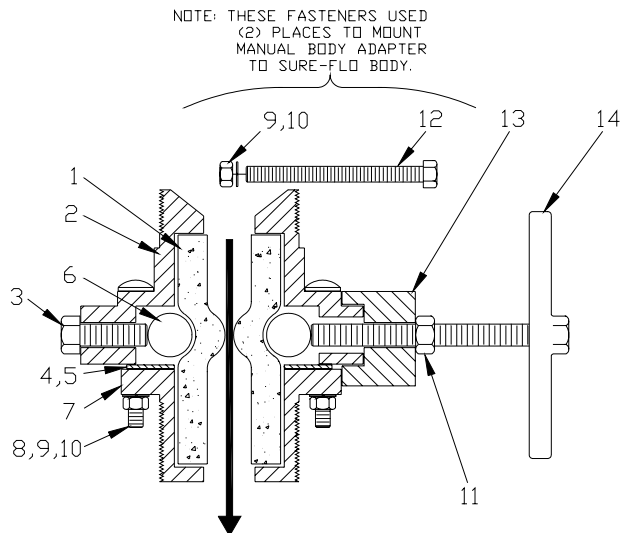
Item	Part Number	Description
3	522611	Exhaust hose assembly (with 1" NPT barb ends), 5' for 1 cu. ft. vessel
	520822	Exhaust hose (1" ID blast hose) (Maximum length: 50')
4	520181	Hose barb, 1" NPT x 1" ID hose (1 each end)
5	520512	Hose clamp, 2" (1 each end)

Pressure Vessel

Item	Part Number	Description
6	140802	Pressure vessel assembly, 1 cu. ft.
	760813	Pressure vessel only, 1 cu. ft., ProFormer
7	760739	Hopper, 1-cubic foot, ProFormer
8	524371	Gasket, reclaimers to hopper)
9	523942	Sealing ring, rubber, 2-1/8" ID
10	510431	Plunger, sealing, PVC coated
11	546072	Plunger guide (1/2" NPT x 3-1/2" nipple)
12	545702	Tee, 1" x 1" x 1/2" NPT
13	517503	Check valve, 1" NPT
14	518492	Ball valve, 1" NPT
15	520581	Hose clamp for 1" ID hose (1 each end)
16	520912	Hose, 1" ID (specify 1.5' for 1 cu. ft.; 3.5' for 3 cu. ft.)
17	545822	Tee, 1" x 2" x 1" NPT
18	546192	Nipple, 1" NPT x close, HD
19	567332	Label, WARNING "Do not disassemble..."
	567312	Label, WARNING "Flange above..."

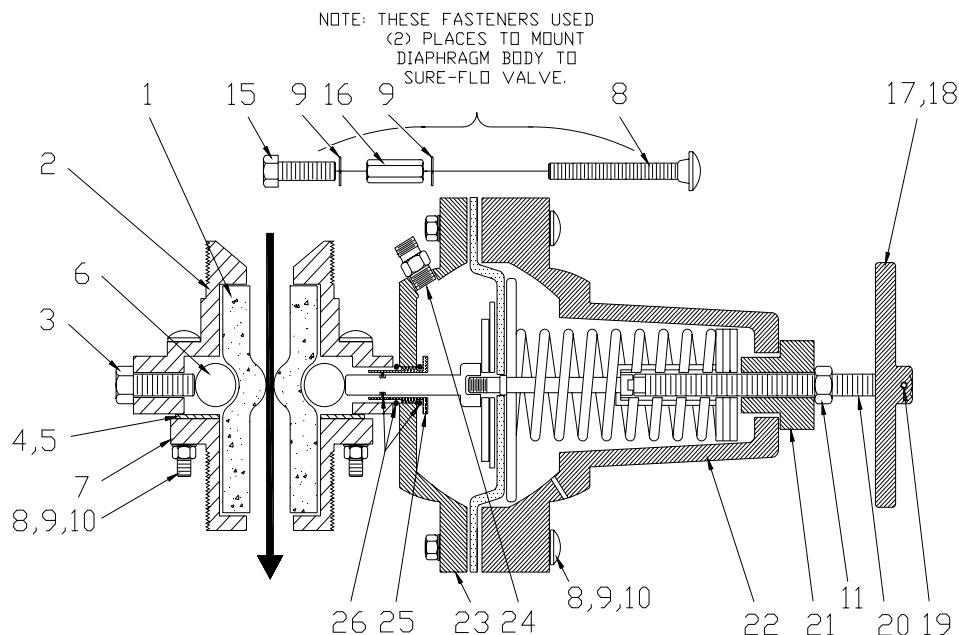
Sure-Flo Media Regulators

Part Number	Catalog Name	Description	Shipping Weight
290383	Manual	Manual Sure-Flo Media Regulator (grit valve) normally open, 9" clearance required	25 lbs.
290215	Automatic	Automatic Sure-Flo Media Regulator (grit valve) normally closed, 9" clearance required	30 lbs.
290188	Conversion kit	Converts Manual Sure-Flo to Automatic	25 lbs.



