

martin®

Martin® ***Typhoon*** ***Air Cannon***

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Operator's Manual
M3813

Important

MARTIN ENGINEERING HEREBY DISCLAIMS ANY LIABILITY FOR: DAMAGE DUE TO CONTAMINATION OF THE MATERIAL; USER'S FAILURE TO INSPECT, MAINTAIN AND TAKE REASONABLE CARE OF THE EQUIPMENT; INJURIES OR DAMAGE RESULTING FROM USE OR APPLICATION OF THIS PRODUCT CONTRARY TO INSTRUCTIONS AND SPECIFICATIONS CONTAINED HEREIN. MARTIN ENGINEERING'S LIABILITY SHALL BE LIMITED TO REPAIR OR REPLACEMENT OF EQUIPMENT SHOWN TO BE DEFECTIVE.

Observe all safety rules given herein along with owner and Government standards and regulations. Know and understand lockout/tagout procedures as defined by American National Standards Institute (ANSI) z244.1-1982, *American National Standard for Personnel Protection - Lockout/Tagout of Energy Sources - Minimum Safety Requirements* and Occupational Safety and Health Administration (OSHA) Federal Register, Part IV, 29 CFR Part 1910, *Control of Hazardous Energy Source (Lockout/Tagout); Final Rule*.

The following symbols may be used in this manual:



Danger: Immediate hazards that will result in severe personal injury or death.



Warning: Hazards or unsafe practices that could result in personal injury.



Caution: Hazards or unsafe practices that could result in product or property damages.



Important: Instructions that must be followed to ensure proper installation/operation of equipment.



Note: General statements to assist the reader.

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Introduction

General

The Martin[®] Typhoon Air Cannons are pneumatic, bulk material-moving systems that quickly release compressed air into a storage vessel to restore flow to material that is clinging (A), bridging (B), rat-holing (C), or arching (D) (see Figure 1). This manual provides instructions for installing cannons on steel structures only. For installations on other structures, call Martin Engineering or a representative.

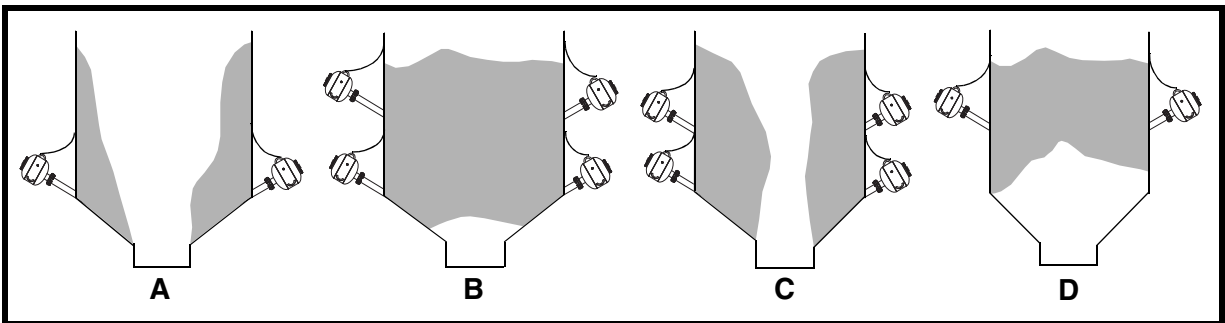


Figure 1. Restricted Material

Operation

The Martin[®] Typhoon Air Cannon System consists of one or more air cannons mounted on a storage vessel. The air cannon charges when the tank is filled with plant compressed air or nitrogen between 40 psi (2.76 bar) and 120 psi (8.27 bar) (A, Figure 2) that is controlled by a 3-way normally open solenoid valve. Air fed through the valve assembly-mounted quick exhaust valve (QEV) passes through the piston and into the tank (B). When tank pressure equals line pressure, airflow is static and the cannon is ready to discharge (C). By activating the solenoid valve, the air supply is shut off and the air line between the QEV and solenoid is emptied. This allows the QEV to quickly release the pressure holding the piston. The piston is instantly forced back by the pressure stored in the tank which then exits through the discharge pipe, releasing the energized air pressure stored in the tank. This blast of air is directed through the discharge pipe and into the storage vessel (D).

Air cannon materials

The air cannon tank is manufactured to American Society of Mechanical Engineers (ASME) Code Rules, Section VIII, Division 1. It is National Board registered, and is pressure vessel quality (PVQ). After the tank is welded, paint is applied inside the tank to prevent rust and corrosion. **Never weld tank.** Welding will melt paint and violate ASME coding.

Safety

All safety rules defined in the above documents, and all owner/employer safety rules, must be strictly followed when installing and servicing this equipment.

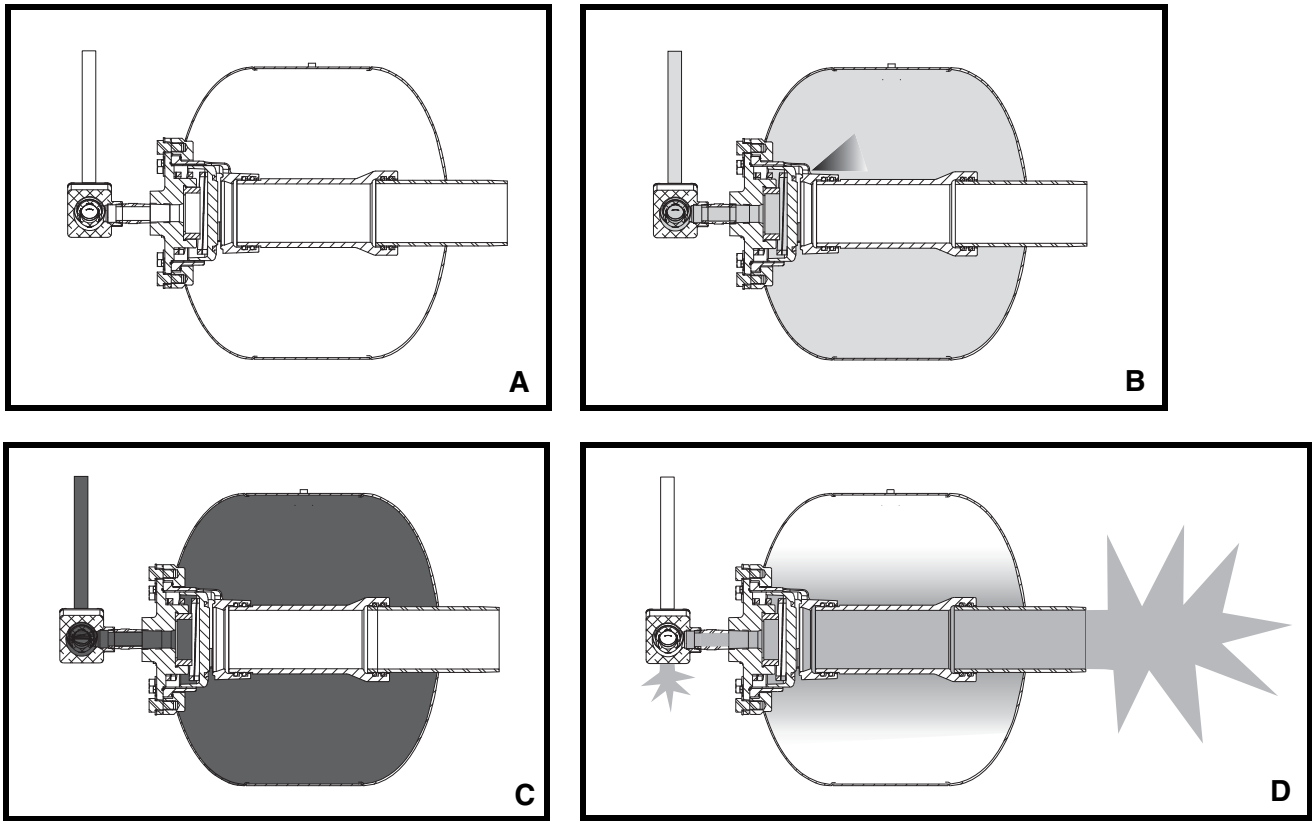


Figure 2. Air Cannon Charging and Discharging

Model and serial numbers

Each air cannon’s serial and model number is shown on a plate attached to the tank (see Figure 3). Serial and model numbers must be referenced when ordering parts from Martin Engineering or representative, and on all correspondence.



Figure 3. Serial and Model Number Plate

Materials required

Materials other than standard hand tools that are required to complete tasks are listed where applicable.

Required accessories

This manual includes instructions for installing accessories required for air cannons to be fully operational (see Figure 4). The following accessories can be ordered from Martin Engineering and shipped separately from air cannons (see “Part Numbers”):

- Quick exhaust valve (A).
- Air control components: manual valve (B) or electrical solenoid valve (C), air filter (D), air regulator (E), air lubricator (F), lockout ball valve (G), and check valve (H).

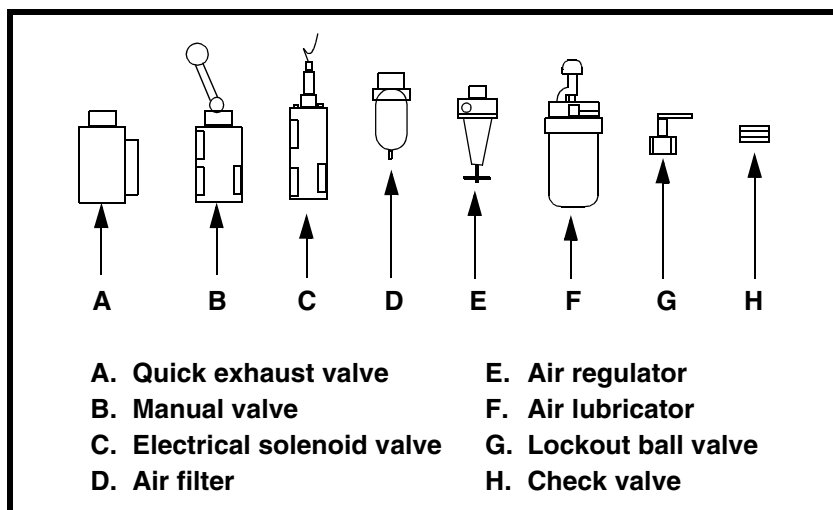


Figure 4. Air Cannon Accessories

References

The following documents are referenced in this manual:

- American National Standards Institute (ANSI) z244.1-1982, *American National Standard for Personnel Protection - Lockout/Tagout of Energy Sources - Minimum Safety Requirements*, American National Standards Institute, Inc., 1430 Broadway, New York, NY 10018.
- Federal Register, Volume 54, Number 169, Part IV, 29 CFR Part 1910, *Control of Hazardous Energy Source (Lockout/Tagout); Final Rule*, Department of Labor, Occupational Safety and Health Administration (OSHA), 32nd Floor, Room 3244, 230 South Dearborn Street, Chicago, IL 60604.
- *The National Electrical Code (NEC) Handbook*, National Fire Protection Association, 1 Batterymarch Park, P.O. Box 9101, Quincy MA 02269-9101.
- ICS 1-1988, *General Standards for Industrial Control and Systems*, and 250-1985, *Enclosures for Electrical Equipment (1000 Volts Maximum)*, National Electrical Manufacturers Association (NEMA), 2101 L Street N.W., Washington, D.C. 20037.
- *Section VIII, Rules for Construction of Pressure Vessels, Division 1*, American Society of Mechanical Engineers, United Engineering Center, 345 East 47th Street, New York, NY 10017.

Before Installing Air Cannon

IMPORTANT

The delivery service is responsible for damage occurring in transit. Martin Engineering CANNOT enter claims for damages. Contact your transportation agent for more information.

1. Inspect shipping container for damage. Report damage to delivery service immediately and fill out delivery service's claim form. Keep any damaged goods subject to examination.
2. Remove air cannon from shipping container. Equipment in container should include the following:
 - Air cannon, relief valve, and safety cable kit.
 - Air Blast Warning Label, P/N 31913.
 - Lockout Valve Warning Tag, P/N 35146.
3. If you ordered accessories from Martin Engineering, remove from shipping container. Equipment in container may include the following:
 - Quick exhaust valve.
 - Air control components: manual valve or electrical solenoid valve, air filter/regulator/lubricator, air supply line, lockout ball valve, and check valve.
4. If anything is missing, contact Martin Engineering or representative.

⚠ WARNING

Before installing air cannon, lock out/tag out any equipment that is loading or unloading material from the storage vessel.

