3.2 Compressed Air Requirements

Blast nozzle
The blast nozzle size and blast pressure determine the compressed air requirements. Available air flow capacity and/or air compressor size must be considered before selecting the blast nozzle size. An air source dedicated to the abrasive blast system is preferred to reduce system pressure drops and back flow of air. If an existing air compressor will be used or a limited air supply is available, then the blast nozzle must be selected based on these conditions. Be aware that as the blast nozzle wears the air demand will increase. See Table 1 in Section 13.0 for air consumption by nozzle size at various pressures. The required air consumption will be used to select the proper size AirPrep System.

3.3 Air compressor size

Air compressor size is crucial to the operation of the abrasive blasting equipment which in turn will affect the selection of the AirPrep system. Blast nozzle selection and desired productivity must be evaluated to determine the air flow requirements prior to selecting the air compressor size. Sufficient air supply capacity is necessary to maintain the system air pressure. Insufficient air flow capacity will result in reduced blast nozzle pressure and lost productivity. The air compressor must be large enough to supply:

i. The sum of blast air requirements for each nozzle at the highest pressure that will be used (see Section 13.0, Table 1).

ii. The 12 CFM breathing air supplied to each blast operator respirator. **NOTE**: Reference OSHA regulations regarding requirements for breathing air, especially when an oil-lubricated air compressor is used.

iii. The AirPrep System size should be selected based on the size and capability of the air compressor to be used to meet the air requirements determined above.

3.4 AirPrep System Air Supply Lines

The air supply hose and fittings connected to the inlet and outlets of the AirPrep System must be rated at a minimum of 150 psi operating pressure. The air supply hose from the air compressor to the AirPrep System should be at least the same diameter as the air inlet piping (see Section 2.7). AirPrep Systems are equipped with smaller secondary outlet ports which can be reduced in size by installing pipe bushings to match the connecting equipment. Again the air requirement of the connecting equipment must be considered so that the proper size piping/hose is selected. See Section 5.14.

3.5 AirPrep System Air Pressure

The standard maximum operating pressure for AirPrep Systems is 150 psig; however custom systems may have varying operating pressure. The maximum operating pressure for the AirPrep System is stamped on the ASME nameplate attached to the vessel. AirPrep Systems equipped with air motors to drive the cooling fan are supplied with an air pressure regulator. This air regulator is to reduce the air pressure to the required operating pressure of the fan air motor. The regulator is pre-set at the manufacturer and should not be altered. The required operating pressure for the fan air motor is given in Section 11.0, Table 2.

3.6 Blast System Air Quality

AirPrep Systems are equipped with an inlet filter/separator to remove debris and condensed moisture from the incoming air flow; however, if the air source contains an excessive amount of debris, it may be necessary to install a preliminary filter upstream of the AirPrep System inlet. Excessive contamination of the incoming air can clog the heat exchanger of the AirPrep System and cause expensive damage to the system.

3.7 Electrical Requirements

AirPrep Systems can be equipped with electric fan motors. On units equipped with electric fan motors the supply voltage can range from 110Vac (single phase) to 460Vac (three phase). Each electric motor can be wired one of two voltages as specified by the purchaser at the time of purchase however, the motor can be rewired at installation. If the unit is to be rewired it may be necessary to change the motor starter and/or the thermal overload strips. Only a qualified electrician should install and/or make electrical changes to the AirPrep Systems.

⚠ DANGER

Power connections to AirPrep System with electric motors expose operators to high electrical voltages. Contact with high electrical voltages can result in serious injury or death. Only qualified personnel should install or perform maintenance on the electrical system.

3.9 Breathing Air Quality

All blast operators must be supplied with and required to use NIOSH approved air-fed respirators. Breathing air supplied to these respirators must meet Grade D air quality standards as specified by OSHA 29 CFR 1910.134(i) and the Compressed Gas Association Specifications ANSI/CGA G-7.1. Consult these specifications when selecting a source of breathing air.