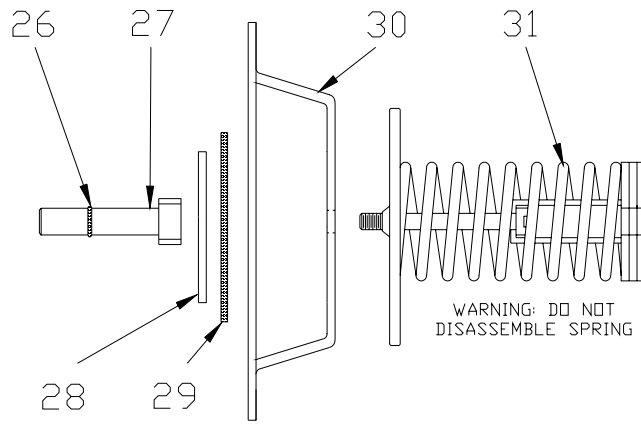
Manual Sure-Flo Media Regulator Parts

Item	Part Number	Description	Nozzle	Grit	Comments
1	525451	Metering tube, 3/8" ID	Small	Fine	Back out roller bolt 1/2"
	525782	Metering tube, 1/2" ID	Small-Med	Fine-Med	Back out roller 1/2"
	523592	Metering tube, 3/4" ID	Medium	Medium	Supplied as standard
	523512	Metering tube, 3/4" ID	Medium	Medium	Use below 32 F. (red)
	525792	Metering tube, 5/8" ID	Med-large	Med-coarse	—
	525802	Metering tube, 7/8" ID	Large	Coarse	High production use
2	753692	Valve body, 2" MPT			
3	552222	Bolt, 7/16"-14 x 1-1/4"			
4	753092	Roller stop/holder			
5	551352	Screw, 8-32 x 1/2" (2 per assembly)			
6	753632	Pinch roller (2 per assembly)			
7	753292	Flange, 2" MPT			
8	552052	Bolt, carriage, 3/8"-16 x 2-1/2" (4)			
9	552762	Lock washer, 3/8" ID (6)			
10	552542	Nut, hex 3/8" -16 (6)			
11	552672	1/2" Jam nut			
12	551902	Bolt, hex 3/8" -16 x 3" (2)			
13	753372	Adapter, manual body, Sure-Flo			
14	290384	Handle assembly, 1/2" -13 x 4"			



Automatic Sure-Flo Media Regulator Parts

Item	Part Number	Description	Nozzle	Grit	Comments
1	525451	Metering tube, 3/8" ID	Small	Fine	Back out roller bolt 1/2"
	525782	Metering tube, 1/2" ID	Small-Med	Fine-Med	Back out roller bolt 1/2"
	523592	Metering tube, 3/4" ID	Medium	Medium	Supplied as standard
	523512	Metering tube, 3/4" ID	Medium	Medium	Use below 32 F. (red)
	525792	Metering tube, 5/8" ID	Med-large	Med-coarse	—
525802	Metering tube, 7/8" ID	Large	Coarse	High production use	
2	753692	Valve body, 2" MPT			
3	552222	Bolt, 7/16" - 14 x 1-1/4"			
4	753092	Roller stop/holder			
5	551352	Screw, 8-32 x 1/2" (2 per assembly)			
6	753632	Pinch roller (2 per assembly)			
7	753292	Flange, 2" MPT			
8	552052	Bolt, carriage, 3/8" - 16 x 2-1/2" (10)			
9	552762	Lock washer, 3/8" ID (12)			
10	552542	Nut, hex 3/8" - 16 (8)			
11	552672	1/2" Jam nut (1/2"-13)			
12	N/A	(Not shown in drawing)			
13	N/A	(Not shown in drawing)			
14	N/A	(Not shown in drawing)			
15	551852	Bolt, 3/8" - 16 x 1-1/4" (2/Auto Sure-Flo)			
16	552662	Nut, extension 3/8" - 16 (2/Auto Sure-Flo)			
17	290217	Handle assembly, 1/2" - 13, Automatic Sure-Flo			
18	753622	Handle (only), 1/2" - 13			
19	551732	Set screw, 1/2" - 13 x 1/2", nyloc			
20	505802	Shaft, handle			
21	505822	Spring tensioner			
22	753682	Spring enclosure			
23	753112	Diaphragm cover			
24	521081	Adapter, 1/4" NPT x 1/4" Tube)			
25	753462	Plunger guide			
26	561422	O-ring kit (includes 2 for guide & 1 for plunger)			
27	505872	Plunger with O-ring			
28	552842	Washer, 1/2" ID			
29	525002	Gasket, diaphragm			
30	525012	Diaphragm			
31	290296	Spring assembly (includes item shown in Detail B)			
32	565452	Tag, instructions, Sure-Flo			