5. Turn off and lock out/tag out energy source to accessory equipment according to ANSI standards (see "References").

⚠ WARNING

If equipment will be installed in an enclosed area, test gas level or dust content before using a cutting torch or welding. Using a cutting torch or welding in an area with gas or dust may cause an explosion.

6. If using a cutting torch or welding, test atmosphere for gas level or dust content.

⚠ CAUTION

When blasting into closed storage vessel, exhaust vents must be considered to prevent internal vessel air pressure from increasing to point where it may damage vessel.

- When blasting into closed storage vessel, consider exhaust vents to prevent internal vessel air pressure from increasing to point where it may damage vessel. Calculate temporary vessel pressure after air cannon discharge with the following equation:

$$P = \frac{\text{pressure in air cannon} \times \text{air cannon volume}}{\text{air cannon volume} + \text{unoccupied volume of vessel}}$$

If calculated pressure is greater than 0.5 psi (.034 bar), install exhaust vents to avoid damage to storage vessel. Observe local and state codes, which may specify limits less than 0.5 psi (.034 bar).

IMPORTANT

Air cannon force output can vary depending on inlet pressure, discharge opening size, structure size, material in structure, and other factors. To determine maximum force output values for your application, call Martin Engineering.

- If you need to know air cannon maximum force output for your application, call Martin Engineering.

Installing Air Cannon

IMPORTANT

Read entire section before beginning work.

To install air cannon, follow the procedures in this section corresponding to the following steps:

1. Install mounting plate.
2. Connect air cannon to mounting plate.
3. Install restraining cable.
4. Connect air supply to air cannon. See “Installing manual valves and electrical solenoid valves” or “Installing solenoid enclosures,” as applicable.

Installing mounting plate

Materials Required: Mounting plate or seal plate and support structure.

NOTE

If you are unsure where to locate air cannon(s) on your storage vessel, contact Martin Engineering or your representative.

1. Mark location for each air cannon on storage vessel.
2. For internal storage vessel temperatures under 500°F (260°C), install standard (30°) or fan jet mounting plate on vessel as follows:
 - a. If using a standard mounting plate (Figure 5), cut a round hole 4-5/8 in. (117 mm) in diameter in storage vessel for each mounting plate. Place short nipple into hole and field weld mounting plate to vessel skin.

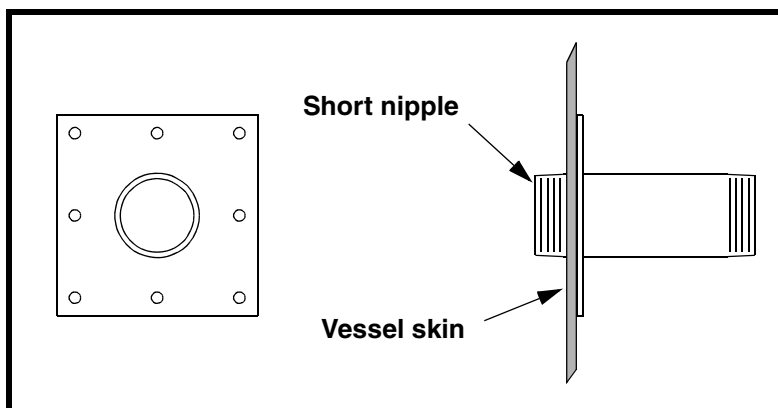


Figure 5. Standard Mounting Plate

- b. If using a 30° mounting plate (Figure 6), cut a hole in storage vessel for each mounting plate. Place mounting plate over hole and field weld to vessel skin.

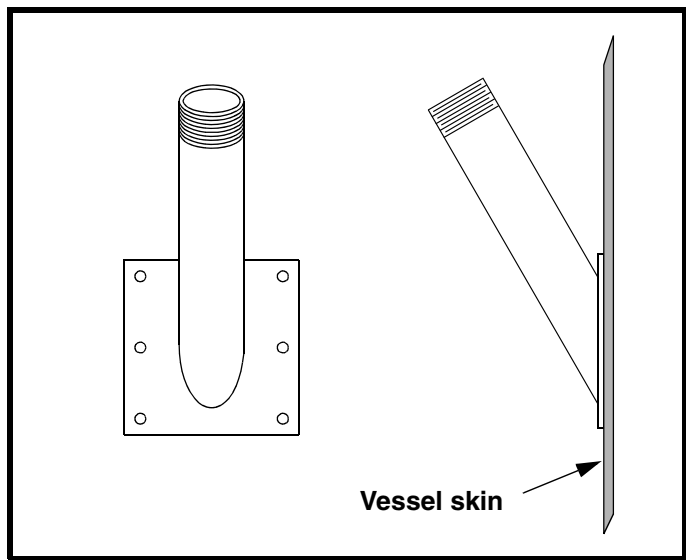


Figure 6. 30° Mounting Plate

- c. If using a fan jet mounting plate (Figure 7), cut a round hole in storage vessel for each mounting plate. Slide nipple through hole from inside. Field weld inside plate and nipple to vessel wall.
- d. Go to “Connecting air cannon to mounting plate.”

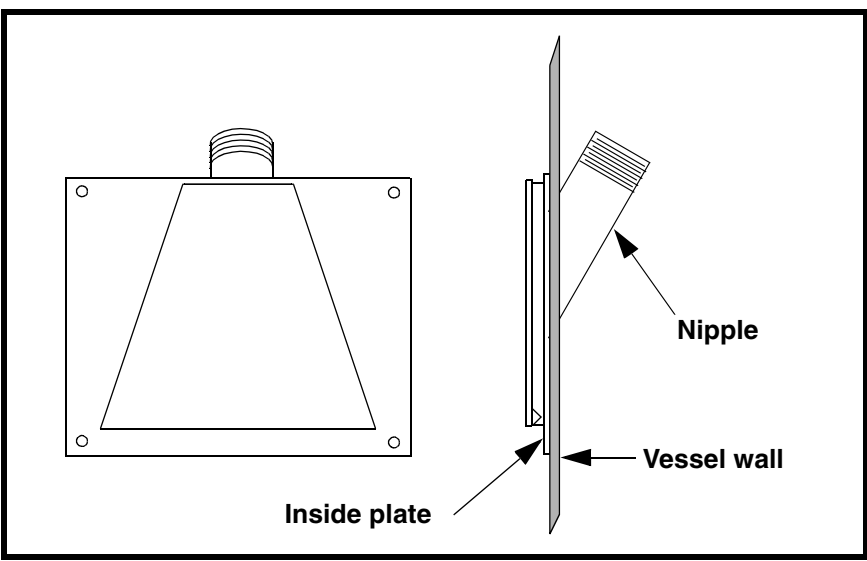


Figure 7. Fan Jet Mounting Plate

3. For internal storage vessel temperatures of 500°F (260°C) or higher, install blow pipe and fan jet angle nozzle, fan jet blow nozzle, or high-temperature blow pipe (Figure 8) on vessel as follows:
 - a. If using fan jet angle nozzle, contact Martin Engineering.

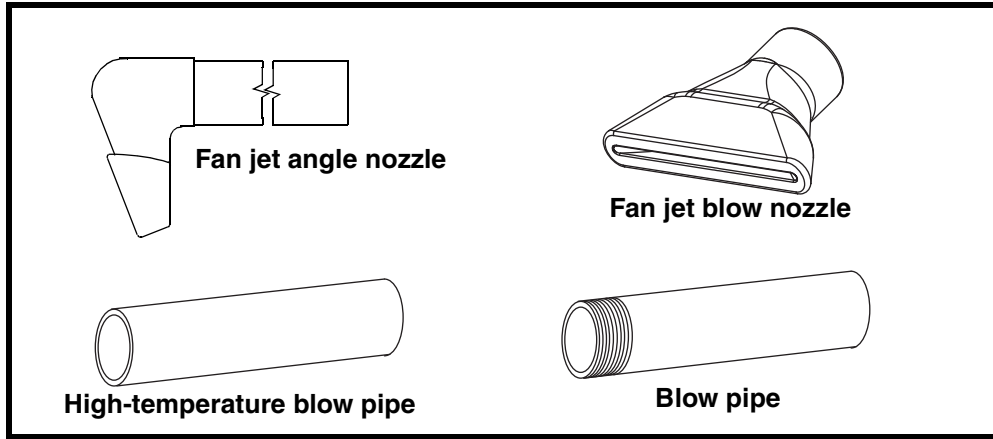


Figure 8. Mounting Nozzles/Pipes (High-Temperature Applications)

- b. If using fan jet blow nozzle, do the following:
 - (1) Cut a 15-in. (381 mm) by 6-in. (152 mm) hole in skin and refractory (A, Figure 9) (if present).
 - (2) If using high-temperature blow pipe, field weld onto fan jet blow nozzle.

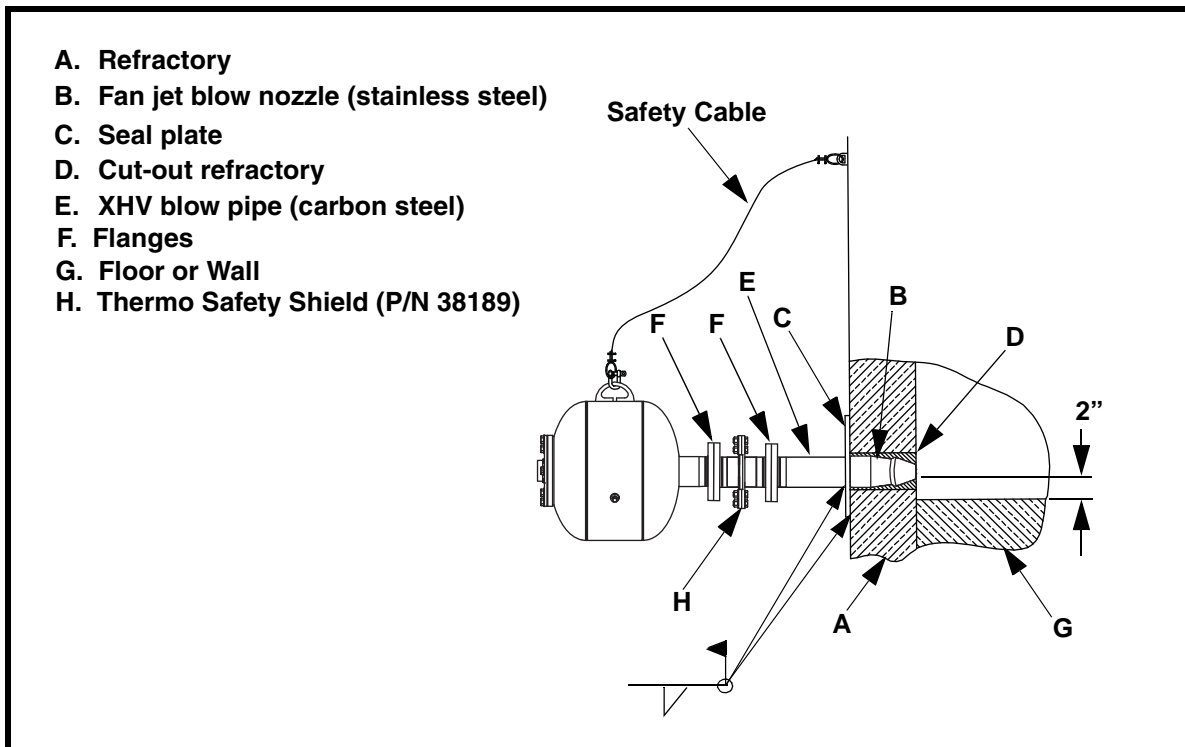


Figure 9. Installing Mounting Plate (High-Temperature Applications)

- (3) Insert fan jet blow nozzle (B) in hole with nozzle face flush with refractory lining surface. Position fan jet blow nozzle to sweep adjacent wall when cannon discharges (see Figure 10).



Figure 10. Riser Duct with Fan Jet Blow Nozzles (High-Temperature Applications)

- (4) Install 1/4-in. (6 mm) thick by 17-in. (432 mm) long by 8-in. (203 mm) wide seal plate (C, Figure 9) over fan jet blow nozzle opening.
- (5) Field weld seal plate to vessel skin.
- (6) Field weld fan jet blow nozzle to seal plate.
- (7) Pack new refractory into hole that you cut out (D) in step 3.b(1) to seal around fan jet blow nozzle.
- (8) Field weld blow pipe to high-temperature blow pipe (if using) or fan jet blow nozzle.
- (9) Go to step 3.d.

