STANDARD SPECIFICATION

SECTION 15214S

BREATHING AIR SYSTEM

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BREATHING AIR SYSTEM

PART 1 - GENERAL

1.01 WORK INCLUDED

A. Materials and operations required for the installation of piping systems including: pipe fittings, valves, equipment, joints, wiring and tests for the following systems:

1. Breathing Air System which consists of an auto switch panel, audio and visual alarm system inside and outside of the spec gas room for low cylinder pressure, audio visual alarm inside of the spec gas room for low oxygen content and high carbon monoxide content, the breathing air distribution piping and two hose reels with 50 ft hose and quick connection for respirators.

1.02 QUALITY ASSURANCE

A. Welding Materials and Procedures: Conform to ASME code for Pressure Piping, ANSI/ASME B31.1, Power Piping.

B. Employ welders certified in accordance with ASME Boiler and Pressure Code, as modified by ANSI/ASME B31.1, Power Piping

C. Brazing: Certify brazing procedures, brazers, and operators in accordance with ANSI/ASME B31.1, Power Piping, for shop and jobsite brazing of piping work.

D. Soldering: Conform to ANSI/ASME B31.1, Power Piping.

1.03 REFERENCES

The current editions of the following standards are a part of this specification.

A. Sandia National Laboratories Standard Specifications:

1. Section 01300 Submittals

2. Section 02200 Earthwork

3. Section 09900 Painting

4. Section 15050 **Basic Mechanical Materials and Methods**

5. Section 15**070** Vibration Limits and Control

6. Section 15060-S Hangers and Supports
7. Section 15075-S Mechanical Identification.
8. Section 16001-S Electrical Work

B. American National Standards Institute (ANSI)

1. ANSI B2.1 Standard Welding Procedure Specification
2. ANSI B31.1 Power Piping
3. ANSI Z-88.2 Standard for Respiratory Protection

C. OSHA, Occupational Safety and Health Administration 29 CFR 1910

D. NIOSH, Natioanl Institute of Occupational Safety and Heath

1.04 SUBMITTALS

A. All required submittals shall be per Standard Specification, Section 01300.

B. All pipe materials, valves, equipment and accessories not listed in this specification under PART 2 - PRODUCTS shall be submitted for approval.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

The manufacturers listed under this section suppy products of acceptable type, quality, and performance.

2.02 MATERIALS FOR BREATING AIR SYSTEMS

A. Piping:

1. Seamless tubing, 316L stainless steel per ASTM A269 and A-632, factory cleaned for oxygen service.

B. Fittings:

1. 316L stainless steel, manufactured to ASTM specification A-269, 632 and 479 as applicable. Fitting shall have the minimum wall tubing to guarantee maximum wall thickness after fabrication.

C. Valves:

1. Three Piece Ball Valve, Whitey 60 series, stainless steel body, stainless steel ball and stem, teflon seat, 250 p.s.i. maximum working pressure

2.03 EQUIPMENT

A. General: Equipment required for installation on this contract shall be as specified on the applicable contract drawings and shall be furnished complete with all accessories normally supplied with the catalog item listed and all other accessories necessary for a complete and satisfactory operating system.

B. Automatic Cylinder Change Panel and Monitoring System:

1. Automatic cylinder change panel shall supply breathing air from two breathing air cylinders at a selectable operating pressure into the distribution piping.

2. Automatic cylinder change panel shall switch the active breathing air cylinders to standby breathing air cylinders at a preset cylinder pressure of the active breathing air cylinder.

3. Automatic cylinder change panel shall send out audio and visual alarm at the panel and inside of the specialty gas room for the low cylinder pressure in the active cylinder bottle and for low oxygen concentration. A monitoring system shall be installed for monitoring oxygen and carbon monoxide and send audio visual alarm inside **and outside** the gas room.

PART 3 - EXECUTION

3.01 PIPING INSTALLATION

General:

A. Piping installation shall be coordinated with respect to space available with specialty gas piping, heating, ventilating and electrical installation. In every instance where there is a conflict in the routing of the piping and the ducting, the routing of the ducting shall govern. Installed piping shall not interfere with the operation or accessibility of doors or windows; shall not encroach on aisles, passageways, and equipment; and shall not interfere with the servicing or maintenance of equipment. Pipe shall be cut accurately to measurements established at the construction site and shall be worked into place without springing or forcing, properly clearing all openings and equipment. Cutting or weakening of structural members to facilitate piping installation is not permitted. Pipes shall have burrs removed by reaming and shall be so installed as to permit free expansion and contraction without damage to joints or hangers. Piping above ground shall be run parallel with the lines of the building unless otherwise noted on the drawings.