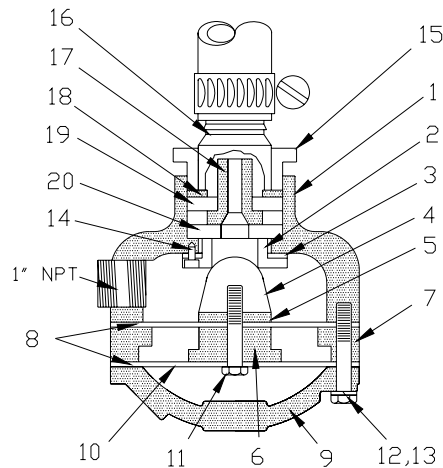
Spring & Diaphragm Assembly Detail

WARNING

Never attempt to disassemble the spring assembly in the automatic Sure-Flo. The spring is under tension and could cause injury to personnel.

MG-78 Exhaust Valve Assembly & Options

Item	Part Number	Description
	290182	Exhaust valve, MG-78 (with ceramic restrictor kit)
	290184	Boron carbide upgrade for restrictor kit, extended wear, Factory Installed (option)
	502081	Boron carbide upgrade replacement restrictor.



Exhaust Valve Components

Item	Part Number	Description
	290183	Rebuild Kit, MG-78 (Seat & gasket, ball, diaphragm, 3 screws, drawing). (items 2, 3, 4, 14) <i>Note: MG-78 castings must be in good condition to use PN 290183 effectively.</i>
1	753332	Valve body
2	753412	Seat, valve ball (steel)
3	524132	Gasket, seat
4	525322	Valve ball (also used on 411 & 412 valves)
5	553412	Spacer washer, steel (1/2" ID x 2" OD x 1/4" thick)
6	753392	Spacer ring, inner
7	753402	Spacer ring, outer
8	523672	Diaphragm (2 per assembly)
9	753382	Cover, valve
10	552842	Washer (1/2" ID x 2" OD x 1/16" thick)
11	551962	Bolt, 1/2" -13 x 1-3/4"

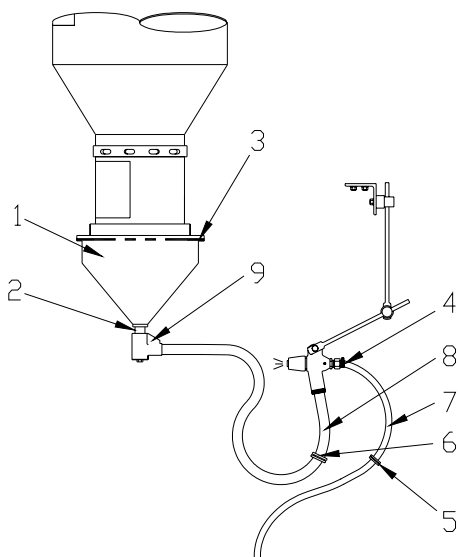
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12	553982	Bolt, 3/8" -16 x 2"
13	552762	Lock washer, 3/8"
14	551122	Screws, seat, 1/4" -20 x 1/2" (pack of 3)
15	544512	Reducer bushing, 1-1/4" MPT x 1" FPT
16	520181	Hose Barb 1"

Restrictor Parts

17	290218	Ceramic Restrictor kit (standard)
	502431	Ceramic nozzle (standard)
	502081	Boron carbide upgrade for restrictor kit, customer installed (extended wear)
	290184	Boron carbide upgrade for restrictor kit, factory installed (extended wear)
18	552952	Washer, steel
19	524062	Washer, nozzle, NW-1 (1" ID x 1-1/2" OD x 1/4" thick) (pack of 10)
20	524082	Washer, nozzle, NW-4 (3/4" ID x 1-1/2" OD x 1/4" thick) (pack of 10)