IMPORTANT

Blow pipe can be installed alone as described in step 3.c. However, if using high-temperature blow pipe, also install blow pipe as described in step 3.c.(5).

- c. If using high-temperature blow pipe and/or blow pipe, do the following:
 - (1) Cut a 5-in. (127 mm) round hole in skin and refractory (A, Figure 9) (if present).
 - (2) Insert blow pipe (B) in hole with pipe end flush with refractory lining surface. Position blow pipe to sweep walls when cannon discharges (see Figure 11).
 - (3) Install 1/4-in. (6 mm) thick by 8-in. (203 mm) long by 8-in. (203 mm) wide seal plate (C, Figure 9) over blow pipe opening in **one** of the following ways:
 - (a) Cut seal plate in half and fit around blow pipe.
 - (b) Cut a 5-in. (127 mm) round hole in seal plate and install over end of blow pipe.

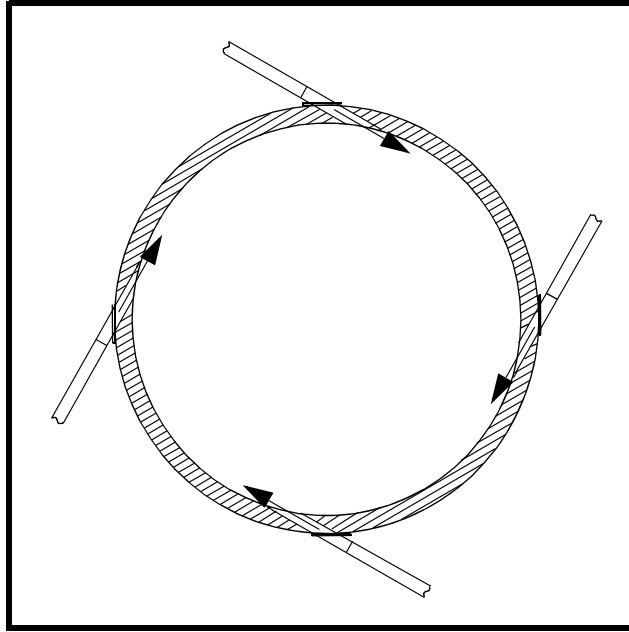


Figure 11. Cyclone with High-Temperature Blow Pipes

- (4) Field weld seal plate to vessel skin.
 - (5) Field weld blow pipe to seal plate.
 - (6) Pack new refractory into hole that you cut out (D) in step 3.c(1) to seal around high-temperature blow pipe.
 - (7) If using high-temperature blow pipe, field weld blow pipe to high-temperature blow pipe.
- d. Go to “Connecting air cannon to mounting plate.”

Connecting air cannon to mounting plate

1. Thread (and weld, if desired) one companion flange (G, Figure 9) to blow pipe and other companion flange to discharge weldment.
2. Bolt flange on discharge weldment to flange on blow pipe.
3. Position tank with inspection ports downward to provide maximum drainage.
4. Go to “Installing restraining cable.”

Installing flexible hoses and hard pipe

NOTE

If you are unsure where to route flexible hoses and hard pipe for optimum performance and convenience, contact Martin Engineering or a representative.

IMPORTANT

Install flexible hoses and hard pipe in a manner that will prevent potential safety hazards. Hoses and pipes need to be clearly visible to prevent low clearance and trip hazards. Anchor hoses and pipes to a secure structure to prohibit unnecessary movement.

IMPORTANT

The purpose of the flexible hose is to aid in aligning the hard pipe with the outlet ports. Flexible hoses should be placed in areas that will allow the hose to remain straight. Flexible hose should be used in as short of lengths as possible. See Figures 12 and 13 for examples of flexible hose and hard pipe installations.

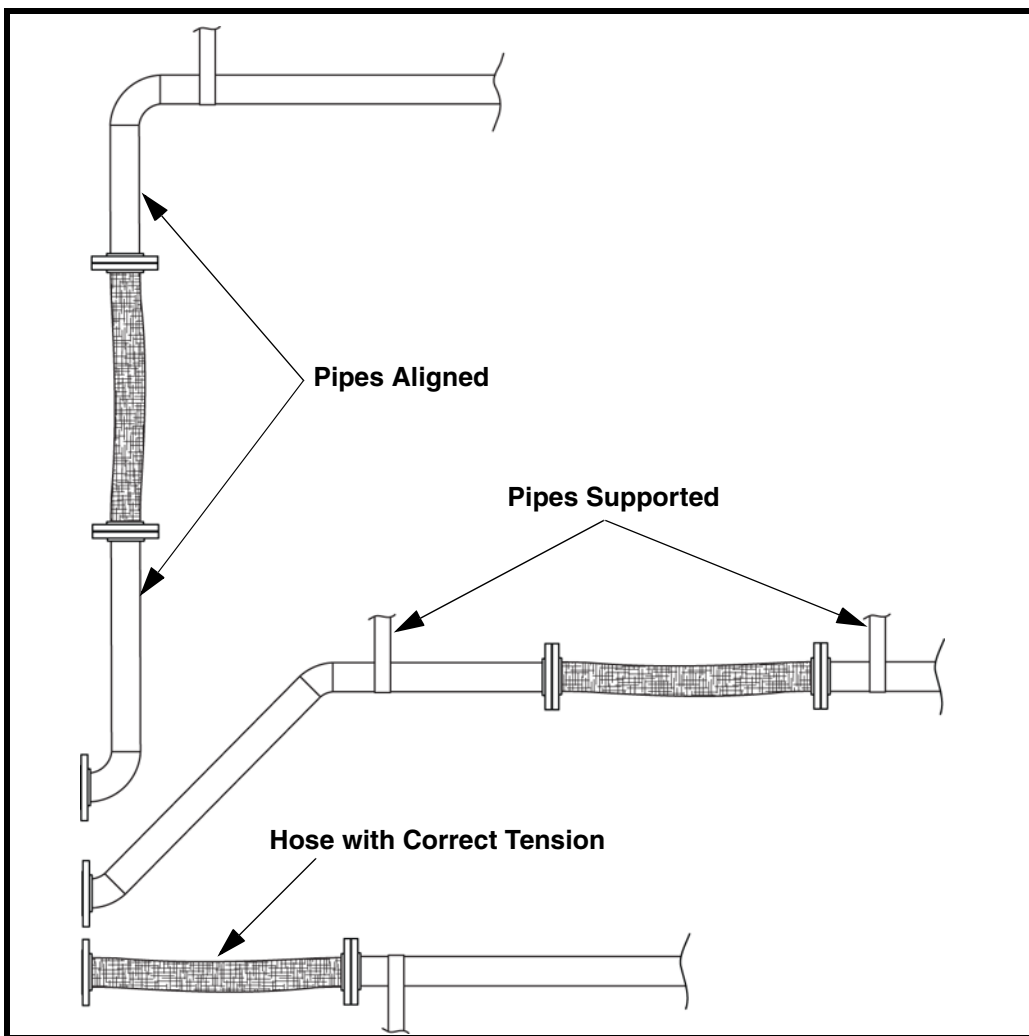


Figure 12. Proper Hose and Pipe Installation

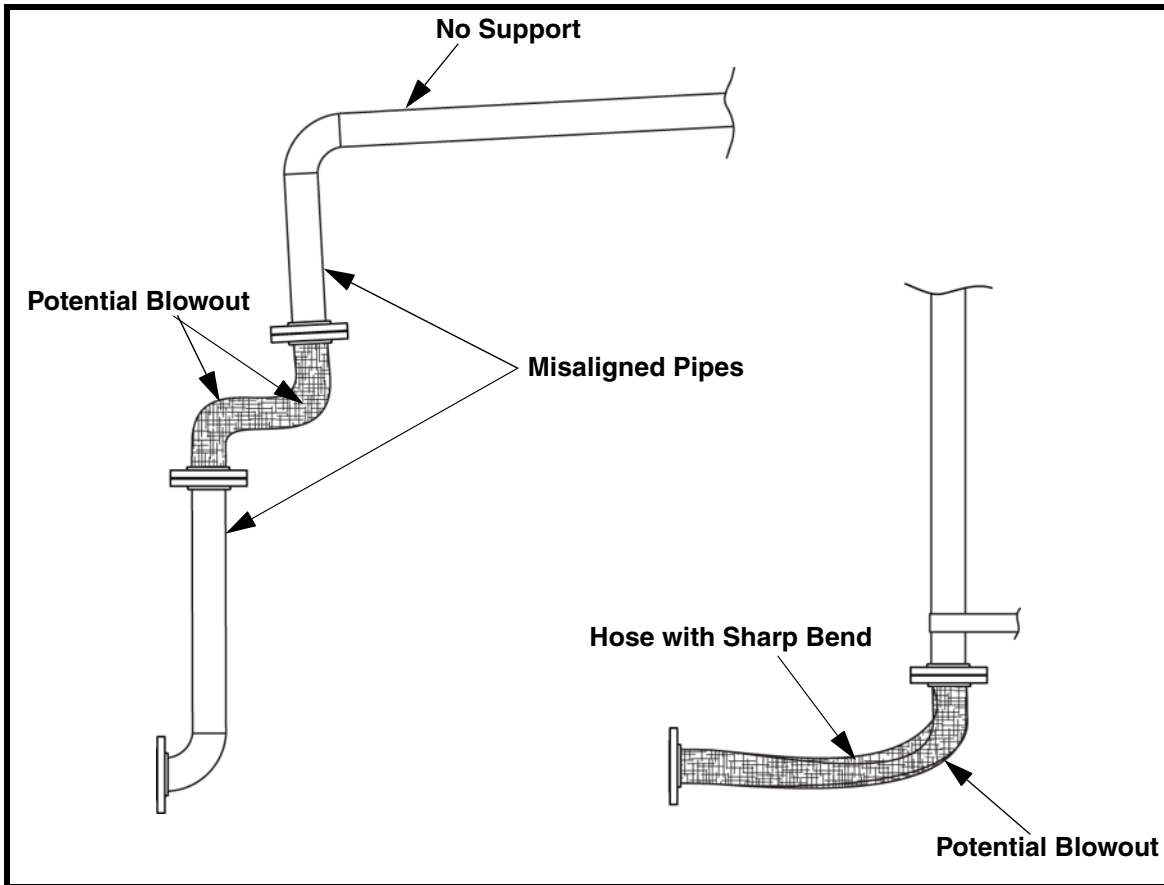


Figure 13. Improper Hose and Pipe Installation

1. Thread or weld a companion flange to the discharge pipe or nozzle.
 - a. For threaded end pipe, screw pipe flange onto pipe completely. If necessary, tack weld connection to prevent from becoming loose. **DO NOT** weld threaded connection completely.
 - b. For plain end pipe, place slip-on flange over end of pipe and fillet weld completely.
2. Route pipe and hose from the air cannon system to the discharge pipe or nozzle.
3. Place a gasket between the pipe flange and discharge nozzle flange, and assemble using cap screws and washers.
4. Repeat procedure for remaining ports.
5. Secure all hard pipe and hoses to prevent movement.

Installing restraining cable

⚠ WARNING

If air cannon is mounted more than 6 in. (152 mm) above ground, install restraining cable to secure air cannon to storage vessel. Without restraining cable, air cannon could fall and cause injury.

Do not use restraining cable to mount air cannon to storage vessel wall. Purpose of restraining cable is to keep air cannon from falling should it come loose from vessel wall, not as primary means of securing air cannon to wall.

⚠ CAUTION

Do not use angle iron or support ring to secure air cannon rigidly to storage vessel. If restrained too rigidly, tank cannot flex and cannon can fail.