Piping connections to equipment shall be in accordance with details shown on the drawings. Service pipe, valves, and fittings shall be kept a sufficient distance from other work to permit finished covering not less than 1/2 inch from such other work, and not less than 1/2 inch between finished covering on the different services.

B. Reducers: Reduction in pipe sizes shall be made with one-piece reducing fittings. Bushings reducing at least two pipe sizes will be acceptable only when there is no room for reducing couplings or swagged nipples.

C. Unions: All piping unions shall be of the ground joint type constructed from materials equivalent in alloy composition and strength to other fittings specified with which they are used. Union pressure classes and end connections shall be the same as the fitting used in the lines with the unions.

Steel unions shall have hardened stainless steel seating surfaces on both faces.

D. Installation of Valves: Valves shall be installed at the locations shown on the drawings and where specified. All valves shall be installed with their stems horizontal or above.

E. Pipe Hangers: Unless otherwise noted on the drawings, horizontal overhead runs of pipe shall be hung with adjustable wrought-iron or malleable-iron pipe hangers, spaced not over 8 feet apart. Tubing shall have hangers spaced not over 5 feet apart. Chain strap, perforated-bar, or wire hangers will not be permitted. Trapeze hangers may be used in lieu of separate hangers on pipes running parallel to each other and close together. All hangers shall have short turnbuckles or other approved means of adjustment, and should be suspended from structural members. Hangers and collars shall be of a size proportionate to the weight of the pipe supported. Where the piping is attached to metal partitions, full-length through bolts shall be used with large washers, on both sides. Copper pipe hangers shall be copper or copper plated. Piping in tunnels or chases shall be supported on Unistrut or approved equal, as indicated on the drawings.

F. Joints:

1. Screwed Joints: Screwed pipe joints shall have American Standard Taper Pipe Threads ANSI B2.1-68. Burrs formed when cutting pipe shall be removed by reaming. Care shall be taken that the inside of pipe is thoroughly clean and free of cutting oil and foreign matter before installation. Joints shall be made perfectly tight by the use of Teflon tape or approved Teflon thread sealing and lubricating compound.

2. Solder-Joints: Tubing shall be cut square and burrs removed. Both inside of fittings and outside of tubing shall be well cleaned with steel wool or wire brush before sweating. Care shall be taken to prevent annealing of fittings and hard drawn tubing when making connections. Joints for sweated fittings on low pressure piping (150 psig and below) shall be made with a noncorrosive paste flux and solid wire solder composed of 95 percent tin and 5 percent antimony. Cored solder will not be permitted.

3. Welded Joints: Joints between sections of pipe and between pipe and fittings may be welded using either gas or electric welding equipment. All pipe surfaces shall be thoroughly cleaned before welding. Each joint, except socket-weld joints, shall be beveled before being welded. The Contractor shall provide an asbestos mat or blanket to protect the structure and adequate fire protection equipment at all locations where welding is done. All elbows shall be long radius where space conditions allow. Wherever tee connections are made to piping systems on the main run, welding sockets or weldolets may be used in lieu of reducing outlet tees for branch connections up to one-half the size of the main run. On connections larger than one-half the size of the main run, welding tees shall be used. The use of fittings formed from welded pipe sections will not be permitted. All welding shall conform with

"General Material and Work Requirements, Mechanical" section of these specifications.

3.02 TESTS.

A. General: All piping, equipment, and accessories installed under this contract shall be inspected and tested by the Contractor in the presence of the Inspector, and approved before acceptance. All labor, material, and equipment required for testing shall be furnished by the Contractor. The Contractor shall be responsible for all repairs and retesting as required. All instruments and other equipment whose safe pressure range is below that of the test pressure shall be removed from the line or blanked off before applying the tests.

B. Testing: Compressed gas piping shall be tested at the test pressures specified and shall not exceed the following drop in pressure in a 24 hour period. Use F-12 and an electronic leak detector to locate leaks in systems that allow no press drop in a 24 hour period. All other system leaks shall be located by soap testing.

Compressed Gas	Test Pressures	Test Gas	Max. Pressure Drop (24 hrs)
Breathing Air	150 psig	Air	5 p.s.i.

END OF SECTION