9.3 Suction Blast Systems

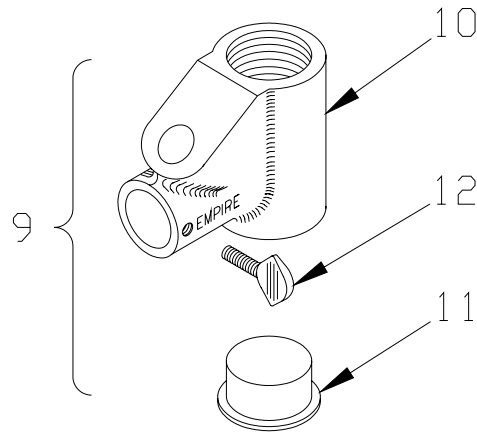


Components

Item	Part Number	Description
1	760751	Hopper, 1 - gun suction
2	546332	Nipple, 1-1/4" NPT x 3"
3	524371	Gasket, reclaimer to hopper
4	520502	Hose clamp, 1/2" air hose (2 per hose)
5	523921	Grommet, air hose, 3/4" x 1-1/16"
6	523931	Grommet, blast hose, 1" x 1-3/8"

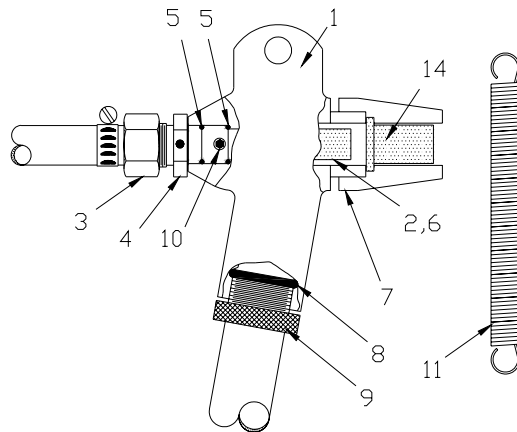
Blast & Air Hoses

Item	Bulk	3642	4652	Description
7	—	522841	522851	Air hose assembly, 1/2" ID
	520861	—	—	Air hose, 1/2" ID
	—	(7')	(8')	(Air hose length, std cabinet)
8	—	522581	522591	Blast hose section, 5/8" ID
	520802	—	—	Blast hose, 5/8" ID
	—	(8')	(9')	(Blast hose length, std cabinet)



SAR-2 Media Regulator

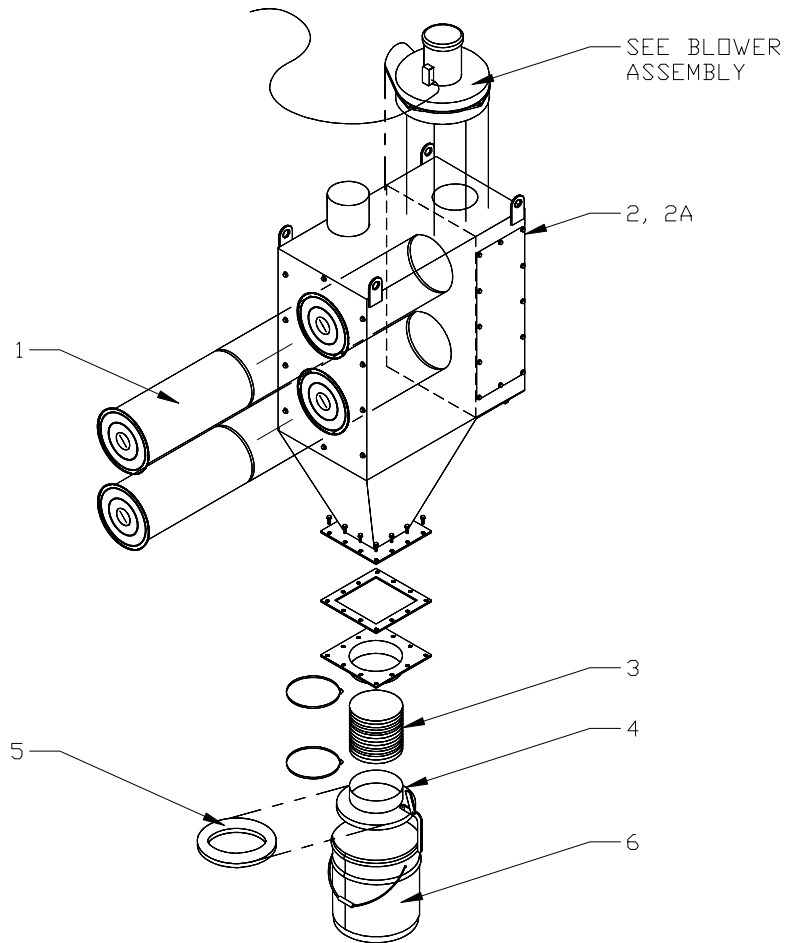
Item	Part Number	Description
9	290156	SAR-2 Media Regulator, complete, 1-1/4" FPT
10	753351	Regulator body, SAR-2
11	510121	Plug, clean out
12	551042	Thumb screw, 1/4"-20 x 1"