1. Weld D-ring (A, Figure 14) onto storage vessel (B) with 1/4-in. (6-mm) field weld.

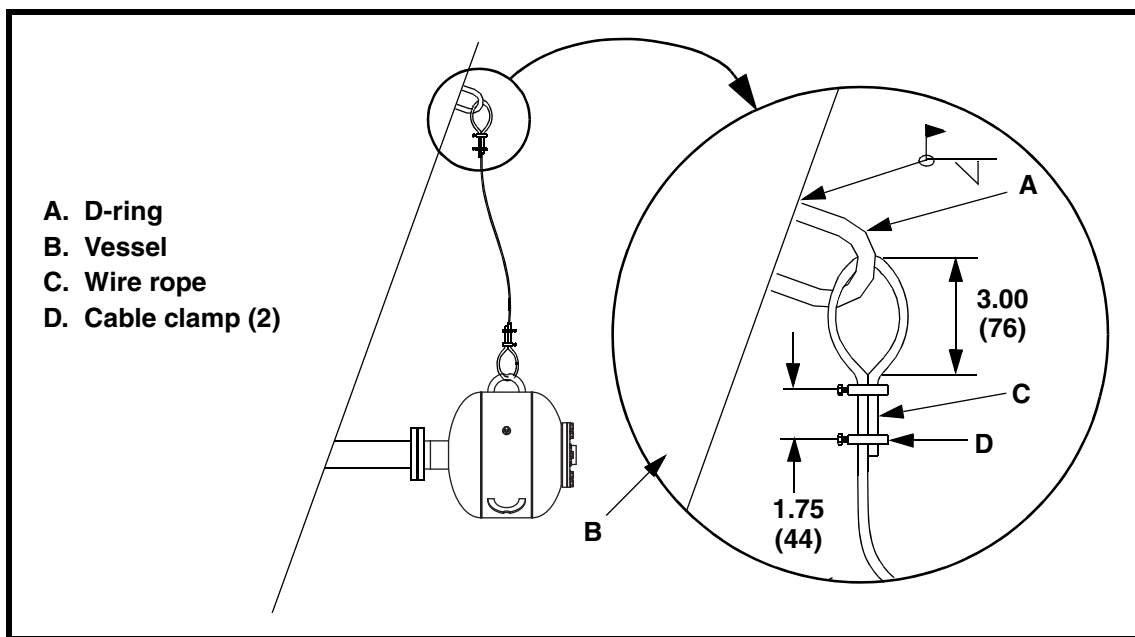


Figure 14. Installing Restraining Cable

2. Insert wire rope (C) through D-ring on storage vessel, making a 3-in. (76-mm) loop. If wire rope supplied with air cannon is not long enough, loop and clamp it to an additional cable and attach additional cable to air cannon.
3. Clamp wire rope with one cable clamp (D) as close to loop as possible. Place another cable clamp 1-3/4 in. (44 mm) from first clamp.
4. Leave at least 1 in. (25 mm) of wire rope on dead end.
5. Gradually tighten nuts alternately and evenly to 15 ft-lbs. Leave 2 to 3 in. (51 to 76 mm) slack in wire rope.
6. Go to “Connecting air supply to air cannon.”

*Mount Martin®
Multi Valve Air
Cannon System*

NOTE

If you are unsure where to locate the air cannon system in relation to your storage vessel, contact Martin Engineering or a representative.

▲ WARNING

The Martin® Multi Valve Air Cannon System weighs approximately 495 lbs (225 kg). The use of a hoist or crane is highly recommended. Lift only from supplied lifting lugs to prevent damaging assembly.

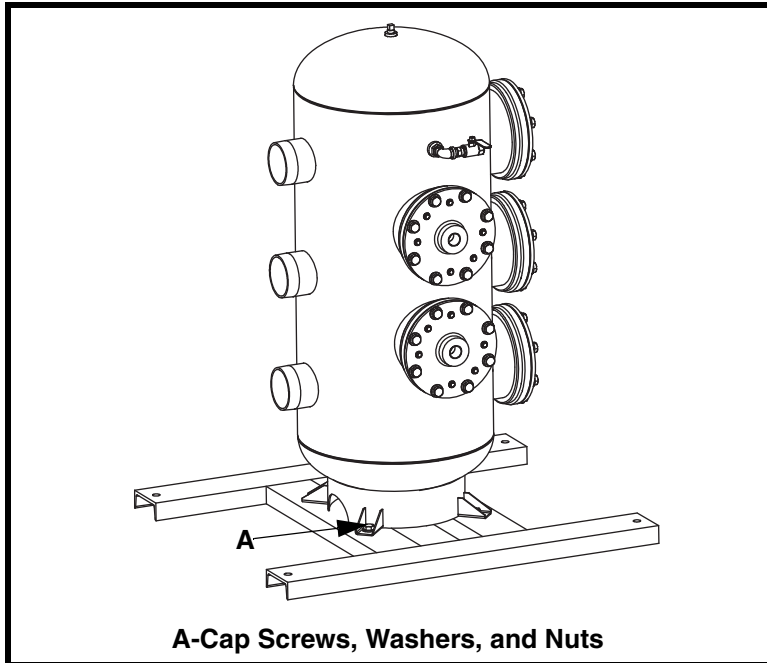


Figure 15. Installing Air Cannon System

1. Locate and mount air cannon system in appropriate relation to storage vessel(s).
2. The system should be mounted on a flat surface with adequate support.
3. Mount air cannon assembly to base weldment using cap screws, washers, and nuts (A).
4. Mount base weldment to surface using best available field resources.
5. Install flexible hoses and hard pipe from air cannon system to mounting nozzles.

*Connecting air
supply to air
cannon*

IMPORTANT

Read entire section before beginning work.

⚠ CAUTION

When pressure in the storage vessel is 4 psi (0.28 bar) or more, apply equal or greater pressure to the air cannon inlet. Absence of inlet pressure will allow material in the storage vessel to enter the air cannon and contaminate the valve assembly and tank.

Installing manual valves and electrical solenoid valves

Materials Required:

- Air filter/regulator/lubricator (1/2-in. NPT).
- Bushing (1/2-in. by 3/4-in.).
- Check valve (1/2-in. NPT).
- Lockout ball valve (1/2-in. NPT).
- Manual 3-way valve or electrical solenoid valve (1/2-in.).
- Pipe (1/2-in. NPT).
- Quick exhaust valve (1-in.).
- 90° street elbow (optional for quick exhaust valve—1-in.).
- 90° street elbow (optional for manual or electrical solenoid valves—3/4-in.).

IMPORTANT

To prevent leaking, apply pipe sealant to all fittings. Air cannon will discharge randomly if leaks are present.

1. Apply pipe sealant to all fittings.

⚠ WARNING

Use ASME-approved relief valve only (supplied with air cannon).

2. Install relief valve. Make sure other inspection ports are tightly plugged.

▲ WARNING

Make sure exhaust port on quick exhaust valve is pointed downward so that dirt cannot enter, and exhaust port is not directed at personnel. Martin Engineering recommends installing a 90° street elbow on quick exhaust valve exhaust port and on manual or electrical solenoid valve exhaust ports to prevent dirt from entering.

3. If using optional 90° street elbow or quick exhaust valve, thread it into quick exhaust valve exhaust port.
4. Thread quick exhaust valve outlet port (with exhaust port pointed down) onto hex nipple and tighten.

IMPORTANT

Manual valves or electrical solenoid valves distributed by Martin Engineering, which are made especially for this air cannon, are recommended. Substitute valves may not work as effectively.

Use any length pipe to connect air filter/regulator/lubricator to check valve. Use 1/2-in. pipe only. Locate manual valve or electrical solenoid valve within 15 ft (4-1/2 m) of air cannon.

5. Choose location for manual 3-way valve or electrical solenoid valve.
6. Install bushing into quick exhaust valve inlet port.
7. Connect manual 3-way valve or electrical solenoid valve outlet port to bushing/quick exhaust valve inlet port with no more than 15 ft (4-1/2 m) of 1/2-in. pipe.
8. Install 90° street elbow for manual 3-way valve or electrical solenoid valve into valve exhaust port.

NOTE

Look at arrow on side of FRL, check valve, and lockout ball valve to make sure flow is correct.

9. Connect air filter/regulator/lubricator and manual 3-way valve or electrical solenoid inlet port with desired length 1/2-in. pipe.

IMPORTANT

OSHA requires installation of a lockout ball valve (see “References”).

10. Connect lockout ball valve to air filter/regulator/lubricator with desired length 1/2-in. pipe. Look at arrow on side of ball valve to make sure flow is correct.
11. Connect check valve to lockout ball valve with desired length 1/2-in. pipe. Look at symbol on side of check valve to make sure flow is correct.

IMPORTANT

For electrical solenoid valve installations, design and wire electrical solenoid controls according to NEC Handbook. Electrical push buttons, timers, and programmable controllers are available through Martin Engineering.

12. For electrical solenoid valve installations, if using electrical solenoid controller, install according to instructions provided with controller.

⚠ WARNING

Do not exceed 125 psi (8.62 bar) maximum working pressure or pressure relief valve will open. Minimum recommended pressure for most applications is 80 psi (5.52 bar) but lower pressures can be used. Make sure air supply is filtered and regulated.

NOTE

Pressure relief valves of up to 150 psi are available from Martin Engineering. Consult the Maximum Allowable Working Pressure (MAWP) on tank's name plate before substituting a different pressure relief valve. Never use a pressure relief valve with a set pressure that is higher than the MAWP of the tank.

⚠ WARNING

Pressure relief valve may relieve at any point between 90% and 100% of set pressure. Exceeding MAWP can cause tank to rupture.

13. Connect air supply to check valve.
14. Anchor all pipes and wires to prohibit movement.
15. Operate air cannon as described under “After Installing Air Cannon.”

Installing solenoid enclosures

Materials Required:

- Air filter/regulator/lubricator (1/2-in. NPT).
- Bushing (3/4-in. to 3/8-in. NPT).
- Check valve (1/2-in. NPT).
- Controller.
- Lockout ball valve (1/2-in. NPT).
- Male adapter fittings (3/8-in. Tubing to 3/8-in. NPT).
- Solenoid enclosure.
- Pipe (1/2-in. NPT).
- Quick exhaust valve (1-in.).
- Stainless steel tubing (3/8-in.).
- 90° street elbow (optional for quick exhaust valve—1-in.).

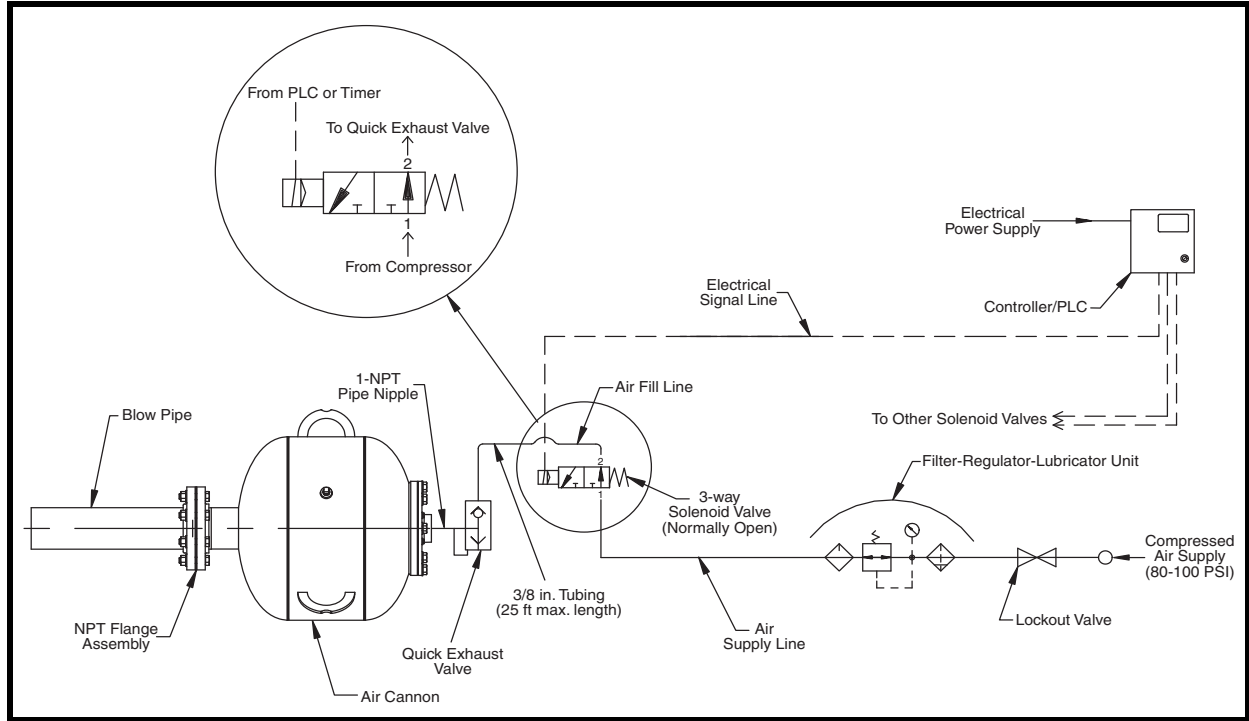


Figure 16. Solenoid Enclosure Piping

IMPORTANT

Solenoid enclosures distributed by Martin Engineering, which are made especially for this air cannon, are recommended. Substitute enclosures may not work as effectively.

