



# Safe Operating Procedure

(Revised 8/23)

## RESPIRATORY PROTECTION – USE AND MAINTENANCE OF SUPPLIED AIR RESPIRATORS (AIR-LINE)

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### Introduction

Supplied air respirators may be used when the level of contaminants exceeds the capability of an air-purifying respirator, and/or employees cannot use an air-purifying respirator due to medical restrictions. Installed and used correctly, this type of equipment provides a high level of protection against respiratory hazards. Other advantages of air-line supplied air respirators are mentioned below under the heading of “face-piece choices.” Information provided in this SOP is general in nature, and is not a substitute for respirator-specific information and instructions provided by the manufacturer.

### Limitations

In general, air-line respirators are not suitable for use in oxygen-deficient or immediately dangerous to life and health (IDLH) atmospheres. The only exception is when the air-line respirator is designed as a full face-piece, pressure demand system supplemented with a self-contained breathing air supply, such as an emergency escape pack (SCBA). The emergency escape pack must be appropriately sized to allow the user time to retreat to a safe atmosphere.

All supplied air respirators require high quality breathing air, as described below. Supplied air respirators do not protect the skin. Half-mask supplied air respirators do not provide eye protection. Movement is restricted by the air-line hose; and the hose can become pinched, twisted, or otherwise compromised. All respirators must be used in accordance with the manufacturer’s instructions and in compliance with the conditions of the respirator’s NIOSH certification.

### Quality of Supply Air

Measures must be taken to assure the breathing air provided is of high quality.

- **Compressed breathing air** must meet or exceed the requirements for Grade D breathing air, as described in the ANSI/Compressed Gas Association Commodity Specification for Air, G-7.1-1989.
  - Oxygen content must be 19.5 - 23.5%.
  - Hydrocarbon content must be 5 milligrams per cubic meter of air or less.



- Carbon monoxide content must be 10 ppm or less.
- Carbon dioxide content must be 1,000 ppm or less.
- No noticeable odors.
  
- **Compressors** used to supply breathing air to respirators must be constructed and situated so as to:
  - Prevent entry of contaminated air into the air-supply system.
  - Minimize moisture content so that the dew point at 1 atmosphere pressure is 10° F below the ambient temperature.
  - Provide suitable in-line air purifying adsorbent beds and filters to further ensure breathing air quality. Sorbent beds and filters must be maintained and replaced or refurbished periodically following the manufacturer's instructions. A tag indicating the date of the most recent sorbent bed change and the signature of the person performing the change should be affixed at or near the compressor.
  - Have a carbon monoxide monitor and alarm to assure carbon monoxide levels do not exceed 10 ppm if the compressor is oil-lubricated.
  
- **Escape Packs** must be:
  - NIOSH certified for escape from the atmosphere in which they will be used.
  - Be fully charged prior to use.
  - Tested, certified, and maintained in accordance with applicable Department of Transportation regulations.
  
- **Couplings** for equipment used to supply breathing air must be incompatible with outlets for non-respirable air or other gas systems at the work site.

## Face-piece Choices

Following is a description of the common types of face-pieces available as supplied air respirators.

- Loose-fitting hoods are light-weight, low-maintenance, and offer a wide field-of-vision. A loose-fitting hood is not fitted to a particular user and allows the user to have a beard or wear eyeglasses without compromising the effectiveness of the respirator. It also provides the greatest cooling.
- Tight-fitting face-piece models typically provide the highest level of protection. To ensure effectiveness of the respirator, a user cannot have a beard or other facial hair that interferes with the seal between the face-piece and face. Users must be fit-tested to use this type of equipment.
- Loose-fitting face-pieces are equipped with either a flip-up visor attached to a helmet or a face shield attached to softer material that covers the user's head and face. Fit testing is not required to use this type of facepiece. The user may have facial hair and wear glasses.



## Equipment Inspection

Air-line respirators must be inspected before and after each use. Equipment found or suspected to be deficient or defective must be removed from service until repaired or verified as functional. Inspection must follow all manufacturer's recommendations and include but not limited to the following checks:

- Cleanliness.
- Signs of deterioration. Parts to check include the facepiece, head straps, valves, and air-line hoses. Repair or replace components, as necessary.
- Tightness of connections.
- Adequacy of the air supply, including system filters and charge on escape pack bottles. Proper functioning of monitoring and alarms systems.

## Donning the Equipment

Put on the respirator before entering the hazardous environment or beginning a task that will generate an airborne hazard.

- Loose-fitting hoods and face-pieces:
  - Place the hood/facepiece over the head.
  - Adjust the position of the hood/facepiece to fit the support on the forehead comfortably.
  - There should be no large gaps around the chin if using a loose-fitting face-piece. If wearing a hood, the skirt of the hood should cover the shoulders.
  - Attach the air supply to the coupling on the hood/facepiece.
- Tight-fitting face-piece
  - Loosen all straps; pull the harness over the head and place the chin in the chin cup.
  - Pull the head harness firmly down on the back of the head.
  - Tighten the harness gently, starting with the bottom straps and then the middle and top straps.
  - Perform a positive seal check by closing off the exhalation valve with the palm of the hand or a flat piece of paper and blowing gently into the respirator. The respirator should gently push away from the face without leakage of air.
  - Perform a negative seal check by blocking off the breathing tube with the palm of the hand. Breathe in and hold breath for 10 seconds. If the seal is good, the facepiece will collapse and remain against the face. If there is leakage or the facepiece does not remain collapsed, remove and reposition to obtain a good fit. If a good seal is not obtained by repositioning the fitting straps, check other components for leaks (i.e., breathing tube). Do not use the respirator until a good fit is obtained.



- Make adjustments, as needed, to assure a good fit.
- Attach the air supply to the coupling on the facepiece.

### **Working While Wearing the Equipment**

Know the hazards of the airborne contaminants and the signs and symptoms of exposure. Discontinue work, leave the area, and notify your supervisor and EHS immediately if experiencing signs or symptoms of exposure. Seek medical attention, if necessary. Make sure the airlines do not get tangled or compromised during work.

### **Cleaning the Respirator**

Follow the manufacturer's cleaning and disinfection recommendations. This generally involves washing the hood or helmet with mild soap and water, followed by disinfection; and wiping of the exterior surfaces of airline hoses, couplings, and other system parts.

### **Storage of the Respirator**

Store equipment in a manner that will prevent the facepiece from becoming damaged or misshapen and in a designated clean environment away from chemicals, dust, sunlight, and/or temperature extremes. Refer to the manufacturer's recommendations for additional storage considerations.

*This SOP supplements the UNL Respiratory Protection Program. Refer to the full program document for more information.*