SUPER COMET
PRESSURE BLAST and VACUUM RECOVERY SYSTEM
O. M. 23437

DATE OF ISSUE: 02/20/02
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⚠WARNING

Do not use this equipment until you have READ this MANUAL and YOU UNDERSTAND its contents. *

These WARNINGS are included for the health and safety of the operator and those in the immediate vicinity.

***If you are using a Clemco Distributor Maintenance and Parts Guide, refer to the orange warnings insert preceding the Index before continuing with the enclosed instructions.**

Electronic files include a Preface containing the same important information as the orange cover.

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⚠ WARNING

- **Employers are responsible for identifying all job site hazards, educating and training all persons who will operate and maintain these products, and ensuring that all blast operators and their assistants understand the warnings and information contained in these instructions relating to safe and proper operation and maintenance of this equipment.**
- **Serious injury or death can result from failure to comply with all Occupational Safety and Health Administration (OSHA)regulations and all manufacturer's instructions.**
- **This equipment is not intended for use in any area considered hazardous per National Electric Code NFPA 70 2011, Article 500.**
- **Read this document and follow all instructions before using this equipment.**

OSHA regulations relating to abrasive blasting are contained in the Code of Federal Regulations, Title 29 (29 CFR 1910 General Industry; 1915 Maritime; 1926 Construction). The most pertinent include: 1910.94 Ventilation, 1910.95 Occupational Noise Exposure, 1910.132 Personal Protective Equipment, 1910.133 Eye and Face Protection, 1910.134 Respiratory Protection, 1910.135 Head Protection, 1910.244 (b) Remote Controls. Consult www.osha.gov for complete information.

NOTICE TO PURCHASERS AND USERS OF OUR PRODUCTS AND THIS INFORMATIONAL MATERIAL

Clemco proudly provides products for the abrasive blast industry and is confident that industry professionals will use their knowledge and expertise for the safe and efficient use of these products.

The products described in this material, and the information relating to these products, are intended for knowledgeable, experienced users.

No representation is intended or made as to: the suitability of the products described here for any purpose or application, or to the efficiency, production rate, or useful life of these products. All estimates regarding production rates or finishes are the responsibility of the user and must be derived solely from the user's experience and expertise, not from information contained in this material.

It is possible that the products described in this material may be combined with other products by the user for purposes determined solely by the user. No representations are intended or made as to the suitability of or engineering balance of or compliance with regulations or standard practice of any such combination of products or components the user may employ.

Abrasive blast equipment is only one component of an abrasive blasting job. Other products, such as air compressors, air filters and receivers, abrasives, scaffolding, hydraulic work platforms or booms, equipment for lighting, painting, ventilating, dehumidifying, parts handling, or specialized respirators or other equipment, even if offered by Clemco, may have been manufactured or supplied by others. The information Clemco provides is intended to support the products Clemco manufactures. Users must contact each manufacturer and supplier of products used in the blast job for warnings, information, training, and instruction relating to the proper and safe use of their equipment.

GENERAL INSTRUCTIONS

This material describes some, but not all, of the major requirements for safe and productive use of blast machines, remote controls, respirator systems, and related accessories. All equipment and accessories must be installed, tested, operated and maintained only by trained, knowledgeable, experienced users.

The blast operator and all workers in the vicinity must be properly protected from all job site hazards including those hazards generated by blasting.

Work environments involving abrasive blasting present numerous hazards. Hazards relate to the blast process from many sources that include, but are not limited to, dust generated by blasting or from material present on the surface being blasted. The hazards from toxic materials may include, but are not limited to, silica, cyanide, arsenic, or other toxins in the abrasives or in the coatings, such as lead or heavy metals. Other hazards from toxins include, but are not limited to, fumes from coating application, carbon monoxide from engine exhaust, contaminated water, chemicals or asbestos. In addition, physical hazards that may be present include, but are not limited to, uneven work surfaces, poor visibility, excessive noise, and electricity. Employers must identify all job site hazards and protect workers in accordance with OSHA regulations.

Never modify Clemco equipment or components or substitute parts from other manufacturers for any Clemco components or parts. Any unauthorized modification or substitution of supplied-air respirator parts violates OSHA regulations and voids the NIOSH approval.

IMPORTANT

Contact Clemco for free booklets:

Blast Off 2 – Guide to Safe, Productive, and Efficient Abrasive Blasting, and Abrasive Blasting Safety Practices – Guide to Safe Abrasive Blasting.

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OPERATIONAL INSTRUCTIONS

OPERATOR SAFETY EQUIPMENT

⚠ WARNING

- **OSHA regulation 1910.134 requires appropriate respiratory protection for blast operators and workers in the vicinity of blasting. These workers must wear properly-fitted, properly-maintained, NIOSH-approved, respiratory protection that is suitable for the job site hazards. Blast respirators are to be worn only in atmospheres not immediately dangerous to life or health from which wearers can escape without use of the respirator.**
- **The employer must develop and implement a written respiratory protection program with required worksite- specific procedures and elements for required respirator use. The employer must provide effective training to employees who are required to use respirators. The training must be comprehensive, understandable, and recur annually, and more often if necessary.**
- **NEVER use abrasives containing more than one percent crystalline silica. Fatal diseases, such as silicosis, asbestosis, lead or other poisoning, can result from inhalation of toxic dusts, which include, but are not limited to, crystalline silica, asbestos, and lead paint. Refer to NIOSH Alert 92-102; and OSHA CPL 03-00-007: "National Emphasis Program – Crystalline Silica", in which OSHA describes policies and procedures for implementing a national emphasis program to identify and reduce or eliminate health hazards from exposure to crystalline silica. Numerous topics associated with the hazards of crystalline silica in silica blasting sand can be found on http:// osha.gov/. Clemco urges users of silica blasting sand to visit this website, and read and heed the information it contains.**
- **Always make sure the breathing air supply (respirator hose) is not connected to plant lines that supply gases that include, but are not limited to, oxygen, nitrogen, acetylene, or other non-breathable gas. Never modify or change respirator air line connections without first testing the content of the line for safe breathing air. Failure to test the line may result in death to the respirator user.**

• Breathing air quality must be at least Grade D, as defined by the Compressed Gas Association specification G-7.1, per OSHA Regulation 29 CFR 1910.134. When compressed air is the breathing air source, a Clemco CPF (suitable sorbent bed filter) should be used. Respirator hose connecting the respirator to the filter must be NIOSH approved. Non- approved hose can cause illness from chemicals employed to manufacture the hose.

• All workers must always wear NIOSH-approved respirators when any dust is present. Exposure to dust can occur when handling or loading abrasive, blasting, cleaning up abrasive, or working in the vicinity of blasting. Before removing the respirator, test the air with a monitoring device to ensure it is safe to breathe.

• Clemco respirators DO NOT remove or protect against carbon monoxide or any other toxic gas. Monitoring devices must be used in conjunction with the respirator to ensure safe breathing air. Always locate compressors and ambient air pumps where contaminated air will not enter the air intake.

• Always use Clemco lenses with Clemco respirators; installing non-approved lenses voids the NIOSH approval. Respirator lenses are designed to protect the wearer from rebounding abrasive; they do not protect against flying objects, heavy high-speed materials, glare, liquids, or radiation.

INDUSTRY ORGANIZATIONS

For additional information, consult:

Occupational Safety and Health Administration (OSHA) - www.osha.gov
Compressed Gas Association (CGA) - www.cganet.com
The Society for Protective Coatings (SSPC) - www.sspc.org
National Association of Corrosion Engineers (NACE) - www.nace.org
American Society for Testing and Materials (ASTM) - www.astm.org
National Institute of Occupational Safety and Health (NIOSH) - www.niosh.gov
American National Standards Institute (ANSI) - www.ansi.org

PREFACE

BLAST MACHINES AND REMOTE CONTROLS

⚠ WARNING

OSHA regulation 1910.169 describes the necessity of pressure relief valves on compressed air equipment. Do not operate blast machines with air compressors that are not equipped with properly functioning pressure relief valves.

OSHA regulation 1910.244(b) requires the use of remote controls on blast machines.
Serious injury or death can result from many sources, among them:

- **Involuntary activation of the remote controls. Never modify or substitute remote control parts; parts are not compatible among different manufacturers. Welding hose is not suitable for remote control hose. Its ID and material composition make it unsafe for remote control use.**
- **Exceeding the maximum working pressure. Clemco blast machines are built to ASME-code and carry a 'U' or 'UM' stamp, and National Board/serial number. Every machine is marked with its maximum working pressure. Never exceed the maximum working pressure limits of the blast machine.**
- **Uncontrolled blast stream. High-velocity abrasive particles will inflict serious injury. Always point the blast nozzle in the direction of the blast surface only. Keep unprotected workers out of the blast area.**
- **Welding on the blast machine. Never weld on the blast machine; welding voids the National Board approval and may affect the dimensional integrity of the vessel.**
- **Moving the blast machine. Never manually move a blast machine containing abrasive, any machine containing abrasive must be moved with appropriate mechanical lifting equipment.**

HOSES, COUPLINGS, AND NOZZLE HOLDERS

- The inside diameter (ID) of air hoses, fittings, and connections should be at least four times larger than the nozzle orifice size. Blast hose ID should be three to four times the size of the nozzle orifice. Example: a #6 nozzle (3/8" diameter orifice) calls for 1-1/2" ID blast hose and 1-1/2" ID or larger compressor hose. All hose runs should be kept as short as possible and run in as straight a line as possible to reduce pressure loss.