Breathing air must be clean, dry, contaminant-free, and provided at a pressure and volume specified by NIOSH. Use NIOSH approved air filters on all sources of breathing air. See Section 3.10.

⚠ DANGER

Breathing air filters do not remove carbon monoxide or any other toxic gases. Use a carbon monoxide monitor to detect unacceptable levels. Consult OSHA 29 CFR 1910.134(i).

Many sources of breathing air are available such as air cylinders, free-air pumps, oil-less air compressors, and oil lubricated air compressors. The most commonly used is the same air compressor that is used for the blast air which most often is oil lubricated. Breathing air provided by an oil-lubricated air compressor can contain carbon monoxide and therefore requires the use of a carbon monoxide detector (See Section 3.10). Carbon monoxide can be in the compressed air produced by an oil-lubricated air compressor when it is operated at extremely high temperature; therefore, a high temperature alarm is required to alert the operators when this condition exists.

⚠ DANGER

Oil lubricated air compressors can produce carbon monoxide. Carbon monoxide can cause asphyxiation and result in death. Use a high-temperature alarm and a carbon monoxide monitor when an oil lubricated air compressor is used to supply breathing air. Consult OSHA 29 CFR 1910.134(i).

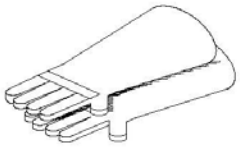
3.10 Personal Protective Equipment (PPE)

AirPrep Systems are designed to be used with abrasive blasting equipment; therefore operators may be exposed to hazards that may not be directly related to the AirPrep System. Abrasive blasting has many hazards that may cause injuries to operators. To protect operators from injury each must be supplied with and required to use Personal Protective Equipment. The Occupational Safety and Health Administration (OSHA) requires the employer to assess the workplace to determine what PPE is necessary and supplied to each operator (Reference 29 CFR 1910 Subpart I). OSHA requires that this equipment meet or be equivalent to standards developed by the American National Standards Institute (ANSI). Figure 3.10 below identifies the minimum personal protective equipment required for each abrasive blast operator. Also identified are the OSHA references for each and the ANSI standard each PPE item must meet. All PPE clothing and equipment should be selected for safe design and quality of construction. Select each for proper fit and for comfort which will encourage operator use.

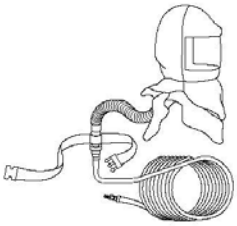
Safety Glasses
Reference OSHA 29 CFR 1910.133
Must meet ANSI Z87.1

Safety Boots
Reference OSHA 29 CFR 1910.136
Must meet ANSI Z41.1

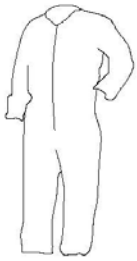
Ear Plugs
Reference OSHA 29 CFR 1926.101
Must meet ANSI S3.19
(Also see OSHA 29 CFR 1910.95)



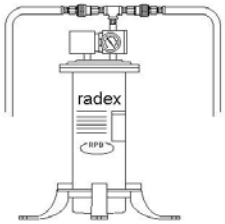
Gloves
Reference OSHA 29 CFR 1910.138
No Applicable ANSI Standard



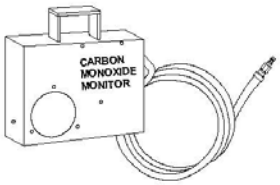
Respirator
Reference OSHA 29 CFR 1910.134
Must be NIOSH approved



Protective Clothing
Reference OSHA 29 CFR 1910.132
No Applicable ANSI Standard



Airline Filter
Reference OSHA 29 CFR 1910.134
Must be NIOSH approved



Carbon Monoxide Monitor
Reference OSHA 29 CFR 1910.134

Figure 3.10 - Personal Protective Equipment

3.11 Pressure Relief Valve Installation

Do Not operate this equipment without a pressure relief device installed to protect the AirPrep System from over-pressurization. The ASME Code requires that all vessels be operated with pressure relief devices in place.