Install a quick exhaust valve for every 25 ft (8 m) of stainless steel pipe from solenoid enclosure to air cannon, or air cannon will not work as intended.

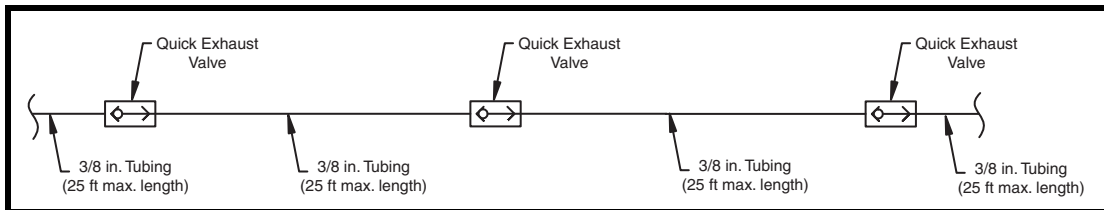


Figure 17. Quick Exhaust Valve Piping

CAUTION

Do not use solenoid enclosure in explosive environment. Solenoid enclosure is not rated for hazardous locations.

1. Refer to Figure 16 and follow steps 1 through 4 under “Installing manual valves and electrical solenoid valves.”
2. Choose location for solenoid enclosure and mount with bulkhead fittings pointing down.

3. Connect quick exhaust valve to solenoid enclosure as follows:
 - a. Install bushing on quick exhaust valve. Install a male adapter fitting on bushing and on solenoid enclosure.
 - b. Connect the two male adapter fittings with 3/8-in. stainless steel tubing.

NOTE

Look at symbol on side of FRL, check valve, and lockout ball valve to make sure flow is correct.

4. Connect air filter/regulator/lubricator to solenoid enclosure inlet line with desired length 1/2-in. pipe.

IMPORTANT

OSHA requires installation of a lockout ball valve (see “References”).

5. Connect lockout ball valve to air filter/regulator/lubricator with desired length 1/2-in. pipe.
6. Connect check valve to lockout ball valve with desired length 1/2-in. pipe.

IMPORTANT

Connect all solenoid enclosures to a controller. Design and wire solenoid cabinet controls according to NEC Handbook. Electrical push buttons, timers, and programmable controllers are available through Martin Engineering.

7. Drill conduit entrance hole in solenoid enclosure for wiring.
8. Connect conduit according to NEC Handbook standards.
9. Wire solenoid enclosure to a mechanical, programmable, or solid-state controller according to controller’s operating manual.
10. Connect air supply to check valve.
11. Anchor all pipes and wires to prohibit movement.
12. Operate air cannon as described under “After Installing Air Cannon.”

After Installing Air Cannon

IMPORTANT

Read entire section before beginning work.

1. Thoroughly wipe storage vessel wall clean next to vessel door/port. Place Air Blast Warning Label, P/N 31913, on vessel wall visible to anyone opening door/port. If more than one door or port exists on storage vessel, request additional labels from Martin Engineering or representative. Attach Lockout Valve Warning Tag, P/N 35146, to lockout valve with cable tie (supplied).
2. Purge air lines.

IMPORTANT

Charge each air cannon individually during initial start-up to avoid significant pressure loss.

Relief valve is preset to open at 125 psi (8.62 bar).

⚠ WARNING

Do not exceed 125 psi (8.62 bar) maximum working pressure or pressure relief valve will open. Minimum recommended pressure for most applications is 80 psi (5.52 bar) but lower pressures can be used. Make sure air supply is filtered and regulated.

NOTE

Pressure relief valves of up to 150 psi are available from Martin Engineering. Consult the Maximum Allowable Working Pressure (MAWP) on tank's name plate before substituting a different pressure relief valve. Never use a pressure relief valve with a set pressure that is higher than the MAWP of the tank.

⚠ WARNING

Pressure relief valve may relieve at any point between 90% and 100% of set pressure. Exceeding MAWP can cause tank to rupture.

3. Supply 80 to 125 psi (5.52 to 8.62 bar) filtered, regulated, and lubricated air to system.
4. For air cannons with manual valves, position manual valve lever so air is supplied to air cannon (inlet to outlet open).
5. If air cannon does not charge, see “Troubleshooting.”
6. Check system for air leaks. If leaking, see “Troubleshooting.”

NOTE

When air cannon blasts, a small amount of air will release from solenoid valve and quick exhaust valve.

⚠ DANGER

Do not open door/port or enter storage vessel when cannons are charged and operational. Flying debris from cannons' blast can kill you.

If air cannons are installed on open pit or on structure with no top, make sure area is clear before firing cannons. Flying debris from cannons' blast can kill you.

Air cannons are loud when firing. Use ear protection to avoid impairment or loss of hearing.

7. Blast air cannon as follows:
 - a. For air cannons with manual valves, move manual valve lever to opposite position (inlet to outlet closed, outlet to exhaust open).
 - b. For air cannons with electrical solenoid valves and external electrical controls, activate electrical solenoid valve by external control (electrical push button, timer, etc.) or by pushing button on electrical solenoid valve. (If wired correctly, this should send signal to solenoid valve closing inlet to outlet and opening outlet to exhaust.)
 - c. For air cannons with solenoid enclosure and controller, set up controller according to controller's operating manual. Use controller to activate solenoid cabinet.
8. Blast air cannon five times to ensure proper operation. Allow tank to fill after each blast.
9. If air cannon blasts properly, continue to operate air cannon as needed. If problems occur, see "Troubleshooting."
10. Keep air cannon charged with air at all times so unit is always ready for use, and so material cannot flow into air cannon.

Maintenance

IMPORTANT

Read entire section before beginning work.

DANGER

Turn off and lock out/tag out air supply and energy source before blasting air cannon to prevent air cannon from refilling.

Do not open door/port or enter storage vessel before turning off compressed air source, locking out controls, purging line pressure, and venting air from tank.

Shutting off lockout ball valve will purge all cannons connected to that valve and cause the air cannons to fire immediately. Do not shut off the valve until you make sure no one is in the structure or near its discharge. Flying debris from the cannons' blast can kill you.

Turn off and lock out/tag out energy source according to ANSI standards (see "References").

Every month

1. Inspect all connections from air supply to tank for leaks and deterioration. If connections are leaking, seal all fittings with pipe sealant and tighten. Replace any deteriorating connections. Make sure hoses do not flex more than 1/4 in. (6 mm).
2. Make sure all pipes and wires are anchored to prohibit movement. Secure as needed.
3. Inspect quick exhaust valve, manual valve or electrical solenoid valve, check valve, lockout ball valve, and air filter/regulator/lubricator for proper operation. If not operating correctly, replace.
4. Wipe all warning labels clean. If labels are not readable, contact Martin Engineering or representative for replacements.

Every year or 50,000 firings

1. Blast air cannon to remove air from tank, then pull ring on relief valve to make sure air stored in cannon has been released.
2. Perform monthly maintenance. See "Every month."

WARNING

Do not remove drain plug until air has been released from tank, or air cannon will discharge.

3. After all air is released, remove drain plug. Allow all moisture to drain from tank.

4. After all moisture is removed, apply pipe sealant to drain plug. Install drain plug on tank.

⚠ CAUTION

Do not weld tank. Paint in tank will melt and welding will violate ASME code. If tank is damaged or leaking, do not use air cannon until tank is replaced or repaired by Martin Engineering.

5. Inspect air cannon mounting area for rust and loose screws, welds, and bolts. Replace, tighten, or weld as necessary.
6. Inspect tank, valve assembly, piston, and discharge nozzle for damage. Replace or return to Martin Engineering for repair as necessary.
7. Inspect restraining cable for wear. Replace if worn.
8. Inspect quick exhaust valve for loose screws or dirt. Tighten and clean as necessary. Inspect rubber diaphragm in quick exhaust valve. If worn, replace. (Repair kit available from Martin Engineering or representative.)
9. On units with electrical controls, inspect wires and connections. Repair or replace wires to NEC Handbook standards as necessary.

⚠ WARNING

Turn off and lock out/tag out air supply and energy source before blasting air cannon to prevent air cannon from refilling. Failure to do so could result in injury to personnel and damage to equipment.

Do not open door/port or enter storage vessel before turning off compressed air source, locking out controls, purging line pressure, and venting air from tank.

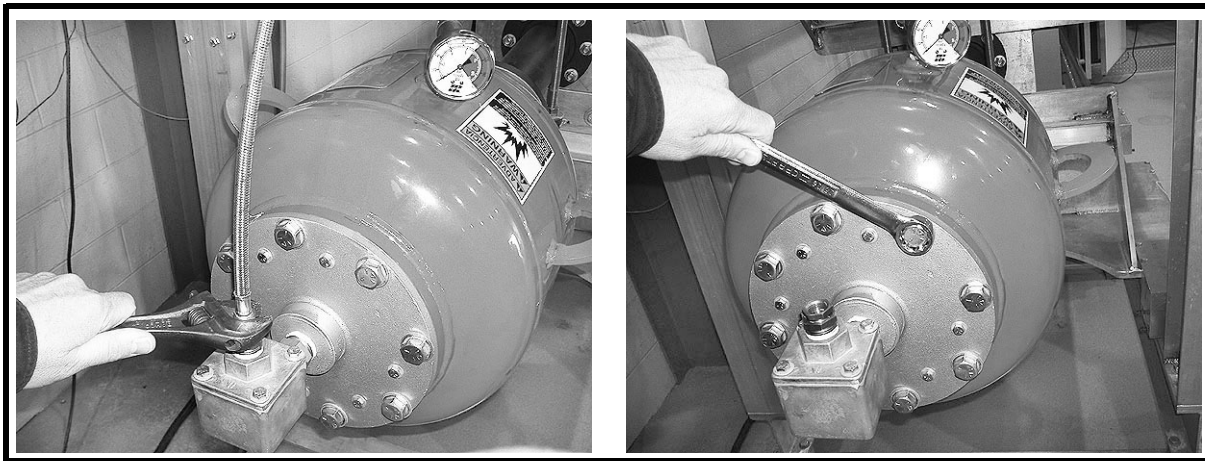
⚠ DANGER

Shutting off lockout ball valve will purge all cannons connected to that valve and cause the air cannons to fire immediately. Do not shut off the valve until you make sure no one is in the structure or near its discharge. Flying debris from the cannons' blast can kill you.