PARTS for MH-2 Guns

Item	Part Number	Description
1	753551	Gun body, MH-2 LONG handle
	753561	Gun body, MH-2 SHORT handle
2	505651	Air jet, 3/32" (orange)
	505661	Air jet, 1/8" (yellow)
	505671	Air jet, 5/32" (green)
	505681	Air jet, 3/16" (blue)
	505691	Air jet, 7/32" (white)
	505701	Air jet, 1/4" (red)
3	520402	Hose barb, 1/2" FPT x 1/2" hose
4	505621	Connector, MH-2
5	523912	O-Ring, 1/2" ID x 5/8" OD (2 required)
	526171	Sleeve, rubber, for air jet
7	505641	Nozzle adapter, plastic (standard)
	504931	Nozzle adapter, steel
8	523881	O-Ring, 1-1/16" ID x 1-5/16" OD
9	520081	Nut, hose clamp, MH-2
10	551702	Set screw, 1/4"-20 x 3/8"
11	511251	Spring, suction gun assist

9.4 Dust Collector



Components

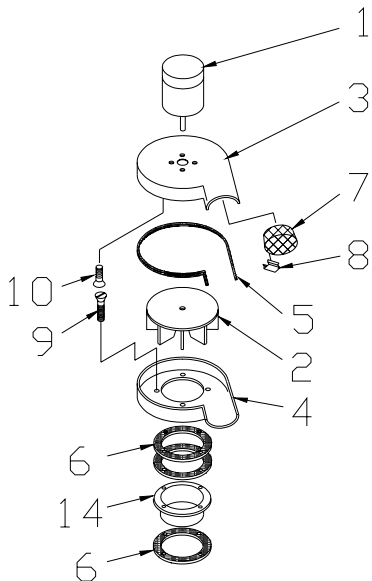
Item	Part Number	Description
1	532523	Filter Assembly, (2)
2	516329	Diaphragm Valve, (2)
2A	516328	Rebuild Kit, Diaphragm Valve
3	516104	Hose, 7" ID x 6" long
4	516106	Cover
5	515710	Gasket, Neoprene, 9-1/2" ID x 12" OD
6	515765	Waste Pail

9.5 Blowers (Fan & Motor)

Blower Assemblies

Part Number	Horsepower	Standard Electrical	CFM @ 6" S.P.	Used with	Notes
140312	1-1/2	230/60/1	600	SEM-2	

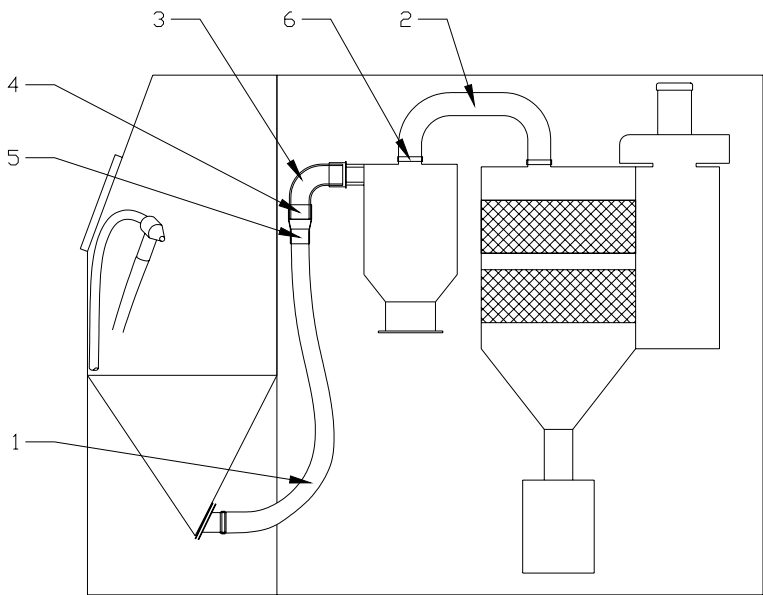
Note: Motor starters, contactors, interconnecting wiring and ducting not included.



