

AIR DISTRIBUTION SYSTEM FOR AIR MASKS AND CHEMICAL AIR SUITS

SAFETY ENGINEERING STANDARD

ISSUED	MARCH 1959
THIS PAGE REVISED	FEB 1982
STANDARD REAFFIRMED	FEB 1982

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This standard includes requirements of the Occupational Safety and Health Act of 1970 (OSHA) as published in the Federal Register. OSHA information is printed in red.

1. SCOPE

This standard describes safe facilities for supplying breathing-quality air from a plant air supply, portable compressor, or cylinders to air masks and chemical air-suit stations. For selection of proper respiratory equipment, see S2H.

2. SAFETY

2.1 Carefully check the entire plant air supply system to make sure there is no possibility of cross contamination from toxic process vapors, inert gas, or radioactive materials which will not be removed by the usual air-line filters. Where such conditions are possible, a separate breathing-quality air supply should be provided.

2.2 Instrument air which has been dried is satisfactory for air mask use if it meets the requirements of 2.1 and the CO content does not exceed the limits as outlined in 2.2.1. Devices using instrument air should be checked to ensure that component failure cannot result in backflow of toxic vapors or inert gas into the air system.

2.2.1 Breathing air shall meet at least the requirements for Grade D breathing air, as described in Compressed Gas Association Specification G-7.1 (maximum carbon monoxide content for Grade D is 20 ppm). See 6.1 of S2H.

2.3 Pure oxygen or oxygen-enriched air must never be used with air-line respirators.

2.4 Air-line couplings shall be incompatible with outlets for other gas systems to prevent inadvertent servicing of air-line respirators with nonrespirable gases or oxygen.

2.5 Nonlubricated compressors are preferred since oil is not introduced into the air supply as a potential source of carbon monoxide. If an internally lubricated compressor is used, it should be well maintained and must be operated well below the degradation temperature of the lubricant. To safeguard against the hazard of carbon monoxide being in the compressed air, the compressor shall be equipped with a high-temperature or carbon monoxide alarm, or both. If only a high-temperature alarm is used, the air from the compressor shall be tested frequently for carbon monoxide, to ensure it meets the requirements

of 2.2.1. Installation of a compressed air purifier (see Note 3) should be considered.

2.6 Air-distribution systems supplied by internally lubricated compressors should be checked periodically for condensed hydrocarbon content per CGA Specification G7.1. One such method is to pass a sample of the air to be tested through an adequate filter (0.8 μ m MCEF) and measuring the increase in weight of the filter. Condensed hydrocarbons should not exceed 5 mg/m³ (S2H).

2.7 The additional hazard of undesirable or toxic contaminants being introduced from the use of portable compressors must be recognized and guarded against. If possible, an electric motor-driven compressor should be used. If this is not practical, diesel engine-powered compressors have less serious exhaust-recycle problems than those equipped with gasoline engines. In either case, they should be provided with extensions to separate exhaust stacks, crank case vents, and compressor intakes; checked carefully for exhaust manifold leakage; and properly oriented with regard to wind direction.

2.8 Purchased cylinders of breathing air should be analyzed before use, preferably by the plant. See S2H for requirements and specifications.

2.9 State and local requirements shall be examined as they may be more restrictive.

2.10 Air-distribution systems utilize air filters or filter/regulators (or both). They must not be used where system pressure or temperature may exceed maximum rated operating conditions.

2.10.1 Polycarbonate plastic bowls are normally supplied on filters and filter/regulators. They can be damaged and possibly burst if exposed to such substances as certain solvents, strong alkalies, compressor oils containing ester-based additives, or synthetic oils. Fumes of these substances in contact with the polycarbonate bowl, externally or internally, can also result in damage. Polycarbonate bowls used in such environments, should be equipped with metal guards.

2.10.1.1 Metal bowls are acceptable alternates to installing guards.

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NOTE

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2.10.2 If outlet pressures in excess of the filter/regulator pressure setting could cause downstream equipment to rupture or malfunction, install a pressure-relief device downstream of the filter/regulator. The relief pressure and flow capacity of the relief device must satisfy system requirements.

2.11 Where the possibility of damage to a plastic filter bowl or filter/regulator bowl exists due to location in an area where it can easily be struck, the bowl must be guarded with a metal bowl guard. Refer to Figures 1 and 2, Notes 2 and 6.

3. INSTALLATION

3.1 Two installations are available. Figure 1 shows the arrangement to be used with demand-type air masks.

Pressure should be 50 to 150 psi and air flow $1\frac{1}{2}$ standard cfm per mask. Figure 2 shows the arrangement for constant-flow type air masks and chemical air suits. Pressure must be below 50 psi. Air flow required is 4 standard cfm for a tight-fitting air mask, 6 cfm for a loose-fitting mask, and 15 to 30 cfm for a chemical air suit.

3.2 The following piping specifications are suggested for the steel portions of Figures 1 and 2:

- a. Galvanized system - SP109U
- b. Not galvanized - SP108U

Pipe shall be cleaned to remove dirt, rust, and oil, see SP4M.