If the AirPrep System does not provide for the installation of a pressure relief valve one can be installed on the blowdown port on the pressure vessel. Refer to Figure 3.11 for an alternate location of the air pressure relief valve.

Local regulations set the specifications for pressure relief valves; therefore it is the responsibility of the owner of the AirPrep System to install a pressure relief valve that meets *all* applicable regulations. The pressure relief device must be set at the maximum allowable working pressure of the AirPrep System pressure vessel. See the ASME/CE vessel nameplates attached to the pressure vessel.

⚠ DANGER

Rupture Hazard. Operating the pressure vessel above the maximum allowable working pressure can result in rupturing the pressure vessel. Install an air pressure relief valve to protect against over pressurization of the blast vessel.

⚠ WARNING

Airborne particles and loud noise hazards from relief valve exhaust air can cause serious injury and loss of hearing. Wear approved eye and ear protection. Stay clear of exhaust air path. DO NOT place hands or other body parts in the exhaust air path. Make sure no personnel are in the exhaust air path. Direct the relief valve exhaust away from work area.

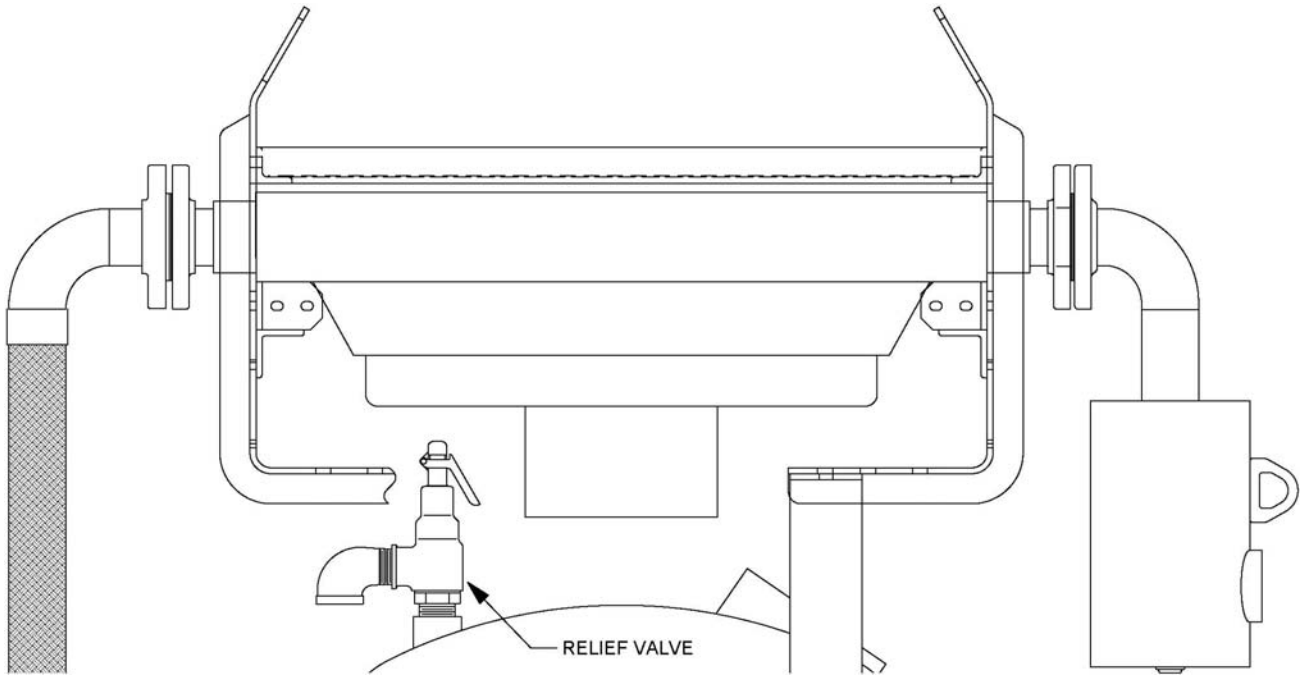


Figure 3.11 – Suggested location for air pressure relief valve

3.12 INSTALLATION CHECKLIST (Photocopy this page to use as a worksheet)

☐ ***Accessories:*** confirm receipt as purchased with the AirPrep System.