- To install, squarely cut the end of the hose so that it fits snugly against the coupling or hose end shoulder. Always use the screws recommended by the manufacturer ensuring that they do not penetrate the inner wall. Make sure the couplings tightly fit the hose. Install cotter pins at every connection or use couplings with built-in lock-springs to prevent disengagement. Install safety cables at all connections to prevent whipping if hoses disengage or blow out.

MAINTENANCE AND REPAIR

- Completely read and follow all service instructions and recommended maintenance intervals. Always shut off compressor and depressurize blast machine before performing any maintenance. At every service interval, clean all filters, screens, and alarm systems. If spring-loaded abrasive valves are used, always cage spring before disassembly.

WARRANTY

The following is in lieu of all warranties, express, implied or statutory, and in no event shall seller or its agents, successors, nominees or assignees, or either, be liable for special or consequential damage arising out of a breach of warranty. This warranty does not apply to any damage or defect resulting from negligent or improper assembly or use of any item by the buyer or its agent or from alteration or attempted repair by any person other than an authorized agent of seller. All used, repaired, modified, or altered items are purchased "as is" and with all faults. In no event shall seller be liable for consequential or incidental damages. The sole and exclusive remedy of buyer for breach of warranty by seller shall be repair or replacement of defective parts or, at seller's option, refund of purchase price, as set forth below
:

1. Seller makes no warranty with respect to products used other than in accordance hereunder.

2. On products seller manufactures, seller warrants that all products are to be free from defects in workmanship and materials for a

period of one year from date of shipment to buyer, but no warranty is made that the products are fit for a particular purpose.

3. On products which seller buys and resells pursuant to this order, seller warrants that the products shall carry the then standard warranties of the manufacturers thereof, a copy of which shall be made available to the customer upon request.

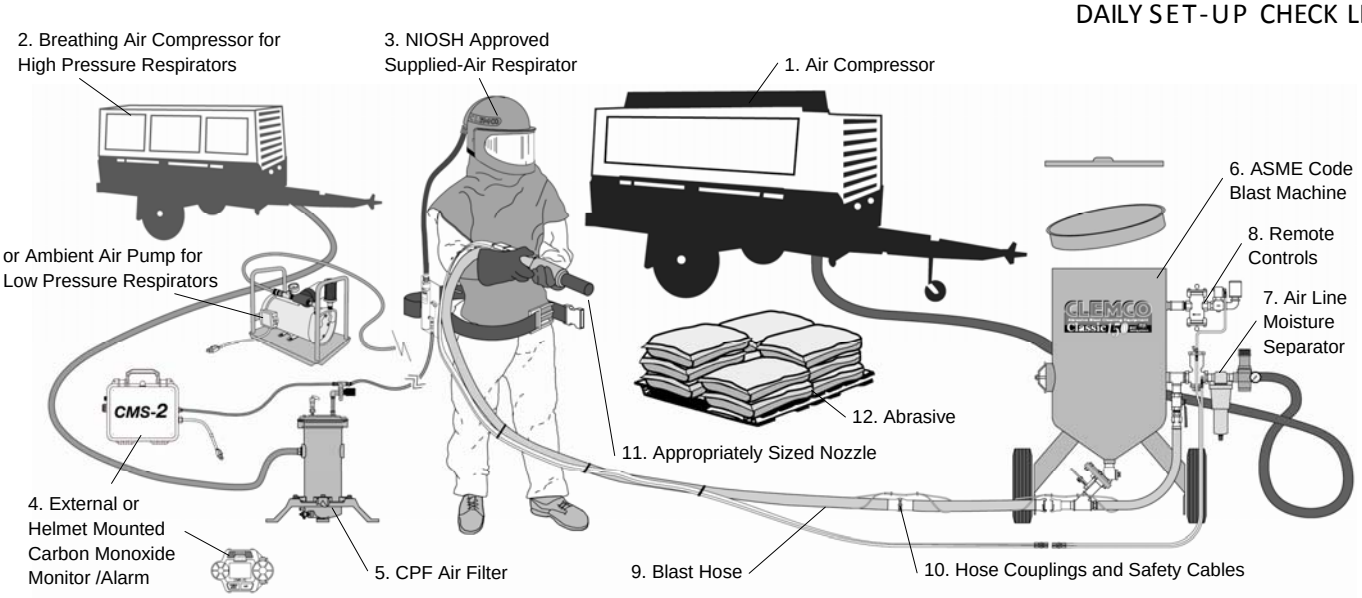
4. The use of any sample or model in connection with this order is for illustrative purposes only and is not to be construed as a warranty that the product will conform to the sample or model.

5. Seller makes no warranty that the products are delivered free of the rightful claim of any third party by way of patent infringement or the like.

6. This warranty is conditioned upon seller's receipt within ten (10) days after buyer's discovery of a defect, of a written notice stating in what specific material respects the product failed to meet this warranty. If such notice is timely given, seller will, at its option, either modify the product or part to correct the defect, replace the product or part with complying products or parts, or refund the amount paid for the defective product, any one of which will constitute the sole liability of the seller and a full settlement of all claims. No allowance will be made for alterations or repairs made by other than those authorized by seller without prior written consent of seller. Buyer shall afford seller prompt and reasonable opportunity to inspect the products for which any claim is made as above stated.

Except as expressly set forth above, all warranties, express, implied or statutory, including implied warranty of merchantability, are hereby disclaimed.

DAILY SET-UP CHECK LIST



Make sure all blast operators are properly trained and suitably attired with a blast suit, safety boots, leather gloves, respiratory and hearing protection. Every day before start up, check all equipment components, including piping, fittings, and hoses, and valves, for leaks, tightness, and wear. Repair or replace as needed. Use the following checklist.

☐ **1. PROPERLY-MAINTAINED AIR COMPRESSOR** sized to provide sufficient volume (cfm) at given pressure for nozzle and other tools. ADD 50% volume (cfm) reserve to allow for nozzle wear. Use large compressor outlet and air hose (at least 4 times the nozzle orifice diameter). For oil-lubricated compressors, the employer shall use a high- temperature or carbon monoxide alarm, or both, to monitor carbon monoxide levels. If only high-temperature alarms are used, the air supply shall be monitored at intervals sufficient to prevent carbon monoxide in the breathing air from exceeding 10 ppm. Follow the manufacturer's checklist and maintenance instructions.

☐ **2. BREATHING-AIR COMPRESSOR** (or oil-less ambient air pump) capable of providing Grade D quality air, located in a dust free area. Read # 1 above.

☐ **3. CLEAN, PROPERLY-MAINTAINED NIOSH-APPROVED SUPPLIED-AIR RESPIRATOR** worn by blast operators, and other workers exposed to blast dust. Make sure all respirator components are in place — all lenses, inner collar, and cape. Thoroughly inspect all components for wear. The NIOSH approval (approval number is listed in the owner's manual) is for a complete assembly from point of attachment on the CPF (sorbent bed) filter to the complete respirator. Substitution of any part voids the NIOSH approval.

☐ **4. CARBON MONOXIDE MONITOR/ALARM** installed at the CPF filter or inside the supplied-air respirator for monitoring for the presence of deadly CO gas and warning the operator(s) when the CO level reaches an unacceptable level. When an ambient air pump is used for breathing air, a CO monitor provides a measure of safety. Read # 1 above.

☐ **5. BREATHING-AIR FILTER (OSHA-REQUIRED** sorbent bed filter) for removal of moisture and particulate matter in the compressed air breathing-air supply. Monitor the condition of the cartridge and replace when odor is detected or at 3 month intervals, whichever comes sooner. The breathing air filter does NOT detect or remove carbon monoxide (CO). Always install a CO monitor/alarm.

☐ **6. BLAST MACHINE** (bearing U or UM stamp, National Board Number, and Maximum Working Pressure) sized to hold a 30-minute abrasive supply. Examine pop-up valve for alignment. Check piping, fittings, screens, valves for tightness, leaks, and wear. Always ground the machine to eliminate hazard of static shock. Install a blast machine screen to keep out foreign objects. Use a blast machine cover if left outdoors overnight. Never exceed the maximum working pressure of the vessel.

☐ **7. AIR LINE FILTER** (moisture separator) installed as close as possible to the blast machine inlet and sized to match the size of the inlet piping or larger air supply line. Clean filter and drain often. Damp abrasive causes operational problems.

☐ **8. REMOTE CONTROLS** are required by OSHA and must be in perfect operating condition. Test and check all components to ensure all parts are present and fully functional. Use genuine replacement parts. NEVER mix parts from different manufacturers. Never use welding hose for remote control hose.

☐ **9. BLAST HOSE** should have an inside diameter sized to suit the blast nozzle. The ID should be three to four times the size of the nozzle orifice diameter. Blast hose should be arranged in as straight a line as possible from the blast machine to the work area, avoiding sharp bends.

☐ **10. COUPLINGS AND NOZZLE HOLDERS** should fit snugly on the hose and be installed with manufacturer recommended screws. Coupling lugs must snap firmly into locking position. Gasket must always be used to form a positive seal, and cotter pins must be installed. Replace gasket when wear, softness or distortion is detected. Check nozzle holder for thread wear; replace at any sign of wear. Install safety cables at all connections.

☐ **11. NOZZLE** orifice size should be checked and nozzle replaced when worn 1/16" from original size. (No. 5 nozzle has 5/16" orifice diameter; replace when it measures 3/8"). Threads should be inspected daily for wear and nozzle should be replaced when wear is detected. Always use a nozzle washer.

☐ **12. ABRASIVE** must be a material specifically manufactured for blasting. It should be properly sized for the job. Check material safety data sheet for free-silica, cyanide, arsenic, lead and other toxins and avoid use when these toxic, harmful substances are present.