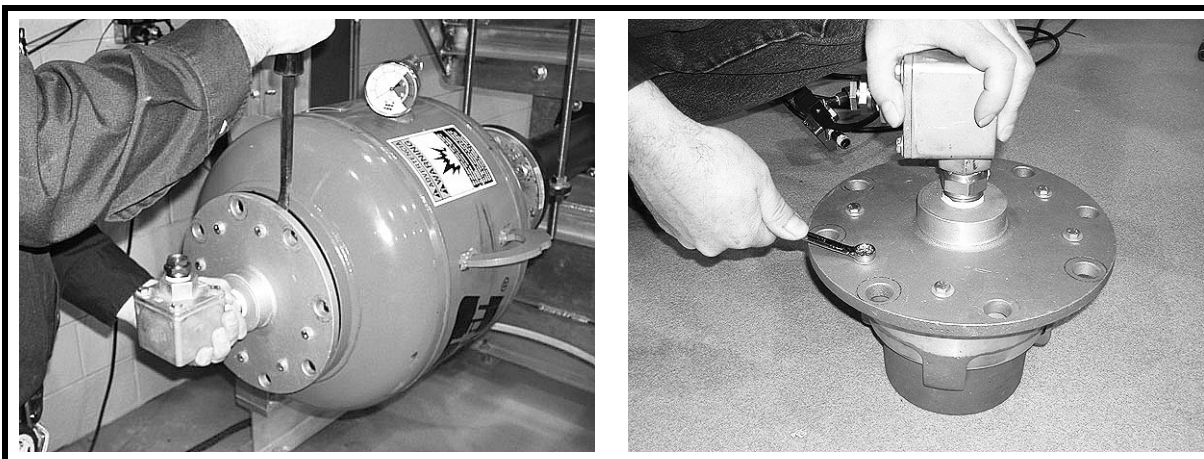
Air Cannon Valve Assembly Replacement



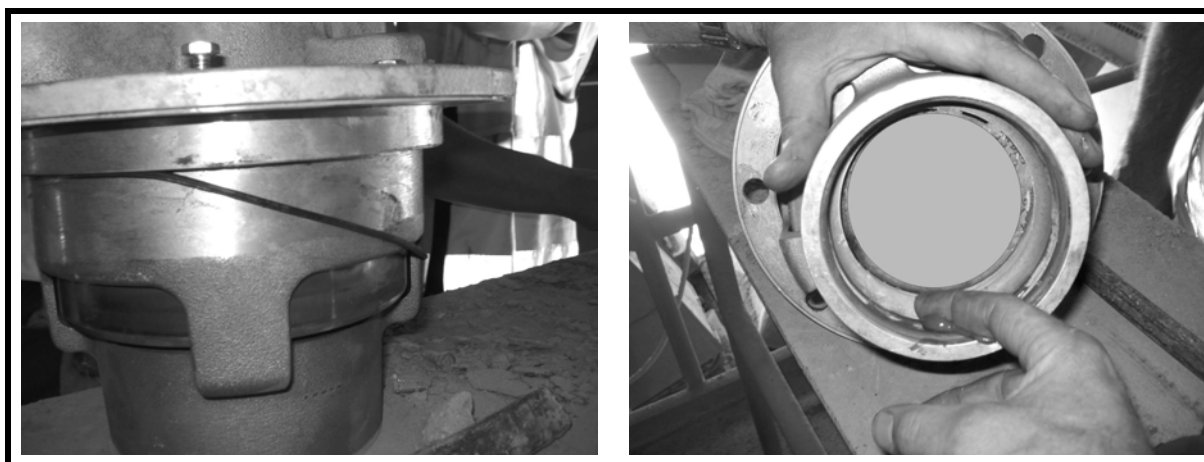
1. De-energize the air cannon; completely drain all compressed air energy from tank.
2. Close safety slide gate if equipped with one. If your air cannon has an open discharge port, make sure you are safely isolated from free-flowing material or hazards inside the discharge area.



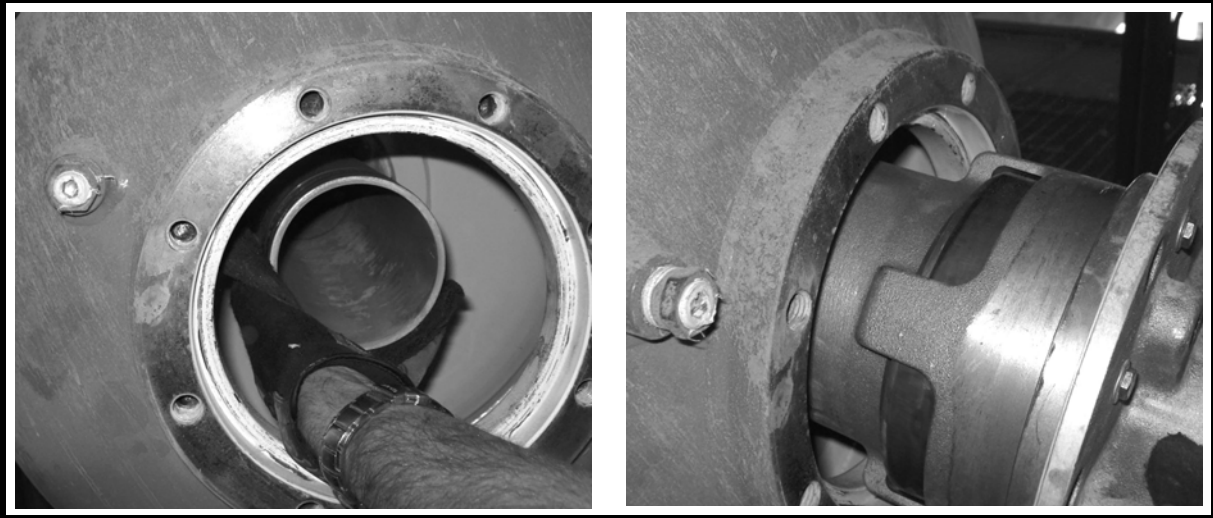
3. Disconnect air line.
4. Remove the 8 bolts on the valve assembly.



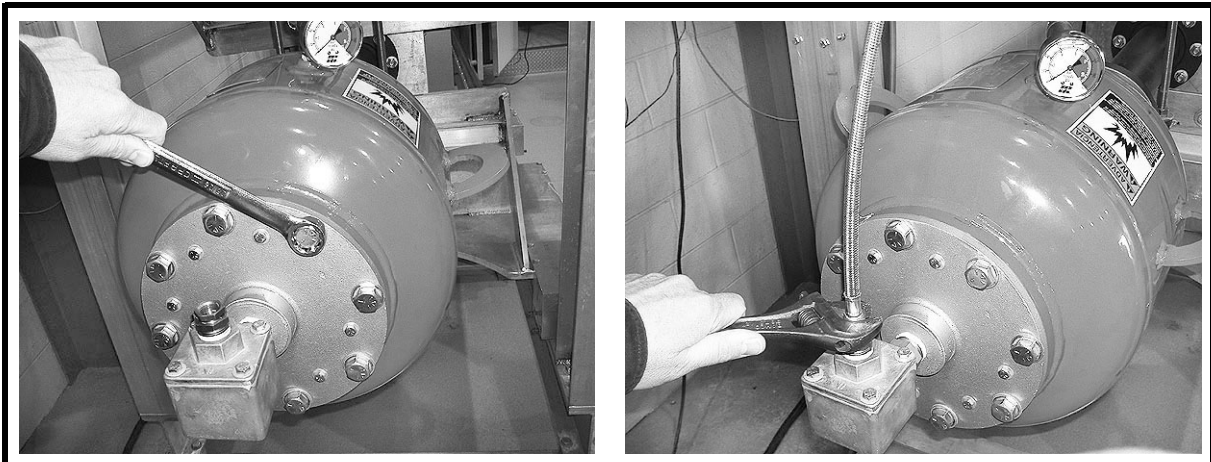
5. Remove valve from tank. A small pry bar can help if O-rings are dry.
6. With the valve assembly removed, the rebuild can be done in the maintenance shop (see list of rebuild kits in “Part Numbers”).



7. When replacing the valve assembly on the tank, a small amount of grease will secure the O-ring. Make sure O-ring stays secure during the reassembly.
8. Place a small amount of grease on the discharge tube O-rings.
9. Inspect interior of air cannon. Make sure discharge tube has a clean and smooth surface for air-tight O-ring seal.



10. Inspect interior of air cannon. Make sure discharge tube has a clean and smooth surface for air-tight O-ring seal.
11. Mate the valve assembly back onto discharge tube, making sure not to pinch O-ring.



12. Install the 8 cap screws and compression washers.
13. After the valve assembly is bolted to tank, re-connect air lines. Ensure there are no leaks or loose connections.
14. If present, pin the Martin® Thermo Safety Shield back to open position.
15. Slowly pressurize air cannon. Check for leaks from any pinched O-rings.
16. When air cannon is pressurized and ready for operation, test fire the cannon.
17. The Martin® Typhoon Air Cannon is now ready for operation.

NOTE

Watch air gauge when air cannon is fired. Needle should drop to “zero” instantly. Exhaust ports should be pointing down so that no dirt can fall into exhaust valve.

Troubleshooting

If the air cannon will not charge or discharge, or if the electrical solenoid valve will not operate, find the possible cause(s) in the appropriate chart below and follow the steps in the “Solution” column.

Problem: Air Cannon Will Not Charge	
Cause	Solution
Shut-off valve not turned on.	Turn on valve.
Quick exhaust valve installed improperly.	Make sure air supply line is connected to correct ports.
Quick exhaust valve dirty or damaged.	Clean or replace quick exhaust valve or valve piston.
Tank inspection plug(s) loose.	Tighten plug(s).
Tank punctured or cracked.	Replace tank.
Restriction in air supply line.	Remove restriction and check air filter/regulator/lubricator.
Electrical solenoid valve is not #125, 3-way normally-opened valve.	Replace valve.
Compressor source.	Make sure compressor is on and air line has pressure.
Ball valves open.	Check that ball valves are fully open to each cannon.
Filter/Regulator.	Factory-set at zero. Rotate clockwise to increase. Check plumbing air flow direction (indicated with an arrow).
Solenoid plumbing.	Check connections. Port 1 = inlet; Port 2 = outlet; Port 3 = exhaust.
Tank plugs missing.	Check to see whether any NPT ports on tank have been left open.

Problem: Air Cannon Will Not Discharge	
Cause	Solution
Quick exhaust valve improperly installed.	Make sure air supply line is connected to correct ports.
Quick exhaust valve dirty or damaged.	Clean or replace quick exhaust valve or valve piston.
Quick exhaust valve exhaust port blocked.	Open exhaust port to atmosphere.
Electrical solenoid valve is not #125, 3-way normally-opened valve.	Replace valve.
Manual or solenoid valve not installed properly.	Check all connections from tank to air supply. Make sure pipes are 1/2-in. NPT.
Supply line too large diameter.	Replace with 3/8-in. tubing for solenoid cabinet installation, and 1/2-in. pipe for all others.
Solenoid valve located too far away from quick exhaust valve.	Move to within 25 ft (7.62 m) on 3/8-in. tubing application, and 15 ft (4.57 m) on 1/2-in. tubing application.
Valve full of foreign matter.	Disassemble and clean out.

Problem: Air Cannon Will Not Discharge	
Cause	Solution
Solenoid plumbing.	Make sure plumbing is correct. Check for leaks. Check plumbing direction.
Solenoid electrical.	Make sure wiring is connected. Check that voltage is correct. Check for signal.
Tank pressure.	Check air gauge.
Blocked discharge—cannon makes “sputtering” sound when discharging; air gauge drops slowly or does not go all the way to zero.	Remove blockage.
Operating pressure is low.	Check that operating pressure is at 80–100 psi.
Control signal too short.	Make sure that solenoid stays on long enough for correct operation (1 second).
Air gauge not working correctly.	Be sure that air gauge drops to “0” psi in less than ½ second.

Problem: Electrical Solenoid Valve Will Not Operate	
Cause	Solution
Defective solenoid valve. (Check the valve by connecting to another output. Low resistance across coil indicates good valve.)	Remove piping from exhaust port of solenoid. If this causes solenoid to operate properly, use larger piping or remove restriction. Replace valve.
Broken lead to solenoid valve.	Replace wire to NEC Handbook Standards.
Defective timer.	Replace timer.

Part Numbers

This section provides product names and corresponding part numbers for Martin[®] Typhoon Air Cannons and related equipment. Please reference part numbers when ordering parts. Part numbers for accessory equipment not listed here are available from Martin Engineering or representative.

Air Cannons

Martin[®] Typhoon Air Cannon Assembly:

Martin[®] Typhoon Air Cannon 35 L: P/N 38005-35FD

Martin[®] Typhoon Air Cannon 70 L: P/N 38005-70FD

Martin[®] Typhoon Air Cannon 150 L: P/N 38005-150FD

Martin[®] Multi Valve Air Cannon System: P/N 38625-FD

Air Cannon Repair Parts

Martin[®] Typhoon Air Cannon Valve Assembly: P/N 38071-FD

Pressure Relief Valve: P/N 21680

Air Pressure Gauge: P/N 34842

Safety Cable Kit: P/N 32271

Main Piston Rebuild Kit: P/N 38426

Quick Exhaust Valve (QEV): P/N 35669

Quick Exhaust Valve (QEV) Rebuild Kit: P/N 36060

Air control components/kits

Air Line Kit: P/N 24679-01. Includes 1/2-in. check valve, ball valve, and filter/regulator/lubricator.

Installation Kit: P/N 35150. Includes QEV, flanges, hardware, gasket, 1-in. street elbow, and 1-in. hex nipple.

1/2-in. Air Filter/Regulator/Lubricator: P/N 14760

Manual 1/2-in. Valve: P/N 36343-L

125# Solenoid Valve 1/2-in. Ports: P/N 36343

1/2-in. Check Valve: P/N 22618

5-Bank Solenoid Enclosure: P/N 36279-05

Air Gauge Accessory Kit: P/N 34843

Fill Control Line Kit: P/N 33739. Includes: (5) 3/8" x 20 ga x 5' long pieces of 304 stainless steel tubing and fittings.

Miscellaneous

High-Temperature Oil: Quart P/N 34528-Q, Case (12 qts), P/N 34528-C

Air Motor Oil: P/N 14766

Controller (115v/220v): P/N 38901

Contact Martin Engineering for information on other repair parts.