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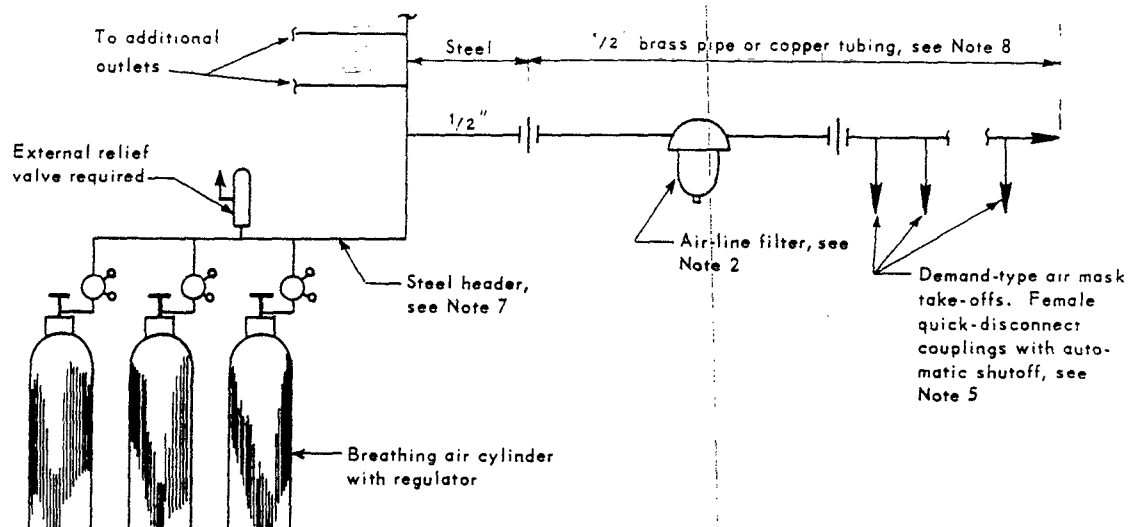