☐ **SURFACE TO BE BLASTED** should be examined for hazardous substances. Take appropriate protective measures as required by OSHA to ensure the blast operator, other workers in the vicinity, and any bystanders are properly protected.

1.0 INTRODUCTION

1.1 Scope of manual

1.1.1 This manual covers installation, operation, maintenance, troubleshooting, and replacement parts for the Super Comet blast and recovery system.

1.1.2 These instructions contain important safety information. All operators and personnel involved with the abrasive blast process must read and understand the contents of these instructions, including the orange cover. It is equally important that the operator is trained and qualified to safely operate the blast machine and remote controls, and all other equipment used with the blast machine.

1.1.3 All personnel involved with the abrasive blasting process must be made aware of the hazards associated with abrasive blasting. The Clemco booklet "Abrasive Blasting Safety Practices" is included with every blast machine, and contains important safety information about abrasive blasting that may not be included in equipment operation manuals. To order additional copies, visit www.clemcoindustries.com or email info@clemcoindustries.com.

1.2 Safety Alerts

1.2.1 Clemco uses safety alert signal words, based on ANSI Z535.4-2011, to alert the user of a potentially hazardous situation that may be encountered while operating this equipment. ANSI's definitions of the signal words are as follows:

This is the safety alert symbol. It is used to alert you to potential physical injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

NOTICE

Notice indicates information that is considered important, but not hazard-related, if not avoided, could result in property damage.

⚠ CAUTION

Caution indicates a hazardous situation that, if not avoided, could result in minor or moderate injury.

⚠ WARNING

Warning indicates a hazardous situation that, if not avoided, could result in death or serious injury.

⚠ DANGER

Danger indicates a hazardous situation that, if not avoided, will result in death or serious injury.

1.3 Components and Operating Principles

1.3.1 Components, Figure 1

1.3.1.1 The primary components of the Super Comet are:

1. Blast machine with controls and blast hose
2. Blast head assembly with brushes for inside corner, outside corner and flat surfaces
3. Reclaimer and vacuum recovery hose
4. Dust collector and exhauster
5. Cart

Refer to Figure 2 for blast machine components.

1.3.2 Blast Machine

1.3.2.1 Clemco blast machines (pressure vessels) are certified to conform to the ASME (American Society of Mechanical Engineers) Boiler and Pressure Vessel Code, Section VIII, Division 1. It is the owner's responsibility to maintain the integrity of the vessel in accordance with the requirements of state regulations. Regulations may include regular inspection and hydrostatic testing as described in National Board inspection code and jurisdictional regulations and/or laws.

⚠ WARNING

Welding, grinding, or drilling on the blast machine could weaken the vessel. Compressed air pressure could cause a weakened blast machine to rupture, resulting in death or serious injury. Welding, grinding, or drilling on the vessel, without a National Board R stamp, voids the Clemco ASME certification.

1.3.2.2 All welding repairs to the vessel must be performed by certified welders at shops holding a National Board R Stamp. Welding performed by any welder not properly qualified per the ASME code, voids the Clemco ASME certification.

1.3.2.3 Do not exceed the maximum working pressure rating (PSI) of the blast machine. The maximum pressure rating is stamped into the ASME nameplate which is welded to the side of the vessel.

⚠ WARNING

Excessive compressed air pressure could cause a blast machine to rupture. To prevent serious injury or death, do not exceed the rated pressure of the blast machine.

1.3.2.4 OSHA does not require pressure relief valves on blast machines when air compressors supplying air to the blast machines are built to ASME[(1)] code and comply with OSHA[(2)] regulations. OSHA regulation 1910.169 refers to the ASME code when describing the necessity of pressure relief valves on compressed air equipment. **DO NOT** operate blast machines with air compressors that are not equipped with properly-functioning pressure relief valves.

[(1)] American Society of Mechanical Engineers, Boiler and Pressure Vessel Code, Section VIII, Division 1,

[(2)] Occupational Safety and Health Administration, 29 CFR 1910, 169.

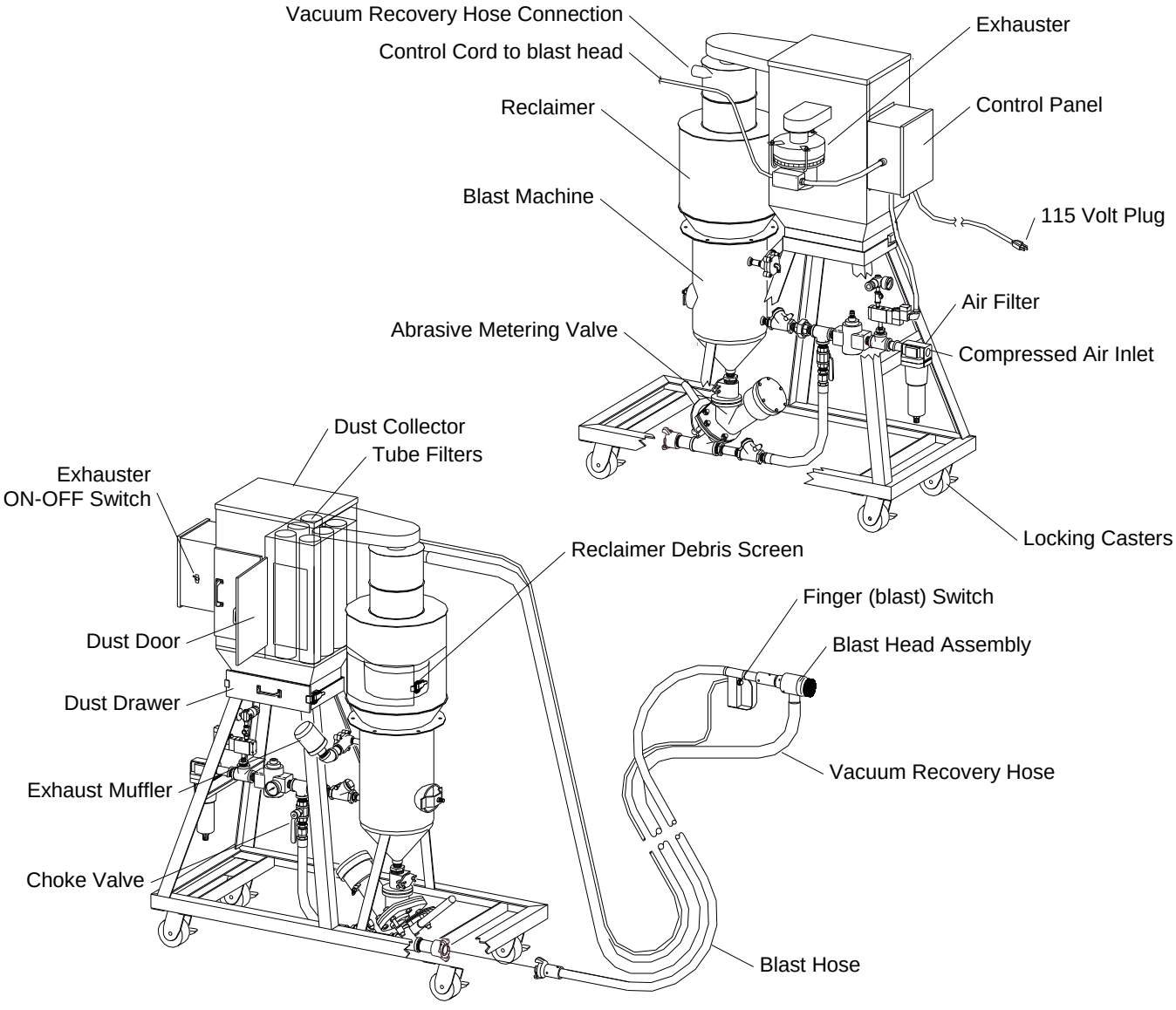


Figure 1

1.3.3 Theory of Operation

1.3.3.1 When the air supply is ON, and electrical power is connected, the blast machine is ready for actuation by pressing the switch mounted on the blast hose hand grip assembly. Pressing the (momentary-contact) finger switch activates the electrical blast-control solenoid, which pneumatically opens the normally-closed pilot-operated pressure regulator, and closes the normally open outlet valve. The incoming air pressurizes the blast machine, and blasting begins. When pressure on the switch is released, the blast machine depressurizes, and blasting stops.

1.3.3.2 During operation, the abrasive metering valve installed at the bottom of the blast machine meters a controlled quantity of abrasive into the air stream, The air and abrasive travel through the blast hose to the blast gun. Blasting is contained entirely within the hand held gun assembly. A brush at the end of the assembly, confines the abrasive and draws in atmospheric air, sweeping the blast area clean.

1.3.3.3 Spent abrasive and by-products are recovered from the blast surface into the reclaimer for separation. Lightweight dust and fines remain airborne and are drawn out of the reclaimer and into the dust collector. Heavier reusable abrasive falls through the screen into the reclaimer hopper located above the blast machine and stored for reuse. When the foot pedal is released, blasting stops.

1.3.3.4 Air, dust and fine by-products leave the reclaimer and collect in the cloth filters; cleaned air passes through the exhaust fan and is discharged into the atmosphere. Dust particles trapped by the filter bags are released by manually reversing the air flow; dust released from the bags collects in a pan for disposal.

1.3.3.5 When the operator releases finger pressure from the control switch, the machine depressurizes and blasting stops. The pop-up valve drops when air is expelled from the machine and pressure equalizes. The blast machine automatically refills with abrasive stored in the hopper.