Components

Item	All Sizes	1-1/2	Description
1	—	549681	Motor, 115/230V, 60 Hz, Single phase
(Motor part numbers shown in BOLD are supplied as standard most often.)			
2	—	753661	Impeller (fan blade), 11-1/2" dia., 5/8" ID
3	—	753511	Housing, fan, top
4	—	753521	Housing, fan, bottom
5	523251	—	Gasket, fan housing, 1/8" x 1/4" (5' section)
6	—	524361	Gasket, mounting (3 required)
7	—	739011	Guard, fan outlet
8	554431	—	Clip, fan guard (4 required)
9	—	553182	Screw, flat head 3/8" -16 x 2-1/4" (dust collector)
	—	551312	Screw, flat head 3/8"-16 x 1-1/4" (slide gate)
10	—	552072	Screw, flat head 3/8" -16 x 1
11	—	—	Bolt, 1/4" -20 x 3/4"
12	—	—	Clip, 1/4"-20
13	—	—	Bolt, 1/4"-20 x 1
14	—	751501	Flange
15	—	140759	Silencer (optional)

9.6 Ducting/Hoses



Conveying Hose

Standard Systems – Suction or Pressure with Reclaimer & Collector

Item	Part Number		Description
	Customer Installed	Factory Upgrade	
1	522351 (4" x 8')	—	Standard Duty Conveying Hose w/o clamps (I.D. x length)
	140354 (4" x 9')	140338 4" x 9'	Heavy Duty Conveying Hose w/clamps (I.D. x length)

Dust Hose

Item	Part Number	Description
2	516103 (6" x 31')	Standard Dust Hose, w/o clamps (I.D. x length)
3	526413	4" Urethane Elbow, 90 degrees
4	769917	Adapter, Ductwork, 4" Hose to 4" Urethane

Clamps and Adapters

Item	Part Number	Description
5	520531	Hose clamp, Standard Duty conveying hose
	522953 (4")	Hose clamp, Heavy Duty conveying hose (Nominal hose diameter)
6	520551 (6")	Hose clamp, dust hose (Nominal hose diameter)

Note: (2) hose clamps are required per hose.

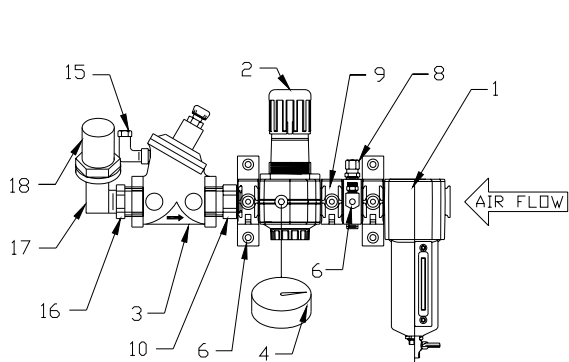
9.7 Pipe Strings

Pipe String Assemblies

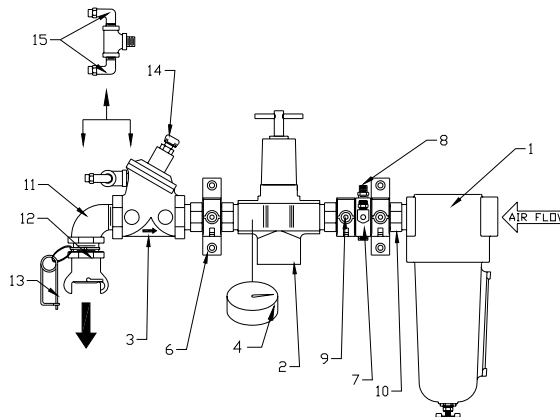
Part Number	Pipe String Size	Used With
140279	1/2"	Suction - 1 gun
140280	1"	Pressure, FaStrip

Pipe String Mounting Hardware

Part Number	Quantity	Description
564121	4	1/4" flat head bolt
552882	4	1/4" washer
552522	4	1/4" hex nut



