Air Quality for Self-Contained Breathing Apparatus (SCBA) and Air-Line Respirators

Chapter 296-842 WAC

Rule

WAC 296-842-20005

Make sure breathing air and oxygen meet established specifications

(1) Make sure that all SCBAs and air-line respirators are provided with safe breathing air and oxygen.

(2) Compressed breathing air must meet the following specifications for Grade D air:

- (a) Oxygen (volume/volume) within 19.5-23.5%
- (b) Hydrocarbon (condensed): no more than 5 milligrams per cubic meter of air
- (c) Carbon **monoxide** (CO): no more than 10 parts per million (ppm)
- (d) Carbon **dioxide** (CO_2): no more than 1,000 ppm
- (e) No noticeable odor

Reference:

See the American National Standards Institute - Compressed Gas Association Commodity Specification for Air (G-7.1.1989) for more information. Contact your local library to access a copy.

(3) Make sure the moisture content of the air supplied meets the following:

- (a) Air supplied to respirators from cylinders must not exceed a dew point of -50°F (or -45.6°C) at 1 atmospheric pressure.
- (b) Compressor supplied air must not exceed a dew point of 10°F (or 5.56°C) below the use temperature at 1 atmospheric pressure.

(4) Cylinders of breathing air purchased or otherwise obtained from a supplier must have a certificate of analysis from the supplier verifying each cylinder's contents meet Grade D breathing air requirements and dew point standards.

(5) Compressed and liquid oxygen must meet the United States Pharmacopoeia requirements for medical or breathing oxygen.

Air Quality for Self-Contained Breathing Apparatus (SCBA) and Air-Line Respirators

Chapter 296-842 WAC

Rule

WAC 296-842-20010

Prevent conditions that could create a hazardous breathing air supply

(1) Use SCBA and air-line respirators safely:

- **Do not** supply compressed oxygen to SCBAs or air-line respirators that previously used compressed air.

Note:

Compressed air leaves residues containing hydrocarbons such as oil or grease. Fire or explosion can occur if compressed oxygen makes contact with these residues.

(2) Use breathing air couplings on air-line respirators that are **not** compatible with couplings for nonrespirable air or other gas systems, for example, utility air used for manufacturing purposes.

(3) **Do not** allow asphyxiating substances to enter breathing air lines; for example, don't flush nitrogen through worksite air lines also used for breathing air.

(4) Use equipment specifically designed for oxygen service or distribution **if** oxygen concentrations greater than 23.5% are used.

Note:

Respiratory equipment **not** designed for oxygen service or distribution can create fire or explosion hazards in oxygen concentrations higher than 23.5%.

-Continued-

WAC 296-842-20010 (Continued)

(5) Make sure cylinders used to supply breathing air for SCBAs or air-line respirators are tested and maintained as described in the federal Department of Transportation's (DOT) Shipping Container Specification Regulations, Title 49 CFR.

Note:

- Use only cylinders marked (with serial number, cylinder pressure, DOT exemption number, and test dates) according to these DOT regulations
- To find any Code of Federal Regulations (CFR) visit: www.access.gpo.gov.

WAC 296-842-20015

Make sure compressors don't create a hazardous breathing air supply

Important:

- Ambient-air movers (or pumps) used to supply air to respirators must be used according to the manufacturer's instructions.
- Respirators used with ambient-air movers must be approved by NIOSH to operate within the pressure ranges of the air mover.

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Air Quality for Self-Contained Breathing Apparatus (SCBA) and Air-Line Respirators

Chapter 296-842 WAC

Rule

WAC 296-842-20015 (Continued)

(1) Locate or modify compressor intakes so they won't pick up contaminated air **or** exhaust gases such as carbon monoxide (CO) from:

- Fuel-powered vehicles

  or

- The internal combustion motor of the compressor

  or

- Other contaminant sources in the area, for example, a ventilation system discharge.

Note:

- You may need to reposition or extend the compressor's intake or engine exhaust pipe or outlet, especially if they are located near each other.
- Be aware that exhaust gases may not adequately disperse when the compressor is operated in:
  - An enclosed space such as a small room, a corner, or near a wall

    or

  - In turbulent wind conditions.

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WAC 296-842-20015 (Continued)

(2) Equip compressors with suitable air-purifying filters, water traps, and sorbents (such as charcoal beds) and maintain them as follows:

(a) Periodically change or clean them according to the manufacturer or supplier's instructions

(b) Keep a tag at the compressor with the following information:

- When the sorbent and filters were last replaced or cleaned
- The date of the most recent changes or cleaning
- The signature of the person authorized by the employer to perform changes or cleaning.

Note:

To be sure you are providing the recommended operating pressure for respirators, you may need to install a delivery pressure gauge where the respirator's airline hose attaches to the manifold or other air outlet.

(3) Make sure the carbon monoxide (CO) level in breathing air from compressors does **not** exceed 10 parts per million (ppm).

Maintain CO levels below 10 ppm in oil lubricated compressors by using at least one of the following:

(a) An effective CO alarm

(b) An effective high temperature alarm **and** testing the air supply often enough to prevent CO levels from exceeding 10 ppm.

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Air Quality for Self-Contained Breathing Apparatus (SCBA) and Air-Line Respirators

Chapter 296-842 WAC

Rule

WAC 296-842-20015 (Continued)

Note:

- If you do not have a reliable CO-free area available for locating your compressor intake, consider these examples of methods to prevent CO contamination of the air supply:
  - Use of continuous and effective carbon monoxide alarms and filters
  - Conduct frequent monitoring of air quality
  - Use a CO converter (converts CO to carbon dioxide).
- How often to test depends on a number of considerations, for example:
  - Compressor age
  - Maintenance history of the compressor
  - Stability of CO readings
- If the CO or high temperature alarm can't be heard by the employee, a flashing light or other effective alternative to an audio alarm needs to be used
- Safeguards, such as alarms, are necessary to prevent CO contamination resulting from compressor overheating. When alarms are provided, proper maintenance practices such as periodic inspections and calibration will help make sure alarms remain effective.
- Any type of oil-lubricated compressor, such as screw or piston types, may produce dangerous levels of CO if overheating occurs
  - Old compressors are known to leak oil due to worn parts, increasing the possibility for overheating. Newer compressors may also overheat if maintenance practices are poor. For example, poor maintenance practices may lead to disconnected or incorrectly set alarms, inoperative shut-offs, or an impaired cooling system
  - You need to instruct employees to move to a safe area when the alarm sounds **and** to stop using respirators.