1.4 Nozzle Options

1.4.1 The Super Comet is shipped with a 3/16" orifice tungsten carbide nozzle. A 1/8" orifice nozzle is available for use when the air supply is limited; a 1/4" orifice nozzle may be used for increased production at lower pressure, but will need to be replaced soon after the nozzle begins to wear, as leakage, due to the additional air volume, can occur at the blast head. Use an optional boron carbide nozzle and boron tube insert when blasting with aggressive abrasive. Refer to blast head and control assembly parts in Section 8.3.

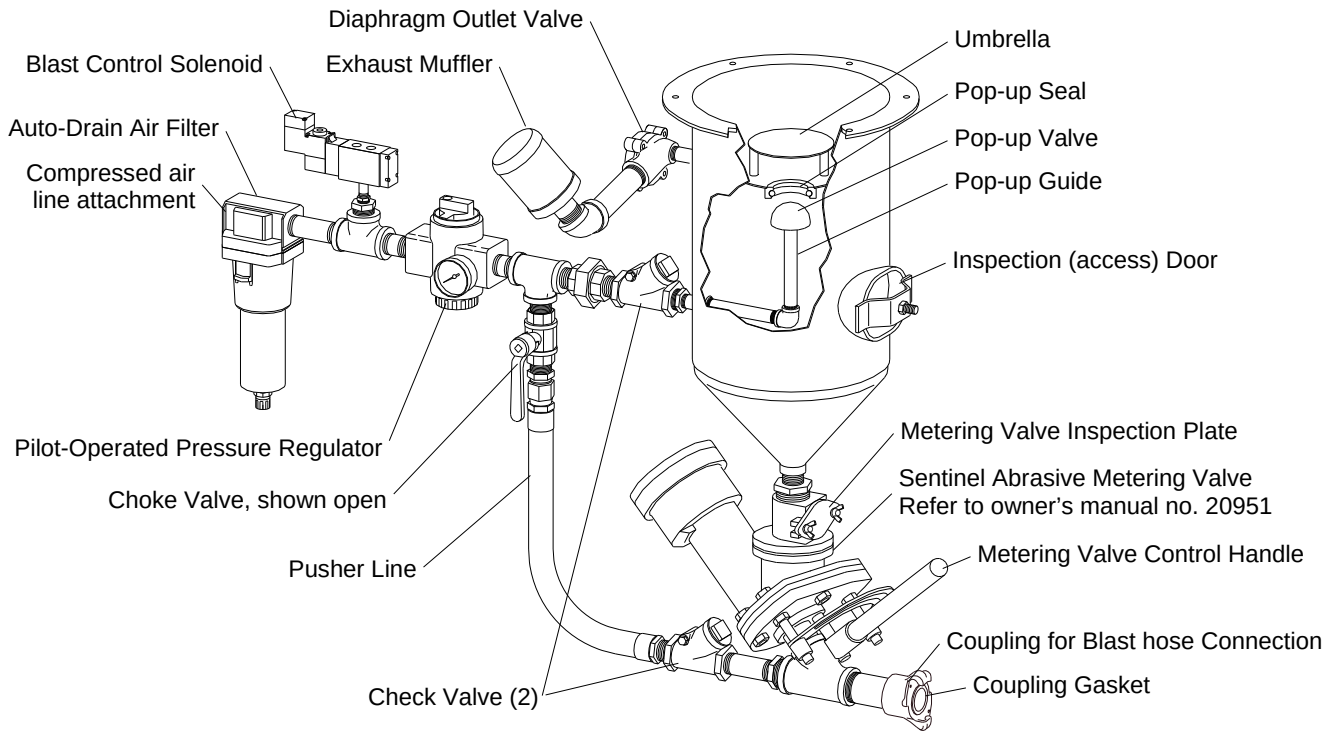


Figure 2

1.5 Operation and Function of the Choke Valve

1.5.1 Temporarily closing the choke valve while blasting clears minor blockage caused from bridging and damp abrasive. Always blast with the choke valve fully open; the valve is open is when the handle is vertical and aligned with the piping as shown in Figure 2.

1.5.2 Closing the valve while blasting lowers pressure in the pusher line from pressure in the vessel, forcing the minor blockage through the metering valve. Closing the valve is also used to rapidly empty the machine as noted in Section 3.3.

⚠ CAUTION

Abrasive cannot be contained within the blast head when the choke valve is fully open; point the nozzle into a drum or suitable container, or in the direction the abrasive is to be disposed. Do not blast with choke valve closed or partially closed. Prolonged blasting with the choke valve partially closed will accelerate wear on the metering valve.

1.6 Abrasive

1.6.1 The Super Comet is designed to utilize most common recyclable abrasives, between 60 and 280 mesh that are specifically manufactured for blasting. Suitable abrasive mesh sizes are based on typical abrasive flow.

1.6.2 Glass Bead: Glass bead No. 6 to 13 may be used. Most beads are treated to ensure free-flow operation even with moderately high humidity. Glass beads subjected to moisture may be reused only after thorough drying and breaking up of any lumps.

1.6.3 Aluminum Oxide, Silicon Carbide, and Garnet: Aggressive abrasives such as these may be used, but consideration must be given to the rapid wear on all parts of the system (reclaimer, nozzle, hoses etc.) which come in contact with the abrasive. Optional boron nozzles and boron tube insert are required when any of these abrasives are used. Refer Section 8.3.

1.6.4 Steel: Steel grit and shot are too heavy for the system to recover. Do not use metallic abrasives.

1.6.5 Sand and Slag: Sand should never be used because of the respiratory hazards associated with abrasives containing free silica. Slags are not recommended because they rapidly break down and are not recyclable, making them unsuitable for closed-circuit blasting applications.

2.0 SET-UP

2.1 Compressed Air Requirements and Air Hose Connection

2.1.1 The size of the compressor required to operate the machine depends on the size of nozzle and blasting pressure. Unless otherwise specified, the machine is supplied with a 3/16" orifice nozzle. The table in Figure 3 shows air consumption of nozzles when new. A nozzle is considered worn when its diameter has increased by 1/16" (to the next orifice size) or when abrasive can no longer be contained within the blast head. A 1/4" orifice nozzle should be limited to lower blasting pressure. Consult with a compressor supplier for a suggested compressor size based on the air consumption.

Compressed Air Consumption *(cfm)

Nozzle size	Air Pressure (psi) 50	60	70	80
1/8"	11	13	15	17
3/16"	26	30	33	38
1/4"	47	54	--	--

* Figures are approximate and for reference only, and may vary for different working conditions. Several variables, including media flow and nozzle wear affect cfm consumption.

Figure 3

2.1.2 The air supply line from the compressor to the blast machine inlet should have a minimum ID of 3/4"; a smaller diameter hose may reduce blasting efficiency.

2.1.3 Apply thread sealant to the male threads of an air fitting that is compatible with the air supply hose fitting, as noted in Paragraph 2.1.2, and install it onto the 1-NPT air filter, as shown in Figure 4. Note that the style of connection shown is for reference only.

⚠ WARNING

Hose disconnection while under pressure can cause serious injury or death. Use safety lock pins or safety wire to lock twist-on (claw-type) couplings together and prevent accidental separation while under pressure, and safety cables to prevent hose from whipping should separation occur.

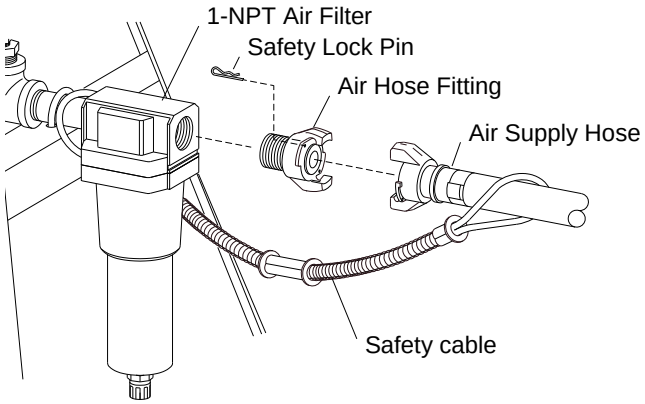


Figure 4

⚠ WARNING

Failure to observe the following before connecting the equipment to the compressed air source could cause serious injury or death from the sudden release of compressed air.

- **Lockout and tagout the compressed air supply.**
- **Bleed the compressed air supply line.**

2.1.4 Install an isolation valve at the air source to enable depressurization for service, and connect an air line from the air source to the air filter inlet located at the blast machine inlet.

⚠ WARNING

To avoid the risk of injury from compressed air, install an isolation valve and bleed-off valve where the air supply is tapped into the compressed air system. This enables depressurization of the compressed-air lines before performing maintenance.

2.2 Compressed Air Filter

2.2.1 The air filter at the blast machine inlet removes condensed water from the compressed air. The filter automatically drains when moisture fills the bowl to a certain level. Its use is especially important in areas of high humidity, or when fine-mesh media are used. Moisture causes media to clump and inhibits free flow through the metering valve. If the filter does not remove enough moisture to keep media dry and flowing, it may be necessary to install an air dryer or aftercooler in the air supply line.

2.2.2 Insert a section of 3/8" O. D. tubing into the automatic drain at the bottom of the filter and place the other end into a pail. When the filter automatically drains, the water will drain into the pail.

2.3 Electrical Requirements

2.3.1 115-VAC, 1-Ph, 60-Hz:, A 115 volt power cord with u-ground plug is provided. No additional wiring is required. **SEE FOLLOWING IMPORTANT WARNING.**

⚠ WARNING

Do not use electrical adaptors that eliminate the ground prong on 115-volt plugs. Doing so can cause electric shock and equipment damage.