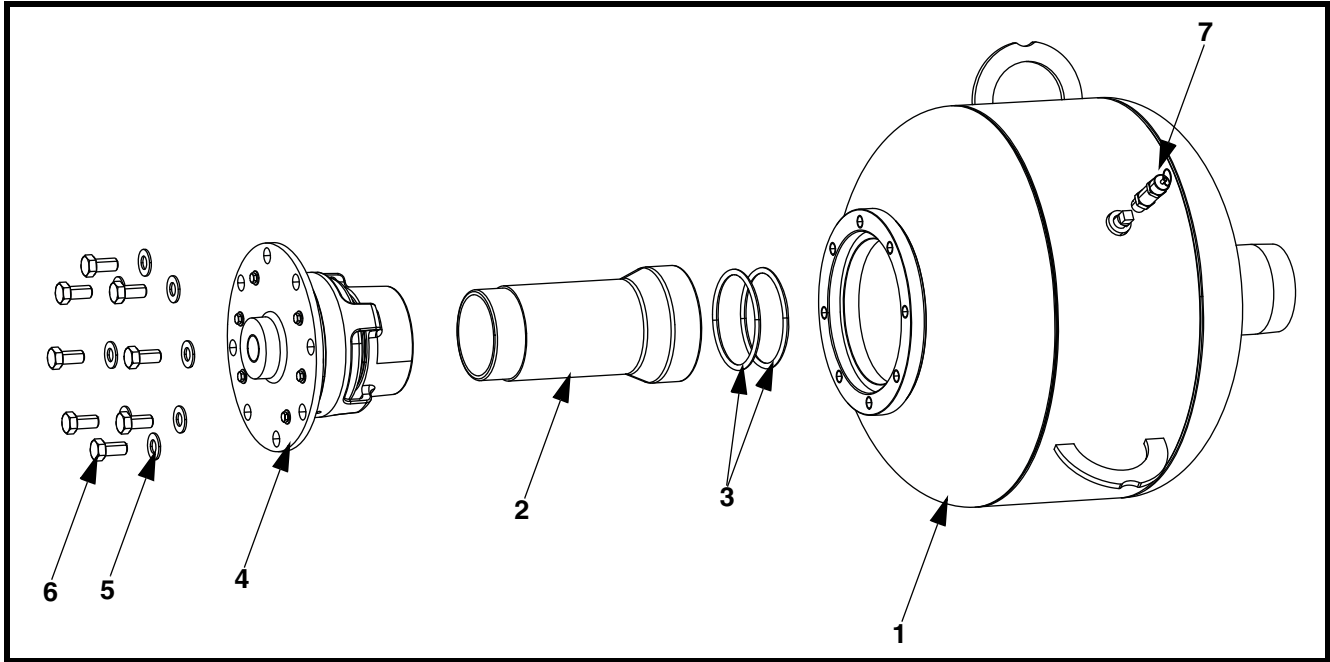


Figure 18. Martin® Typhoon Air Cannon Assembly Parts List

Item	Description	Part No.	Qty
1	Tank (35 Liter)	38181-35	1
1	Tank (70 Liter)	38181-70	1
1	Tank (150 Liter)	38181-150	1
2	Aluminum Pipe Coupling	38602	1
3	O-ring #425, 4.50 ID x .275 CS	20771-S	2
4	Valve Cap Assembly	38071-FD	1
5	Washer Compression 5/8	11752	8
6	Screw, HHC 5/8-11NC x 1-1/4 ZP	15798	8
7	Valve Safety 1/2-NPT Brass	21680	1
8 (NS)	Safety Cable Kit	32271	1
9 (NS)	Label Kit	34517-03H	1
10 (NS)	Manual Operator's	M3813	1

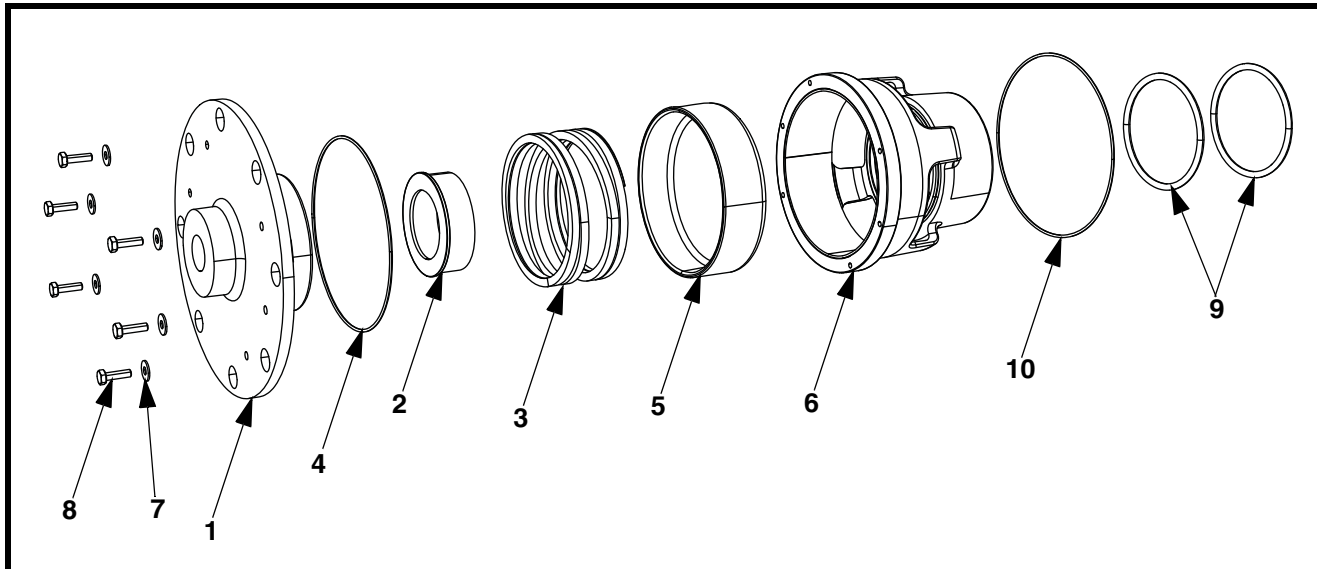


Figure 19. Martin® Typhoon Air Cannon Valve Assembly Parts List, P/N 38071-FD

Item	Description	Part No.	Qty
1	Valve Assembly Cap	35073-FD	1
2	Urethane Bumper	37793	1
3	Spring, Compression	35077	1
4	O-ring #166, 6.737 ID x .094 CS	35078	1
5	Piston	38022	1
6	Basket	37897	1
7	Washer, Compression 1/4	11521	6
8	Screw HHC 1/4-20NC x 7/8 ZP	11891	6
9	O-ring #425, 4.500 ID x .275 CS	20771-S	2
10	O-ring #169, 7.487 ID x .103 CS	38066	1

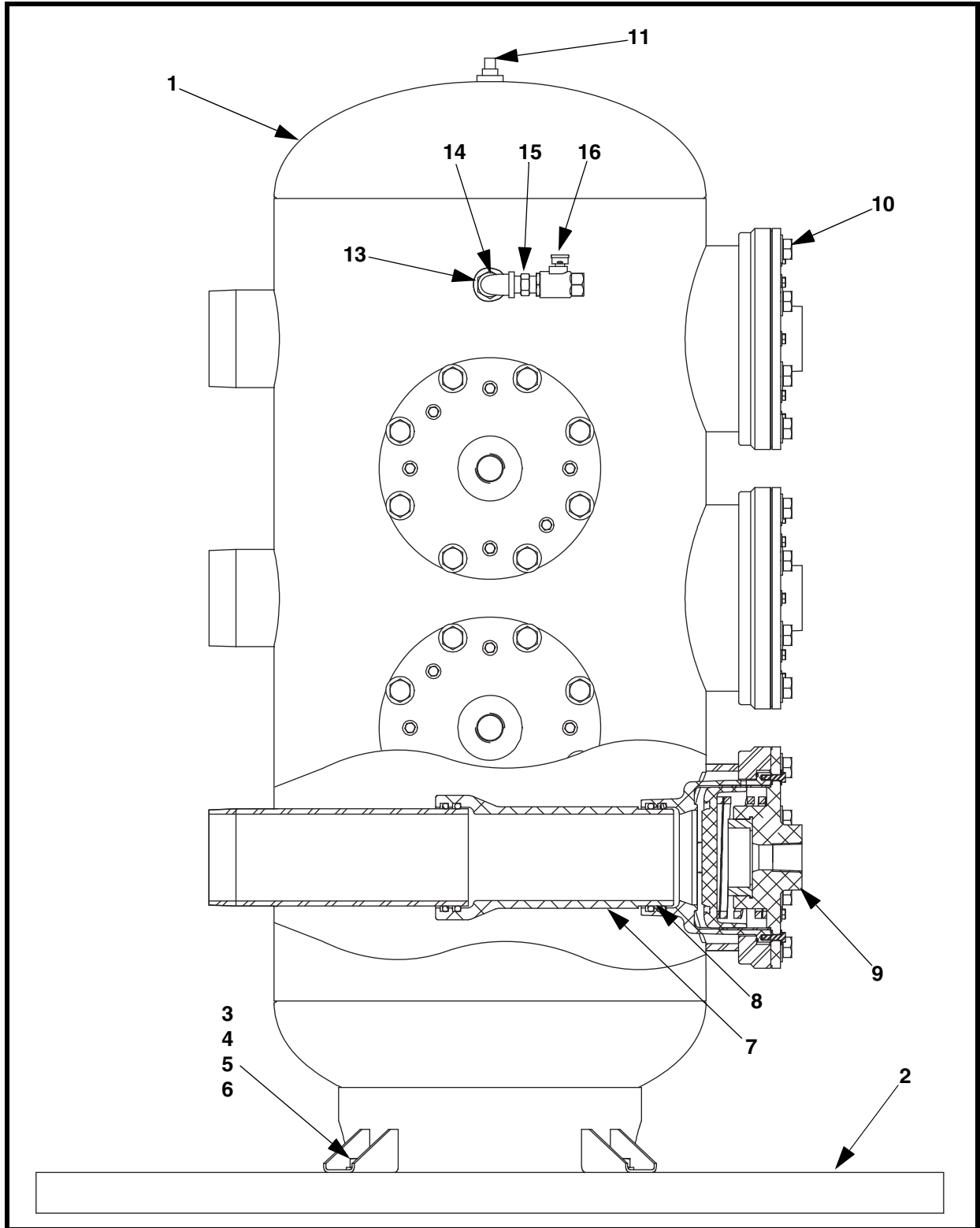
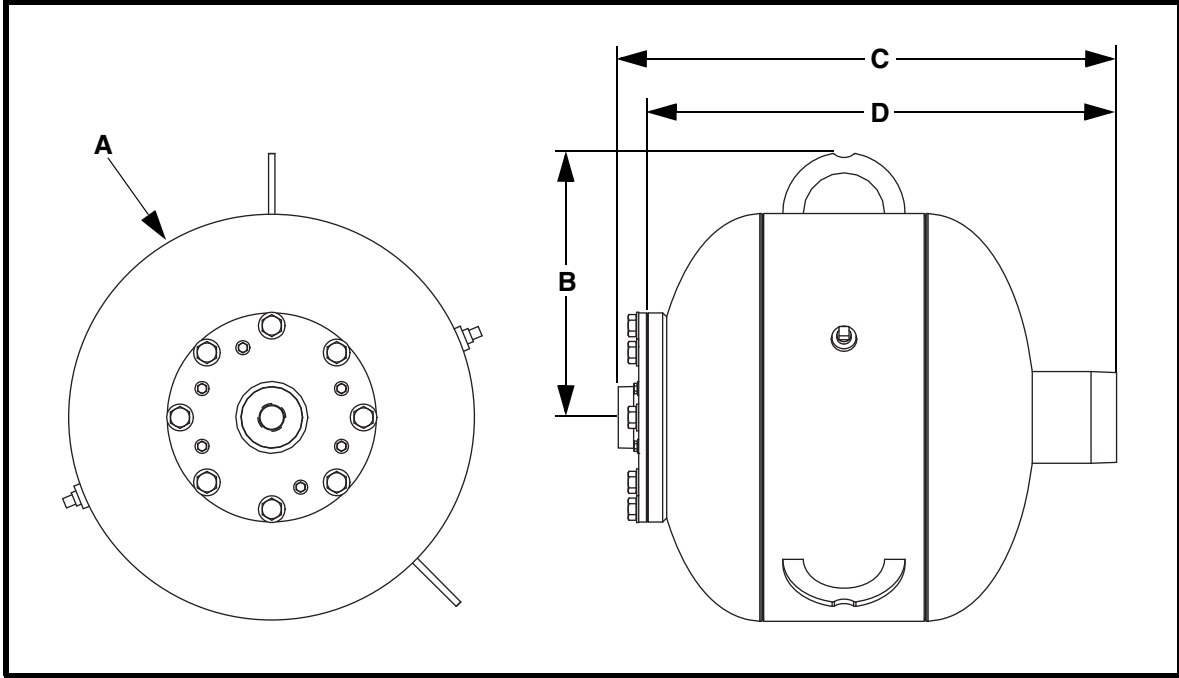