☐ ***Inspect AirPrep System:*** check for possible damage during shipment. See Section 8.0 for inspection instructions.

☐ ***Clean AirPrep ADS System:*** remove handway cover and check for debris inside. If Replace handway cover per instructions in Section 6.3.

☐ ***CFM available:*** determine available air supply (cfm) and record here._____
Confirm AirPrep System capacity meets or exceeds the available cfm from above.
See Sections 3.2, 3.3, and 3.5 for information on determining air requirements.

☐ ***Air inlet/outlet connection:*** install air supply piping or connect an air supply hose that is the same size as the air inlet size. See Section 3.4 for details.

☐ ***Deliquescent (AirPrep ADS Systems):*** fill dryer vessel with deliquescent tablets. See Section 2.2 for capacity.

☐ ***Breathing air:*** provide Grade D air source for blast operators. See Section 3.9.

☐ ***PPE:*** provide all the necessary personal protective equipment. See Section 3.10.

☐ ***Pressure relief valve:*** install pressure relief valve if not provided on AirPrep System. See Section 3.11 for information on pressure relief valve installation.

☐ ***AirPrep System radiator drain:*** for environments where freezing is possible install a radiator drain ball valve to drain water that accumulates in the radiator. **Critical:** This will protect the radiator from damage caused by inside water freezing. See Section 5.3.

☐ ***Air motor lubricator:*** fill lubricator with SAE #10 oil and set correct drip rate as detailed in Section 7.2. Also see Sections 5.4, 5.6, & 8.5.4.

☐ ***Air motor pressure regulator:*** correct pressure is set by the manufacturer; however, to insure optimum operation confirm that it is set correctly. See Sections 5.5 and 11.2.

☐ ***Electric power:*** AirPrep Systems equipped with an electric motor that must be installed by a qualified technician. Confirm the specified voltage to insure proper installation.
Note: motor starter thermal units are installed for the voltage specified at the time of purchase; if the voltage is changed during installation risk of overload or under protection will result. See Sections 3.7 and 5.7.

☐ ***Operator training:*** all operators must completely read and understand the operation and maintenance manual and be properly trained in equipment and blast operations.

☐ ***AirPrep System Setup:*** follow procedures in Section 6.1.

4.0 AirPrep System General Operation

The function of the Schmidt® AirPrep System is to reduce the moisture content of the compressed air used in an abrasive blast system or for other compressed air requirements. The AirPrep System is supplied air from an air compressor which will then supply air to the blast nozzle. The abrasive blast stream through the blast nozzle is used for removing rust, paint, or other unwanted surface defects. After abrasive blasting, the surface is ready for new paint or coating.

The AirPrep System is one of a group of components used in an abrasive blasting job. The typical components are an air compressor, moisture removal device, an abrasive blaster, blast hose, a blast nozzle, operator personal protective equipment, and blast abrasive. See Figure 4.1.

The condensation of moisture in the air flow of a blast operation creates problems with the abrasive flow from the blast vessel; therefore, it is common for the compressed air to be fed through a moisture removal device, such as a Schmidt Air Prep System. The moisture condensation occurs when the compressed air is cooled. The typical occurrences of cooling are inside the blaster when the air expands, and on the surface of the object that is being blasted. An AirPrep System greatly reduces the moisture content in the blast air and air supplied to other equipment such as breathing air filters used in the blast operation. The abrasive blast stream and the dust it creates are harmful, therefore all blast operators and other personnel in the blast vicinity must use personal protective equipment during the blast operation.

All the components required for the blast operation (except for the air compressor) are available from Axxiom Manufacturing, Inc. Call Axxiom to locate a distributor.