3.0 OPERATION

3.1 Inspection

3.1.1 Refer to Figure 5 and make sure coupling gaskets in both couplings are in place and in good condition before connecting the blast hose to the quick coupling on the blast machine. Use safety lock-pins or safety wire to lock the couplings together, to prevent accidental separation during blasting.

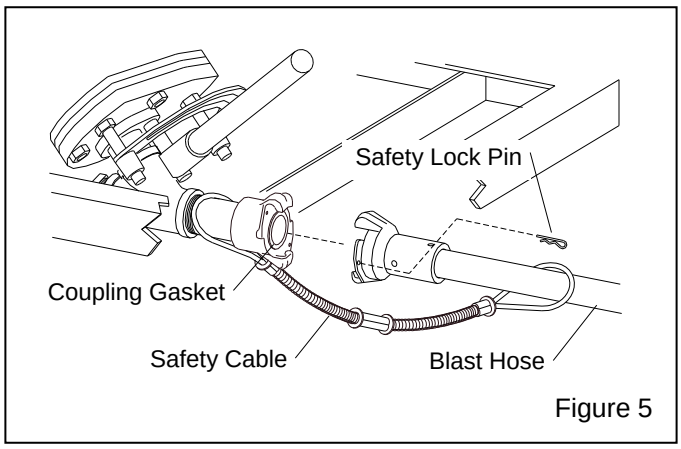


Figure 5

⚠ WARNING

Hose disconnection while under pressure could cause serious injury or death. Use safety lock-pins and safety cables on all hose coupling connections to help prevent couplings from accidental disconnection.

3.1.2 Make sure that all compressed-air supply hose connections are secured with safety lock pins and safety cables to prevent accidental separation or disconnection. Lock pins and safety cables are listed in Section 8.1.

3.1.3 Make sure that all air fittings are secure. Leaks will cause the system to malfunction.

3.1.4 Make sure the choke valve is open (handle in-line with the piping).

3.1.5 Close the abrasive metering valve. The closed position for the Sentinel valve is when the handle is fully to the right. It is not necessary to close the metering valve during routine start-ups once abrasive flow is set as noted in Section 4.2,.

3.2 Loading the Machine with Abrasive

3.2.1 Capacity: Abrasive capacity is approximately 0.5 cu. ft (1/2 cubic foot). The machine is full when abrasive reaches the level of the bottom of the pop-up valve. Overfilling will result in abrasive carryover to the dust collector and possible blockage in the conveying hose.

3.2.2 Abrasive Loading: With the exhauster off, pour clean, dry abrasive into the reclaimer hopper through the reclaimer door.

3.3 Emptying the Machine of Abrasive

3.3.1 When working in environments subject to extreme temperature changes, or very humid conditions, condensation may develop inside the machine. Condensation wets abrasive and causes flow problems. To prevent this, empty the machine of all abrasive when shutting down for the day. This will eliminate trouble from moist abrasive when starting a new day's blasting.

3.3.2 With the blast machine off, turn the blast pressure down to approximately 40 psi, close the choke valve and set the abrasive metering valve at full open.

3.3.3 Point the nozzle into a drum or suitable container, or in the direction the abrasive is to be disposed.

3.3.4 Hold the hose securely and pressurize the machine by activating the control switch. Be prepared for surging, or recoil of the hose, which can be severe.

3.3.5 When the machine is empty, release the control switch, open the choke valve, and reset the abrasive metering valve.

3.4 Select Brush and Attach to Head, Figure 6

3.4.1 Three containment brushes are provided: One for flat surfaces, one for inside corners, and one for outside corners.

3.4.2 Using the elastic brush retainer, attach the appropriate brush to the blast head as follows.

3.4.2.1 Some find it is easier to attach the brush if the elastic retainer is first placed on the head and then rolled inside-out, backward over the head.

3.4.2.2 Place the brush over the end of the head until it snaps into position into the mating groove. Note: inside and outside corner brushes may be rotated to align the angle to the corners to be blasted to minimize interference with the blast and vacuum recovery hoses.

3.4.2.3 Roll the elastic over the end of the brush to secure, as shown in Figure 6.

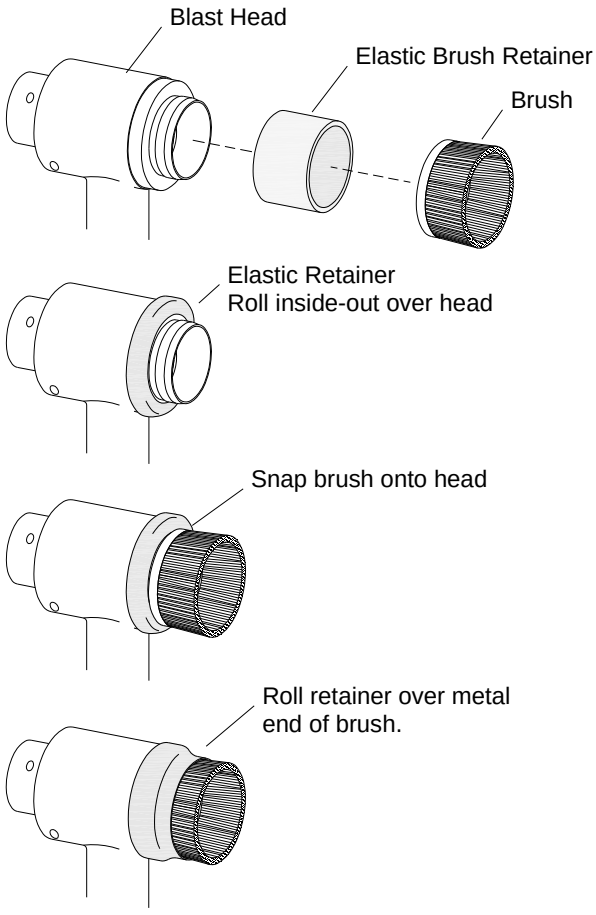


Figure 6

3.5 Blasting Operation

⚠ CAUTION

All parts to be blasted must be free of oil, water, and other contaminants. If not clean, the abrasive may contaminate the blast surface, and may clog abrasive and dust filters, resulting in equipment malfunction.

3.5.1 Operators must wear operator safety equipment. A NIOSH-approved, supplied-air respirator protects against inhalation of dust. Gloves and protective clothing will prevent serious injury from the abrasive blast if the brushes are accidentally lifted off the surface.

3.5.2 The machine is ready for operation when compressed air and electrical power are supplied to the machine, and the machine contains abrasive.

3.5.3 Adjust the pressure regulator, located on the blast machine piping, to the required blasting pressure per Section 4.1.

3.5.4 Start the exhauster by flipping ON the toggle switch located on the electrical panel.

3.5.5 Hold the brush against the surface to be blasted; do not apply excessive pressure that would cause the bristles to bend into the blast stream. Depress the finger switch, blasting (air only at the initial start-up until abrasive flow is adjusted) will begin within a couple of seconds. Adjust abrasive flow per Section 4.2

3.5.6 To stop blasting, release pressure on the finger switch. Leave the brush against the surface for several seconds after blasting stops, to ensure that all abrasive is recovered from the surface.

3.6 Operating Technique

3.6.1 To achieve full abrasive containment and recovery, the brush must be in contact with the surface at all times.

3.6.2 Keep the brush flat against the surface. Keep the blasting head perpendicular to the surface.

3.6.3 Do not apply excessive pressure that would cause the brush to bend into the blast stream.

3.6.4 Make straight, even passes over the blast surface. The blast pattern should barely overlap the pattern from the previous pass.

3.6.5 When reversing direction, move the gun and brush in a small radius, allowing the brush bristles to flex evenly.

3.7 Shut-down

3.7.1 After blasting is complete, run the exhauster for several seconds to clear the hoses before shutting it OFF.

3.7.2 When shutting down for the day, empty the machine of abrasive per section 3.3.

3.7.3 Close the compressed-air supply valve.

3.7.4 Drain receiver tank, filters, and water collecting devices, and bleed the compressed-air supply hose.

3.7.5 Shut down the compressor.

4.0 ADJUSTMENTS

4.1 Blast Pressure, Figure 7

4.1.1 The blast pressure pilot regulator, located on the blast machine piping, enables the user to adjust blasting pressure to suit the application. The suitable pressure for most purposes is 80 psi. Lower pressure may be used for delicate work, minimum pressure is about 40 psi. In all cases, highest production can be achieved only when pressure is carefully monitored.

4.1.2 To adjust pressure, unlock the knob by pulling it straight out as shown in Figure 7, and turn it clockwise to increase pressure or counterclockwise to decrease pressure. Pressure will usually drop from closed-line pressure when blasting is started. Once operating pressure is set, push the knob in to lock it and maintain the setting.

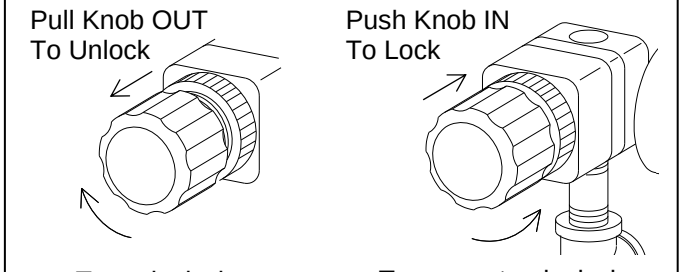


Figure 7

4.2 Abrasive Metering, Figure 8

4.2.1 Adjust abrasive flow using the metering valve located at the bottom of the blast machine. The valve is closed when the handle is fully to the right. To adjust, begin with the valve closed, begin blasting and have someone slowly move the handle to the left in about 1/4" increments to increase abrasive flow. Allow time for the flow to stabilize before further adjusting. The valve is fully open when the handle is at the full left position. Optimum flow rate depends on the type and size of media and blasting pressure, and size of the nozzle orifice, and can best be determined by experience. Use as little media as possible to do the job while maintaining the best cleaning rate.