1/2" Pipe String



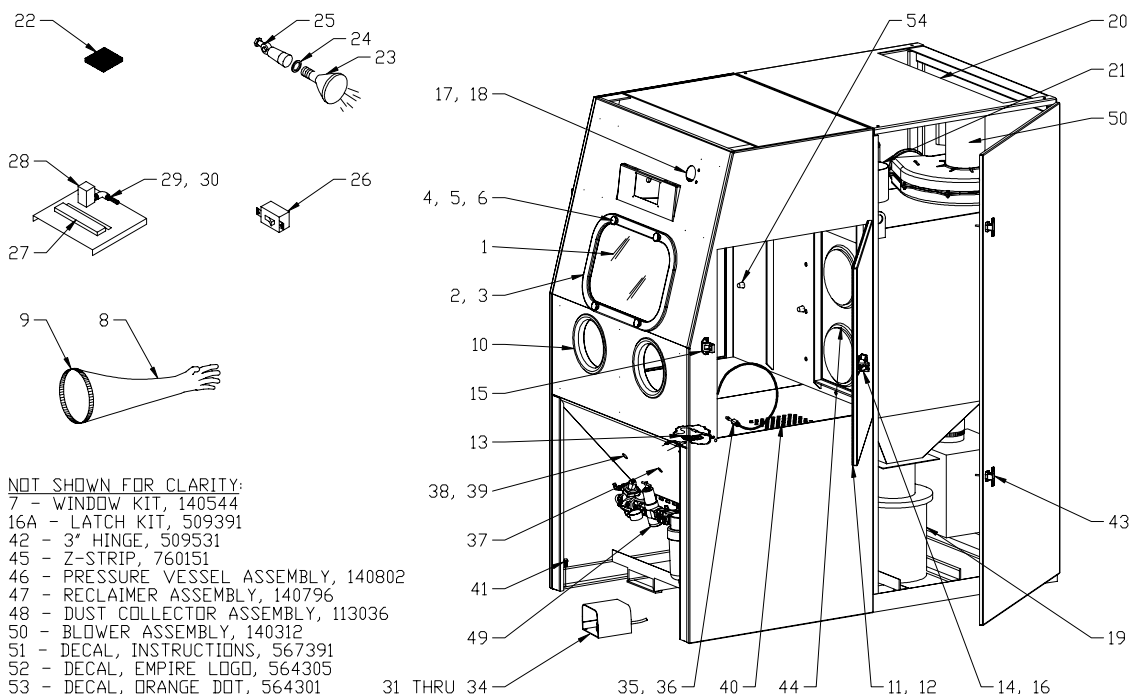
1" Pipe String

Components

Item	Both Sizes	1/2" Only	1" Only	Description
1	—	504652	517271	Air Filter (1/2" manual, 1" manual; Norgren)
		508012	508002	Element for Norgren air filter, 5µ
		508112	505161	O-ring and gasket kit for Norgren air filter
2	—	517141	517251	Air Pressure Regulator (Norgren)
		508102	508161	Diaphragm & O-ring kit for Norgren regulator
3	517042	—	—	Main Air Valve (1" Aquamatic)
	517582	—	—	Diaphragm and seal kit for 1" Aquamatic
	518512	—	—	Special wrench for 1" Aquamatic
	517583	—	—	Repair Kit for 1" Aquamatic*
4	—	550232	550232	Gauge, (550232 1/4" NPT; 550212 1/8" NPT back mount)
6	522155	—	—	Mounting Feet/Quick Clamp
7	522157	—	—	Porting Block
8	520222	—	—	Hose adapter, 1/4" x 1/4"
9	522154	—	—	Quick Clamp
10	522156	—	—	Adapter
11	—	—	543542	Elbow, 1" NPT street
12	—	—	505782	Coupling, 1" FPT, UF-100
13	—	—	510511	Safety pin
14	523261	—	—	Vent
15	520432	—	—	Adapter 1/4" Tube x 1/4" NPT 90
16	—	544497	—	Bushing, 1" x 1/2" Brass
17	—	543533	—	Elbow, 1/2" x 90
18	—	520362	—	Hose Barb, 1/2"

* Repair kit P/N 517583 includes the seal kit P/N 517582.
O-Ring for modular pipe strings P/N 522162.