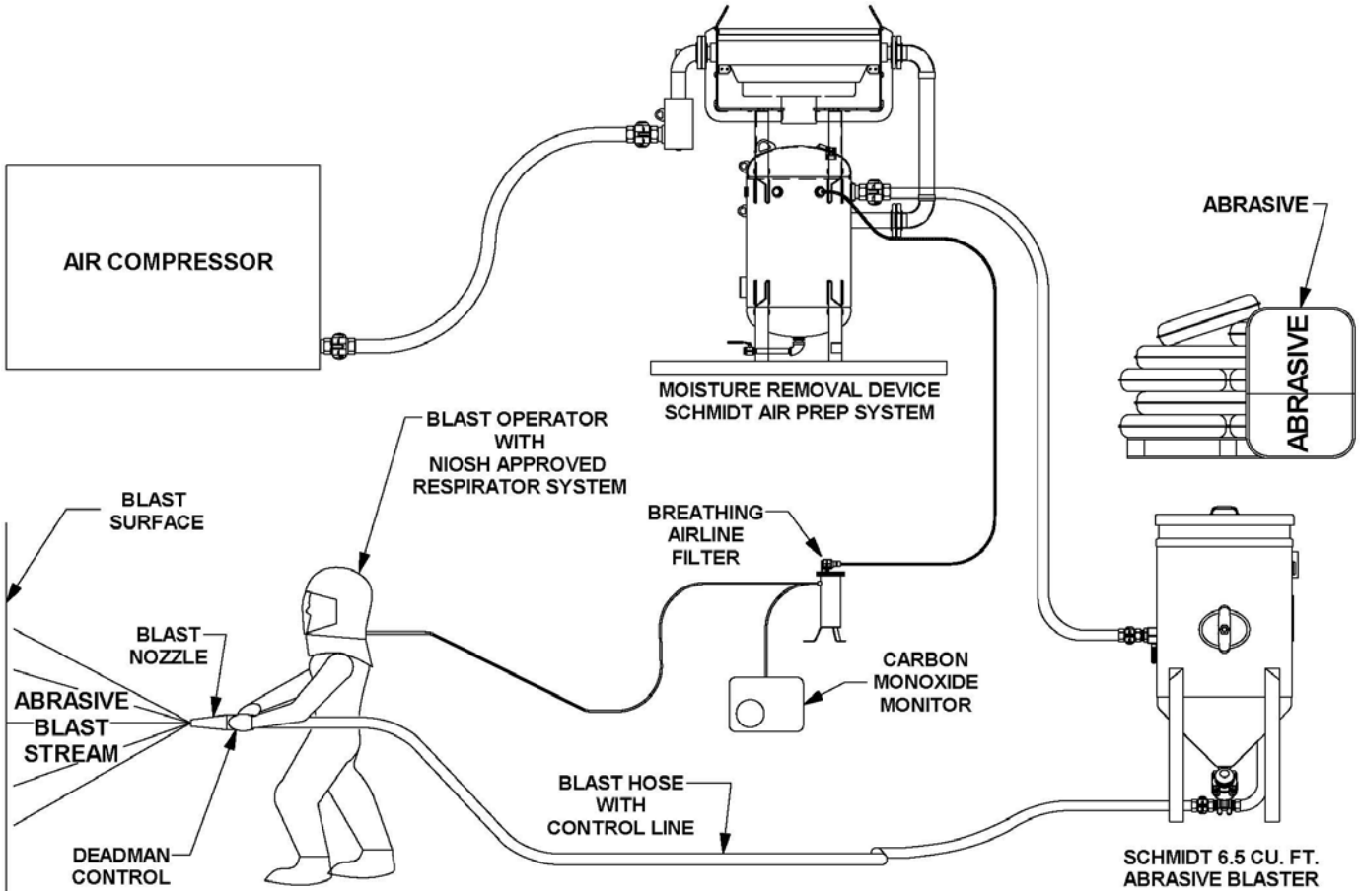


Figure 4.1 – Typical Abrasive Blast System