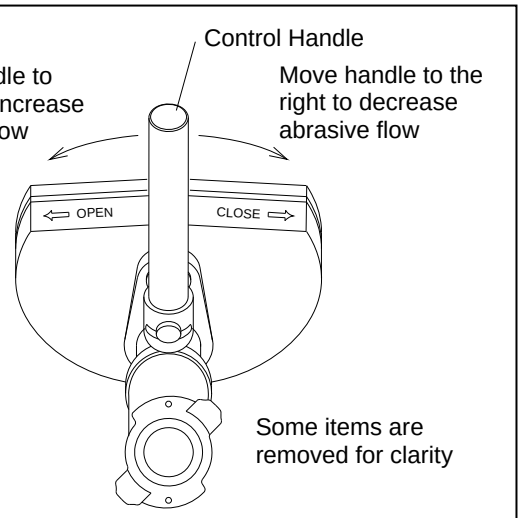


Figure 8

5.0 PREVENTIVE MAINTENANCE

⚠ WARNING

Failure to wear approved respirators and eye protection when servicing dust-laden areas of the dust collector, and when emptying the dust drawer, could result in serious eye irritation and lung disease or death. Toxicity and health risk vary with type of abrasive and dust generated by blasting. The respirator must be approved for the type of dust generated. Identify all material being removed by blasting, and obtain Safety Data Sheets (SDS) for the blast abrasive.

5.1 Inspection

5.1.1 To avoid unscheduled downtime, establish an inspection schedule. Inspect all parts subjected to abrasive contact. Observe the schedule shown below until the wear rate based on the application is established, and then modify the schedule accordingly.

5.1.2 Daily

5.1.2.1 Brushes: Inspect brushes for wear. Replace brush as soon as it no longer contains abrasive at the blast surface.

5.1.2.2 Compressed-air filter: The blast machine is equipped with an auto-drain air filter. By inserting a section of 3/8" O.D. tubing into the automatic drain at the bottom of the filter and placing the other end into a pail, the filter will automatically drain the water into the pail. Empty the pail before it is full and while it is a manageable weight. Moist air inhibits the flow of abrasive. If the filter does not remove enough moisture to keep abrasive dry and flowing, it may be necessary to install an air dryer or aftercooler in the compressed-air supply line.

5.1.2.3 Inspect reclaimer debris screen: The screen is accessible through the reclaimer door. With the exhauster off, remove the screen and empty it daily or when loading abrasive. Empty more often if part blasted causes excessive debris. Do not operate the machine without the screen in place.

5.1.2.4 Clean dust collector filters: The dust collector uses tubular filters which collect dust on their inner surfaces. Every two to three hours while the exhauster is ON, release dust from the filter bags by alternately opening and closing each dust collector door four to six times in. Hand pulls are provided on these two doors which are located on the dust collector directly above the dust drawer. Opening and closing the doors momentarily draws in through the clean side of the filter bag, loosens dust, causing it to drop it into the dust drawer. During the blasting operation, the collector doors must be closed tightly.

5.1.2.5 Empty dust drawer: Begin by checking the drawer after every bag cleaning, and adjust frequency based on usage and breakdown rate of abrasive. Dump the contents into a suitable disposal container.

⚠ CAUTION

Blast media is usually non-toxic; however, some materials removed by the process may be toxic. Check with proper authorities for disposal regulations.

5.1.3 Weekly

5.1.3.1 Blast head assembly: Inspect blast head, tube insert nozzle, and brushes for wear.

5.1.3.2 Blast hose: Inspect the blast hose for wear and thin spots by pinching it every 6 to 12 inches. Soft spots mean the hose is worn. The first sign of wear is usually along the outside radius where the hose bends just behind the nozzle holder. Replace the hose as soon as soft spots are noted.

⚠ WARNING

Worn blast hose can suddenly burst. Couplings and nozzle holders may not adequately grip worn hose causing them to blow-off under pressure. Compressed air and abrasive escaping from a burst hose, or disconnected coupling or nozzle holder, can cause severe injury.

5.1.3.3 Dust collector: Inspect the dust collector bag compartment for dust. Check the dust bags for wear.

5.2 Changing Abrasive Type

5.2.1 When changing abrasive type, make sure the blast machine, blast hose, recovery hose, and reclaimer are cleaned, to fully remove any remaining abrasive. If not done, the new abrasive will become contaminated.

6.0 SERVICE MAINTENANCE

⚠ WARNING

Failure to wear approved respirators and eye protection when servicing dust-laden areas of the dust collector, and when emptying the dust collector could result in serious eye irritation and lung disease or death. Toxicity and health risk vary with type of media and dust generated by blasting. Identify all material being removed by blasting, and obtain Safety Data Sheets (SDS) for the blast media.

6.1 Nozzle

6.1.1 Replace the nozzle when the diameter of its orifice has increased by 1/16", or sooner if pressure diminishes noticeably, or if abrasive escapes from the brush. Make sure the nozzle gasket is in place before screwing the nozzle into the nozzle holder.

6.2 Filter Tube Replacement, Figure 9

⚠ CAUTION

- **Do not bend spring ends so tightly that the ends kink.**
- **Do not use a sharp instrument to force spring rings into the opening. This could damage the filter and seriously impair the efficiency of the dust collector.**
- **Install one filter at a time. Make sure top and bottom spring rings are fully seated, and the tube is not twisted, before proceeding to the next.**

6.2.1 Replace damaged filters immediately. Remove the old filters by pulling the spring rings off the bottom and top tube plates. Working from the back to the front, install one filter at a time. To install new filters, form the end of the spring ringed tubular filter into a shallow "c" shape, push the filter far enough into the hole of the top plate to allow one spring ring to snap into place above the tube plate and the other to snap into place below it. Refer to the illustration in Figure 9.

6.2.2 The tubular filter is held firmly by spring rings above and below the hole in the top and bottom tube plate. The filters fit tightly to prevent dust leakage; force may be required by the installer. Check for proper seating at both ends, and remove any twist in the tube before proceeding to the next filter.

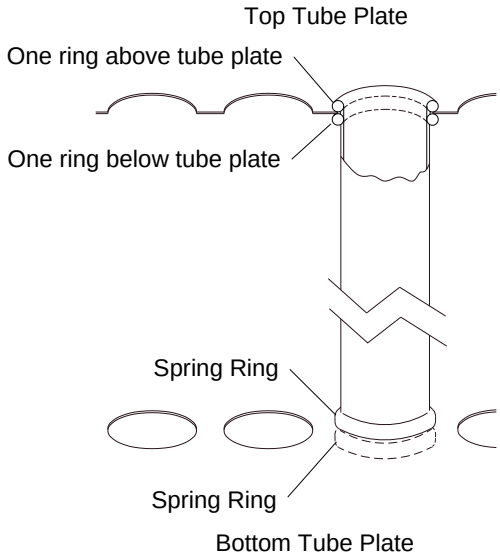


Figure 9

6.3 Brushes

6.3.1 To avoid unscheduled down-time, keep spare brushes on-hand. Replace brushes at the first sign of deterioration. A worn brush will cause abrasive leakage at the blast surface.

6.4 Pop-up Valve Replacement, Figure 10

6.4.1 Empty the machine of abrasive as described in Section 3.3.

6.4.2 Depressurize the blast machine, and lockout and tagout the compressed-air supply.

⚠ WARNING

Failure to observe the following procedure before performing any maintenance could cause serious injury or death from the sudden release of compressed air.

- **Depressurize the blast machine.**
- **Lockout and tagout the compressed-air supply.**
- **Bleed the air supply line to the blast machine.**

6.4.3 To gain access to the pop-up valve, remove the inspection door assembly.

6.4.4 Using a small pipe wrench, unscrew the pop-up valve guide, by turning it counterclockwise. Remove the pop-up valve and guide from the machine.

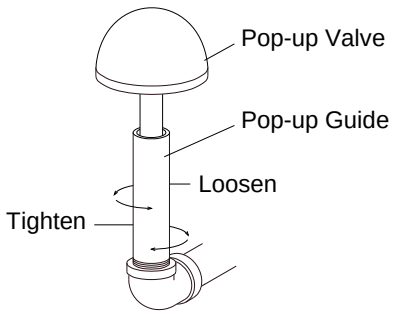


Figure 10

6.4.5 Place the new pop-up valve in the guide, and then screw the valve guide (with the pop-up valve in it) into position inside the machine. Tighten the guide, it should be wrench-snug, but not wrench-tight. Over-tightening the guide will make it difficult to remove the next time the pop-up valve needs replacement.

6.4.6 Put a new gasket on the inspection door before bolting the door onto the machine.

6.5 Pop-up Valve Seat Replacement

6.5.1 The easiest method to replace the rubber pop-up seat is through the reclaimer access door. If for some reason replacement cannot be made through the reclaimer, observe the warning in Section 6.4, empty the machine and bleed the air supply line. Remove the inspection door and work through the opening.

6.5.2 Remove the old seat by using a finger, screwdriver, or similar object, to work the seat out of the retainer groove.

6.5.3 Push the new seat all the way through the port and then fit it into the groove. Pull up on the seat and allow it to "pop" into position.

7.0 TROUBLESHOOTING

⚠ WARNING

To avoid serious injury, observe the following when troubleshooting.