9.8 Basic Cabinet Assembly



Components

Item	Both Sizes	3642 Only	4652 Only	Description
1*	510401	—	—	Safety Glass, 14" x 22" Δ
2†	524451	—	—	Gasket, window, 6' section
3	760291	—	—	Frame, window
	523551	—	—	Gasket, window frame per ft., 6' required
4	510461	—	—	Knob, 3/8" -16, (4) required
5	551852	—	—	Bolt, 3/8" -16 x 1-1/4", (4) required
6	525931	—	—	Spacer, window, (4) required
7	140544	—	—	Window Kit (items 1 through 6)
8*	509891	—	—	Gloves, pair
	510821	—	—	Glove, left hand
9	520561	—	—	Clamp, 8", per glove
10	555016	—	—	Glove Hole Flange, Plastic
11	524441	—	—	Gasket, 3/4" x 3/4", 20" for 3642/24" for 4652
12†	525041	—	—	Bumper, urethane
13†	521561	—	—	Interlock Hose
14	509371	—	—	Latch, Door, w/o Handle Hole
15	751242	—	—	Catch, Door
16	509381	—	—	Spacer, Catch, Shim Only
16A	300016	—	—	Latch Kit, Items 14, 15 & 16
17	504201	—	—	Gauge, Minihelic
18	504101	—	—	Manual Pushbutton, (2) required
19	509611	—	—	Dust Bucket, 5 Gallon
20	—	765023	765043	Roof Cover
21	516103	—	—	Dust Hose, 6"
22	510491	—	—	Filter, Kleensweep™ inlet, (2) required
23†	532701	—	—	Floodlight bulb
24*	580191	—	—	Gasket, light bulb, 1 per bulb
25	532711	—	—	Light fixture, with gasket
26†	534561	—	—	Switch, Snap, 20 amp
27	533611	—	—	Terminal strip, 10 pole
28†	519001	—	—	Solenoid valve, Standard and CSA
29†	520252	—	—	Barbed fitting, 1/4" tube x #10-32
30	520432	—	—	Adapter, 1/4" tube x 1/8" MPT, 90°

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31	518651	—	—	Foot Treadle Assembly
32†	518661	—	—	Valve, for Foot Treadle
33	518671	—	—	Repair Kit, For Treadle Valve
34	522661	—	—	Hose Assembly, ¼", for Foot Treadle
35	509821	—	—	Gun, dust off
36		522631	522641	Hose with fittings, dust off gun
37	523951	—	—	Grommet, dust off hose 1/4"-5/8" x 7/8"
38	523931	—	—	Grommet, blast hose, 1"x 1-3/8"
	523921	—	—	Grommet, suction air hose, 3/4" x 1-1/16"
39	536391			Hole Seal
40	—	760697	760698	Floor section, std cabinet, (2) required
41	—	551742	551742	Leveling bolt, 3/8" -16 x 2", (4) required
42	509531	—	—	Hinge, 3", (10) required
43	509005	—	—	Latch, Compression, (4) required
44	523523	—	—	Filter, SEM-2, (2) required
45	760151	—	—	Z-strip, reclaimr mount
46	140802	—	—	Pressure Vessel Assembly,
47	140796	—	—	Reclaimr Assembly
48	113036	—	—	Dust Collector Assembly, SEM-2
49	140280	—	—	Piping Assembly, 1"
	140279	—	—	Piping Assembly, ½"
50	140312	—	—	Blower Assembly, 1-1/2 HP, 230V/60Hz/1-Ph
51	567391	—	—	Decal, Instruction/Warnings
52	564305	—	—	Decal, Empire logo
53	564301	—	—	Decal, orange dot strip, 42" **
54	523533	—	—	Rubber nut, 1/4"-20 (for optional curtains)

* Recommended spare part – consumable wear item.

† Essential component - to prevent downtime.

†† For systems with optional equipment

** Specify length (per foot)

WARNING

Replace the window with Empire safety glass only. Failure to do so could result in serious injury.

10.0 Warranty

Empire Abrasive Equipment Company (“Empire”) warrants all parts and equipment against defect in material and workmanship to the original purchaser for a period of **three (3) years** after shipment. Upon prompt notification by the buyer, to Empire, components that are determined by Empire to be defective will be repaired or replaced at not additional charge.

LIMITATIONS:

1. This warranty does not apply to normal wear items such as nozzles, blast hose, and reclaimers or to other components that are exposed to direct contact with blast media.
2. The buyer must follow all recommended maintenance schedules; see Operating Instruction on prior pages.
3. Does not apply to misapplication of product.
4. Unauthorized service, repair, improper installation, improper operation, improper maintenance, alternations, misuse, neglect, accident or excessive ambient conditions will void the warranty.
5. **If genuine Empire replacement parts are not used the warranty is void.**
6. Returned Material Authorization (RMA) form must be completed and accompany all returned goods. Returns are not recognized without prior authorization and RMA number.
7. Associated installation costs are excluded.
8. Freight costs for goods returned to Empire are to be assumed by the buyer unless the parts are determined defective by Empire.
9. Parts that are not supplied by Empire are not covered. Commercial components are warranted under term of the original manufacturer.