Figure 1A - With Air Cylinder Supply

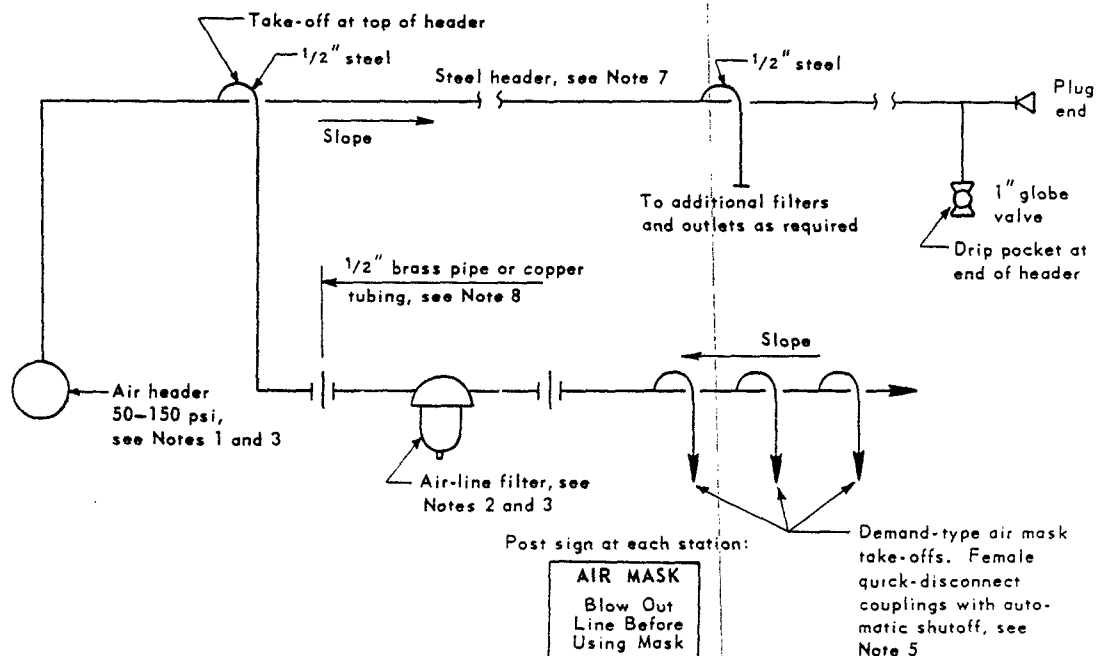


Figure 1B - With Plant Air Supply

FIGURE 1 - TYPICAL INSTALLATIONS FOR DEMAND-TYPE AIR-MASK STATIONS

For notes, see page 4



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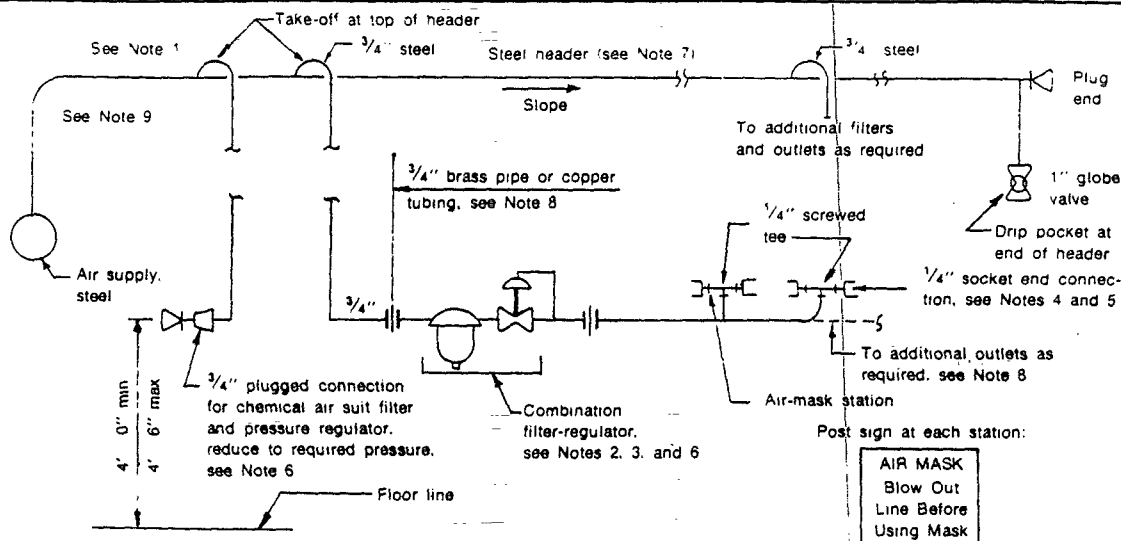


FIGURE 2 - TYPICAL AIR-MASK STATION, CONSTANT-FLOW TYPE, PLANT AIR SUPPLY

Notes:

1. Care must be taken to avoid contamination of breathing air by process or instrument connections, see 2.1.
2. Suggested air-line filters, C. A. Norgren Co. Littleton, CO 80120. Base configuration on intended use and location.

Configuration	Norgren Model No.	Configuration	Norgren Model No.
Plastic bowl, no guard, manual drain	F12-400-M3TA	Metal bowl, manual drain	F12-400-M3MA
Plastic bowl, slotted metal guard, manual drain	F12-400-M3PA	Metal bowl, automatic drain	F12-400-A3MA
Plastic bowl, no guard, automatic drain	F12-400-A3TA	Metal bowl, manual drain, liquid level gage	F12-400-M3DA
Plastic bowl, slotted metal guard, automatic drain	F12-400-A3PA	Metal bowl, automatic drain, liquid level gage	F12-400-A3DA

Equivalents may be used. Filter element should not exceed 50-micron size. Filter should be supported so that bowl can be detached and removed readily.

3. Where air supply is of questionable quality, a compressed-air purifier such as the Del-Monox, manufactured by Deltech Engineering, Inc. Century Park, New Castle, DE 19720, is recommended in place of the standard air-line filter. Note: Predrying of air before it is passed through the Del-Monox purifier will prevent the color change of the cartridge and give a false indication of contaminant removal efficiency. If predried air is to be used, consult manufacturer for special instructions. Alternate is the use of a CO analyzer, such as Ecolyzer, manufactured by Energetics Science Inc. 6 Skyline Drive, Hawthorn, NY 10532.
4. Plant shall standardize these connections and limit them for this use only. Suggested type: "Perfecting" Socket No. 2AM2 (use Plug No. A2S2 on hose), or equal Perfecting Div. Duff Norton Co. Amstar Corp. 100 Pioneer Drive, Charlotte, NC 28232. Outlets are designed to be used with 1/4 inch 1D hose fittings for air masks. Three-quarter inch 1D air hose for chemical air suits would require different part numbers.
5. Pipe and outlet assembly is to be separately supported to withstand the strain of frequent use.
6. Suggested filter/regulator, C. A. Norgren Co. Littleton, CO 80120. Base configuration on intended use and location.

Configuration	Norgren Model No.
Transparent bowl, manual drain	B12-621-M3LA
Transparent bowl with guard, manual drain	B12-618-M3LA
Transparent bowl, automatic drain	B12-621-A3LA
Transparent bowl with guard, automatic drain	B12-618-A3LA
Metal bowl with sight glass, manual drain	B12-697-M3LA
Metal bowl with sight glass, automatic drain	B12-697-A3LA

Regulator includes pressure relief and gage, Range 1-50 psi. Filter specification similar to Note 2. Regulator may be omitted if air supply is within range of respirator to be used, or if respirator is equipped with regulating valve such as MSA Hyper-Flo valve.

7. Recommended header size and take-offs:

Header Size (in)	No. Take-Off Lines per Header	Max No. Air Masks per Take-Off Line
1	1	16
1 1/2	5	10
2	10	10

8. In corrosive atmospheres, stainless steel pipe or tubing may be considered an acceptable alternate to brass and copper.
9. Block valves are not indicated. They are to be provided as required by the user.

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