- **Turn off the air, and lockout and tagout the air supply.**
- **If checking the controls requires air, always enlist the aid of another person to:**
  - **Hold the nozzle securely.**
  - **Operate the finger switch.**

Never bypass the finger switch, or tie it in the operating position.

7.1 Poor vacuum recovery (abrasive escaping at brushes)

7.1.1 Dirty tube filters. Clean the tube filters, and empty dust drawer regularly.

7.1.2 Using friable abrasive that rapidly breaks down, or using abrasive that is too fine or worn out.

7.1.3 Hole worn in recovery hose between blast head and reclaimer inlet. Inspect hose for wear.

7.1.4 Reclaimer or dust collector door open. All doors must be closed during operation.

7.1.5 Obstruction in recovery circuit. Check for blockage.

7.1.6 Brushes worn. Inspect brushes.

7.1.7 Nozzle worn. Check nozzle orifice, and replace the nozzle if worn by 1/16″.

7.2 Abnormally high abrasive consumption

7.2.1 Door on reclaimer open, or improper fit or worn door gasket. Air entering the reclaimer at this point will cause abrasive to be carried into the dust collector. DO NOT operate unless all doors are closed.

7.2.2 Abrasive may be too fine or worn-out.

7.2.3 Using friable abrasive that rapidly breaks down.

7.2.4 Nozzle pressure too high for the abrasive, causing abrasive to break down.

7.2.5 Hole worn in reclaimer, or leak in reclaimer seams. Check reclaimer for negative-pressure leaks.

7.3 Reduction in blast cleaning rate

7.3.1 Low abrasive level reducing abrasive flow. Check abrasive level and refill as needed.

7.3.2 Incorrect metering valve adjustment. Adjust per Section 4.2.

7.3.3 Reduced air pressure. This may be caused by a malfunctioning regulator, a dirty filter element in air filter, partially closed air valve, leaking air line, or other air tools in use.

7.3.4 Blockage in nozzle. Blockage may occur as a result of a missing debris screen.

7.3.5 Moist abrasive. Frequent bridging or blockage in the area of the metering valve can be caused by moisture. Refer to Section 7.7.

7.4 Neither abrasive nor air comes out the nozzle when the finger control switch is pressed

7.4.1 Depressurize the blast machine, and check the nozzle for blockage. Refer to Section 7.6.

7.4.2 Make sure the blast machine pressurizes when the finger switch is pressed. If it does not, refer to Section 7.8.

7.4.3 Make sure the abrasive metering valve and the choke valve are open.

7.5 Air only (no abrasive) comes out the nozzle

7.5.1 Make sure the machine contains abrasive.

7.5.2 Make sure the media metering valve is not closed. Adjust abrasive flow per Section 4.2.

7.5.3 Check for minor blockage in the abrasive metering valve by fully opening the metering valve, and closing the choke valve. Activate the finger control switch, to blow out obstructions. If this procedure fails, depressurize the machine, open the metering valve inspection plate, and check for foreign objects.

7.5.4 Check the muffler on the solenoid valve. Air should exhaust from the muffler when the finger switch is released. If air does not exhaust, remove the muffler and try again. If air exhausts now, the muffler is blocked. If air does not exhaust, the solenoid valve may be faulty. Have it checked by a qualified electrician.

7.5.5 Make sure the abrasive metering valve opens when the finger switch is pressed. Refer to Figure 11 and use the following method to make sure the valve opens.

7.5.5.1 Insert a straightened paperclip or wire as far as it will go into the relief hole located in center of the cylinder cap, as shown in the upper illustration in Figure 11, it will bottom against the piston inside the body.

7.5.5.2 Before activating the finger switch, mark the wire at the cylinder cap or measure the distance between the top of the cap and end of the wire.

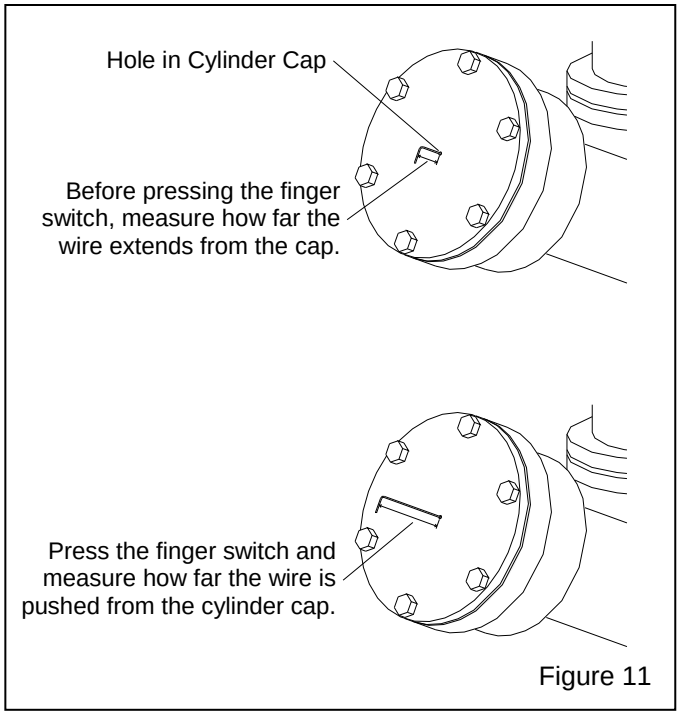


Figure 11

7.5.5.3 Press the finger switch and measure how far the wire is pushed out the hole as the piston moves up within the body. The wire should be pushed out approximately 1-3/16" if the valve is fully opening, a shorter distance indicates the valve may not be fully opening. Check control-line pressure to the Sentinel valve. If pressure is equal to supply line pressure, the valve requires service. Refer to the Sentinel metering valve manual, stock number 20951.

7.6 Plugged nozzle

7.6.1 Depressurize the blast machine before checking the nozzle for blockage.

7.6.2 A damaged or missing reclaimer screen will allow large particles to pass and block the nozzle. Replace or re-install the screen as necessary.

7.7 Abrasive bridging

7.7.1 Frequent bridging or blockage in the metering valve can be caused by damp abrasive. Abrasive becomes damp by blasting parts that are slightly oily, from moisture in the compressed air line, or from absorption.

7.7.2 To avoid contaminating abrasive from the workpiece, all parts should be clean and dry. If parts are oily or greasy, degrease and dry them prior to blasting.

7.7.3 Moist compressed air may be due to: a faulty compressor that overheats, or pumps oil or moisture into the air line; too long an air line permitting moisture to condense on the inside; or high humidity. If the problem persists, change abrasive more often, or install an aftercooler or air dryer.

7.7.4 Absorption. Some abrasive tends to absorb moisture from the air, especially fine-mesh abrasive in high humidity areas. Empty the blast machine after use.

7.8 Blast machine does not pressurize

7.8.1 Make sure that the air compressor is on and air supply valves are open.

7.8.2 Make sure the pressure regulator is not turned too low. Minimum pressure is 40 psi. Refer to Section 4.1.

7.8.3 Inadequate air supply. Refer to Section 2.1.

7.8.4 Inspect the diaphragm outlet valve for wear.

7.8.5 Inspect pop-up valve and seat for alignment and wear.

7.8.6 Blocked or leaking control line. Check all fittings for blockage or leaks.

7.8.7 Finger switch or solenoid valve malfunction. Check by qualified electrician.

7.8.8 Inspect the check valve (Section 8.2, Item 5) for obstruction or broken flap.

7.9 Blast machine will not depressurize or depressurizes too slowly

7.9.1 Faulty finger switch or solenoid valve. Check voltage and continuity, by a qualified electrician.

7.9.2 Check the outlet muffler for blockage.

7.10 Heavy abrasive flow

7.10.1 Make sure the choke valve is open.

7.10.2 Abrasive metering valve open too far. Adjust per Section 4.2. If adjusting the valve does not regulate abrasive flow, empty the machine, depressurize the machine, and inspect internal parts of the valve for wear. Refer to the Sentinel metering valve manual, stock number 20951.

7.11 Abrasive surge (A small amount of surge is normal at start-up.)

7.11.1 Heavy abrasive flow. Adjust per Section 4.2

7.11.2 Empty, and depressurize the blast machine, and inspect the internal parts of the metering valve for wear.

7.12 Dust leaking from dust collector

7.12.1 Check for damaged or loose filters.

8.0 ACCESSORIES AND REPLACEMENT PARTS

8.1 Electrical and Miscellaneous

Refer to the wiring schematic packed in the electrical panel for electrical items not listed

Description	Stock No.
Transformer	12172
Relay, 24 volts	12047
Switch, control panel toggle	12127
Caster, 4 inch, each	13142
Lock pins (pkg of 25) for twist-on couplings	11203
Safety cable, 1/2" to 1-1/4" OD hose	15012