Figure 20. Martin® Multi Valve Air Cannon System Parts List, P/N 38625-FD

Item	Description	Part No.	Qty
1	5-Port Tank	38604-5	1
2	Base Weldment	38624	1
3	Washer Flat 5/8 Narrow ZP	16814	4
4	Screw, HHC 5/8-11NC x 1-1/2 ZP	11746-04	4
5	Washer Compression 5/8	11752	44
6	Nut Hex 5/8-11NC ZP	11772	4
7	Aluminum Pipe Coupling	38602	5
8	O-ring #425 4.50 ID x .275 CS	20771-S	10
9	Valve Cap Assembly	38071-FD	5
10	Screw, HHC 5/8-11NC x 1-1/4 ZP	15798	40
11	Plug Pipe 1/2 NPT	12519	1
12 (NS)	Valve Safety 1/2 NPT Brass	21680	1
13	Bushing 3/4 NPT x 1/2 NPT Galvanized	38236	1
14	Elbow Street 1/2 NPT Galvanized	38235	1
15	Nipple Hex 3/8 NPT ZP	38291	3
16	Valve Ball 1/2 NPT	14824	1
17	Plug Pipe 1/2 NPT	21874	1
18	Label Kit	34517-03H	1
19 (NS)	Manual Operator's	M3813	1

Notes

Appendix A
Martin[®] Typhoon Air Cannon Specifications

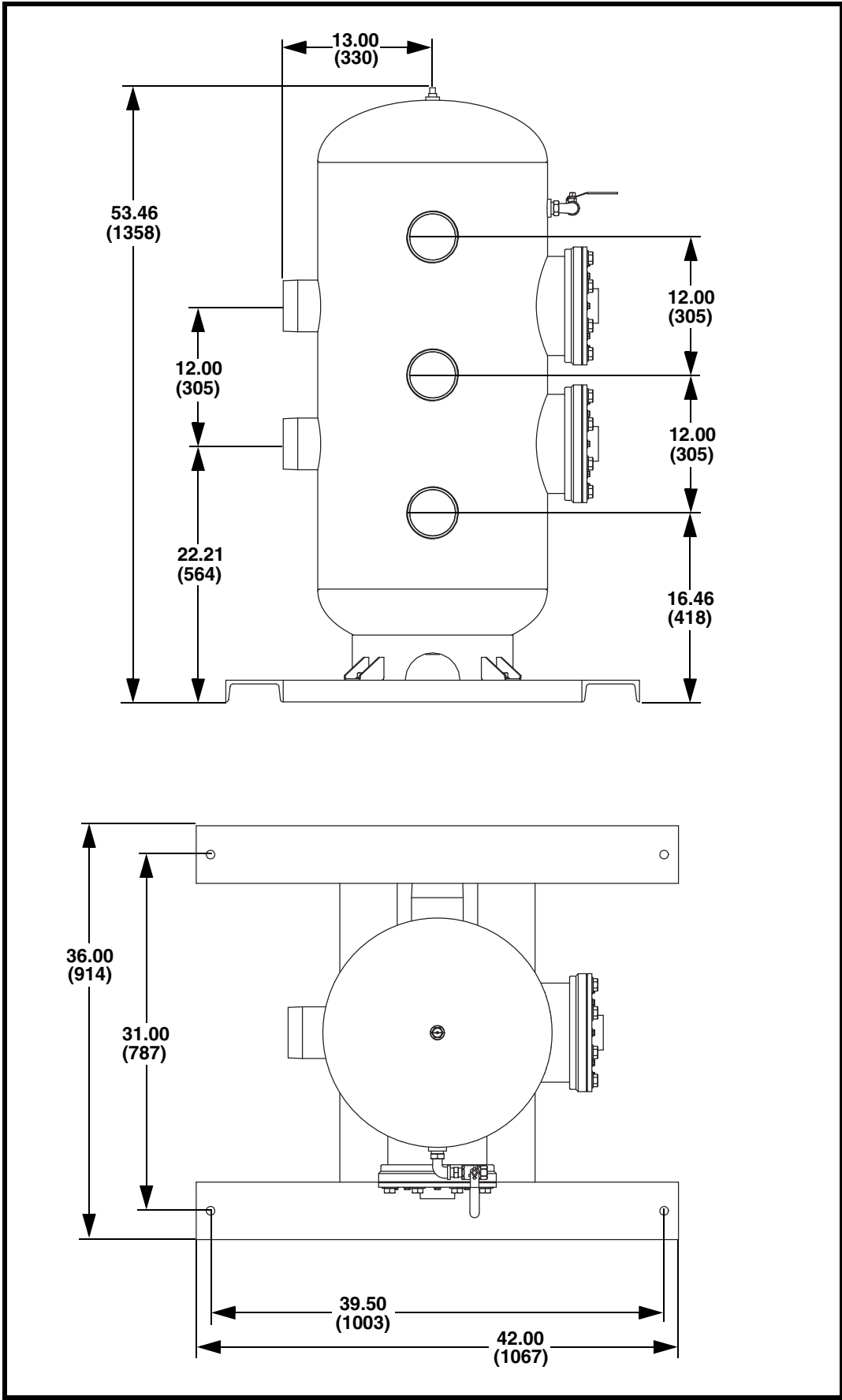


Martin® Typhoon Air Cannon

Dimensions--in. (mm)				
P/N	A	B	C	D
38005-35FD	16.00 (406)	10.95 (278)	21.44 (545)	20.00 (508)
38005-70FD	20.00 (508)	12.95 (329)	28.43 (722)	18.75 (476)
38005-150FD	24.00 (610)	14.95 (380)	32.19 (818)	30.75 (781)

Air Cannon Air Volume in Cubic Feet (Liters) Free Air

Air Pressure psi (bar)	38005-35FD ft ³ (L)	38005-70FD ft ³ (L)	38005-150FD ft ³ (L)
0	1.2 (35)	2.4 (70)	5.3 (150)
40 (2.8)	4.6 (130)	9.2 (260)	19.7 (558)
50 (3.4)	5.4 (153)	10.8 (308)	23.3 (660)
60 (4.1)	6.2 (176)	12.5 (355)	26.9 (762)
70 (4.8)	7.1 (201)	14.2 (403)	30.5 (864)
80 (5.5)	7.9 (224)	15.9 (450)	34.1 (966)
90 (6.2)	8.8 (249)	17.6 (498)	37.8 (1020)
100 (6.9)	9.6 (272)	19.2 (546)	41.4 (1172)
110 (7.6)	10.4 (294)	20.9 (593)	45.0 (1274)
120 (8.3)	11.3 (320)	22.6 (641)	48.6 (1376)



Martin® Multi Valve Air Cannon System

Notes

Appendix B
Martin[®] Typhoon Air Cannon Labels



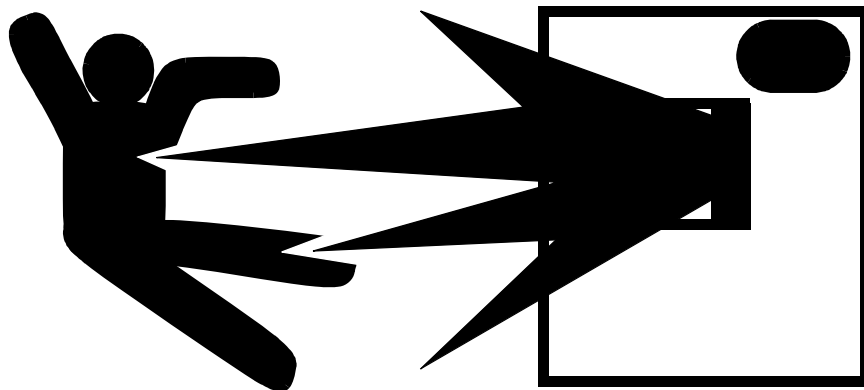
Air Cannon Warning Label, P/N 33439



Martin® Serial/Model Number Label, P/N 21313

! ADVERTENCIA

! WARNING



Air cannon(s) are mounted on this structure.

DO NOT OPEN this door until you:

- 1. Lock out/tag out all power.**
- 2. Purge line pressure.**
- 3. Vent air from all cannons.**

Opening this door while cannons are operational can kill you.

Detonador(es) neumaticos son montados en esta estructura.

NO ABRA la puerta sin haber:

- 1. Bloquee/rotule todas fuentes de energía.**
- 2. Purga la presión de línea.**
- 3. Ventile el aire de los detonadores.**

Abrir esta puerta mientras los cañones están operando puede ser mortal!

Label P/N 31913

Air Blast Warning Label, P/N 31913

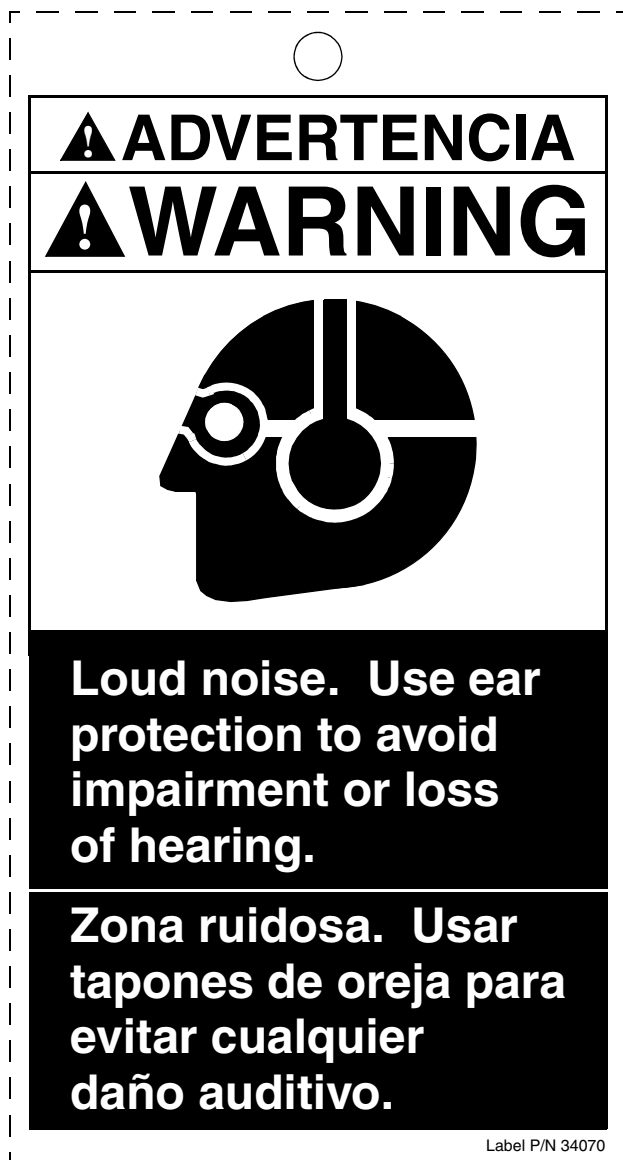
○

⚠ ADVERTENCIA
⚠ WARNING

Shutting off the lockout ball valve will cause the air cannons on this structure to fire immediately. DO NOT shut off the valve until you make sure no one is in the structure or near its discharge. Flying debris from the cannons' blast can kill you!
Cerrar la válvula de cierre estilo bola causará que los cañones de aire en la tolva disparen inmediatamente. Antes de cerrar la válvula, asegúrese que nadie este dentro de la tolva o cerca de la descarga de la tolva. Escombros volantes pueden causar heridas serias o muerte.

Label P/N 35146

Lockout Valve Warning Tag, P/N 35146



Loud Noise Warning Tag, P/N 34070

Notes

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One Martin Place
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