8.2 Blast Machine, Figure 12

Item	Description	Stock No.
1.	Ball valve with handle, 1"	02396
2.	Handle, 1" ball valve	22531
3.	Pop-up valve	01242
4.	Seat, pop-up	01245
5.	Check valve, 1" swing	12187
6.	Metering valve, Sentinel fine mesh	21439
7.	Inspection door assembly, 3" x 4"	01267
8.	Gasket, 3" x 4" inspection door	01249
9.	Regulator, 1/4" pilot, with gauge	12050
10.	Gauge, pressure, 1/8" cbm	01908
11.	Solenoid, 4-way	12197
12.	Muffler, 1/4" bronze	03988
13.	Valve, 1/2" diaphragm outlet	02512
14.	Adaptor, 1" male NPT x 1" male flare	11720
15.	Pusher line assembly, 1" x 21"	22508
16.	Muffler, exhaust	05068
17.	Regulator, 1" pilot operated with gauge	12052
18.	Gauge, pressure, 1/4" cbm	11830
19.	Air filter, auto-drain	22425
20.	Gasket, 5/16" x 1" adhesive backed, (4 ft. required)	00187
21.	Fitting, elbow 1/4" NPT x 3/8" tube	11685
22.	Fitting, straight 1/4" NPT x 3/8" tube	11736
23.	Tubing, 3/8" OD poly, specify ft. req'd	12478
24.	Tee, 1/4", one MPT x two 1/4" FPT	20847
25.	CF Coupling w/1-1/4-NPT x 3" nipple	10806
26.	Coupling, 1/2" ID hose, CQA-1/2	00599
27.	Gasket, CQG, pkg of 10	00850
28.	Nozzle holder, CHE-1/2	00577
29.	Blast hose, 1/2" ID x 25 ft. coupled, includes items 26 & 28	01268
30.	Diaphragm, 1/2" outlet valve	02511
31.	Cap, 1/2" outlet valve	02299
32.	Body, 1/2" outlet valve	02298
33.	Lock pins, pack of 25	11203
34.	Safety cable, 1/2" to 1-1/4" OD hose	15012

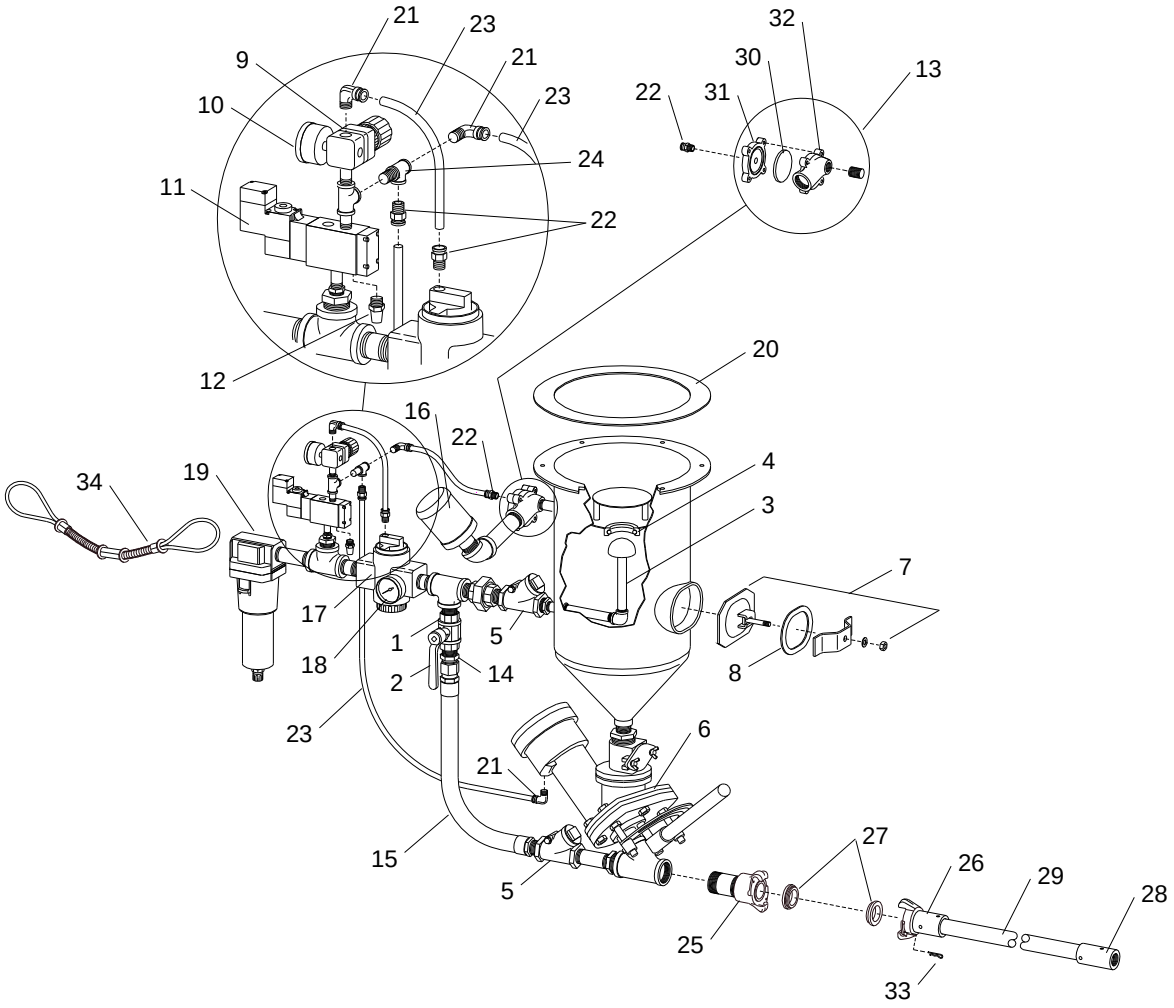


Figure 12

8.3 Blast Head and Control Assembly, Figure 13

Item	Description	Stock No.
1.	Control assembly, includes items within dashed box	12383
2.	Head, vacuum, includes 5 item 19 and item 3 in alum.	12300
3.	Insert, tube	
	aluminum, standard	12175
	boron carbide, optional	12409
4.	Collar	13890
5.	Nozzle,	
	Tungsten carbide	
	CT-2, 1/8" orifice	01351
	CT-3, 3/16" orifice, standard	01352
	CT-4, 1/4" orifice	01353
	Boron carbide, CTB-3	21091
6.	Nozzle washer, NW-1, pack of 10	21580
7.	Retainer, brush	12039
8.	Cover, switch	11587
9.	Switch	12119
10.	Gasket, 1/8" x 2" foam, per foot 1 foot min., trim to fit	13089
11.	Hose, blast 1/2" ID x 25 ft., coupled includes item 12 and coupling	01268
12.	Nozzle holder, CHE-1/2"	00577
13.	Hose, vacuum, 1-1/2" x 20 ft.	12450
14.	Clamp	12750
15.	Brush, flat surface	11569
16.	Brush inside corner	11570
17.	Brush outside corner	11571
18.	Screw, 1/4-NC x 3/8 socket set	13873
19.	Screw, 1/4-NC x 1/2 socket set	12067

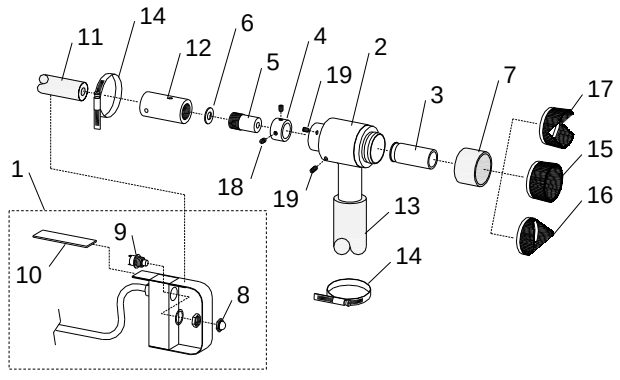


Figure 13

8.4 Dust Collector, Figure 14

Item	Description	Stock No.
1.	Spring Latch w/strike	11876
2.	Gasket, door, 2 required	13872
3.	Gasket, 5/16" x 1" adhesive backed, (3 ft. required)	00187
4.	Dust Bag, 3" x 20", 12 required	11506
5.	Gasket, air injector	11754
6.	Gasket, motor adaptor	11781
7.	Bolt, 1/4-20 J	13576
8.	Motor, exhauster	12315
9.	Brushes, blower motor, ea., not sown	28157

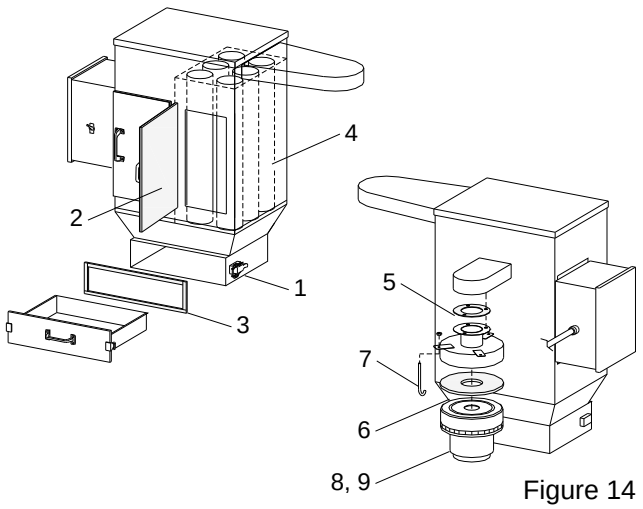


Figure 14

8.5 Reclaimer, Figure 15

Item	Description	Stock No.
1.	Debris screen, 8-mesh	21265
2.	Gasket, door	11745
3.	Gasket, reclaimer mount	11755
4.	Hose, vacuum, 1-1/2" x 20 ft.	12450
5.	Clamp	12750
6.	Gasket, 5/16" x 1" adhesive backed, (4 ft. required)	00187
7.	Spring latch assembly	12263

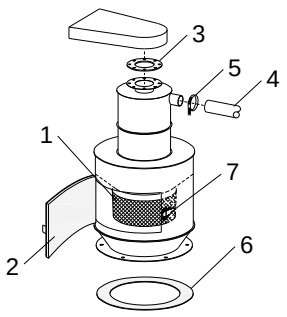


Figure 15