Washington State Department of
Labor & Industries

Supplied Air Respirators

Airline respirators and SCBAs

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All photos from Adobe Stock unless otherwise indicated

This is limited training

This module is introductory training for employees who wear supplied air respirators.

The two main types of supplied air respirators are covered in this module. Abrasive blasting hoods or re-breather type respirators are not covered.

This module only covers basic facts of supplied air respirators and is not complete training by itself.

You will also be given hands-on training with the respiratory equipment you use.

What are supplied air respirators?

Photo from Drager

Airline respirator – air from a compressor

SCBA (self-contained breathing apparatus) – air from a tank

Supplied air respirators provide positive pressure inside the facepiece at all times

Conditions where supplied-air respirators are required

- Oxygen deficiency

- High levels of toxic chemicals in the air – above “IDLH” levels

- Other conditions of high levels of highly toxic chemicals in the air

- Firefighting

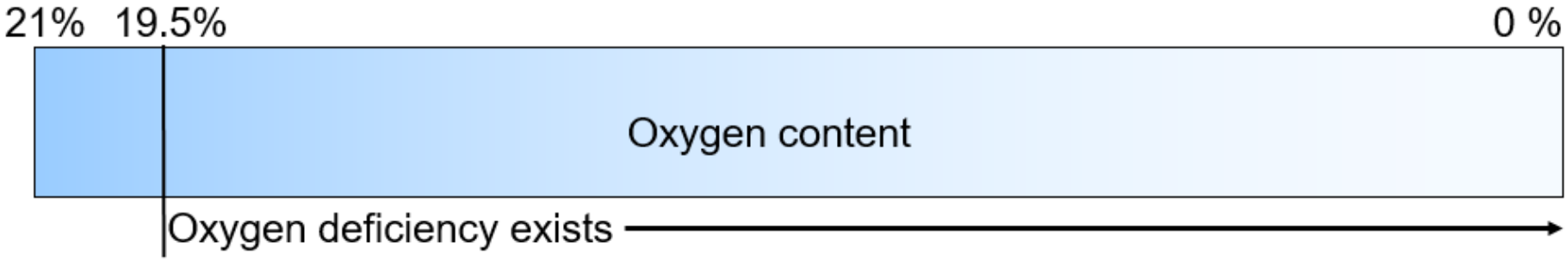
What is oxygen deficiency?

An oxygen deficiency can be life-threatening

Normal air contains 21% oxygen. A space with oxygen content below 19.5% is "oxygen deficient".

Lack of oxygen can cause immediate collapse and death.

Oxygen deficiency can occur in confined or enclosed spaces or areas of large chemical leaks.



Effects of oxygen deficiency

% Oxygen	Symptoms
19.5% - 16%	Fatigue, mild impaired coordination
16% - 12%	Increased breathing rate and pulse; impaired coordination, perception
12% - 10%	Further increased breathing rate, blue lips, mental confusion
10% - 8%	Fainting, nausea, vomiting, mental confusion within minutes, collapse
8% - 6%	Collapse, death within 8 minutes
6% - 0%	Coma within 40 seconds, death

What is “IDLH”

“IDLH” means immediately dangerous to life or health.

Many chemicals have a listed IDLH level.

Oxygen deficiency is also IDLH.

IDLH conditions can occur in confined spaces, large chemical spills or leaks, and fires.

NIOSH Table of IDLH Values

Example of IDLH - Hydrogen Sulfide (H_2S)

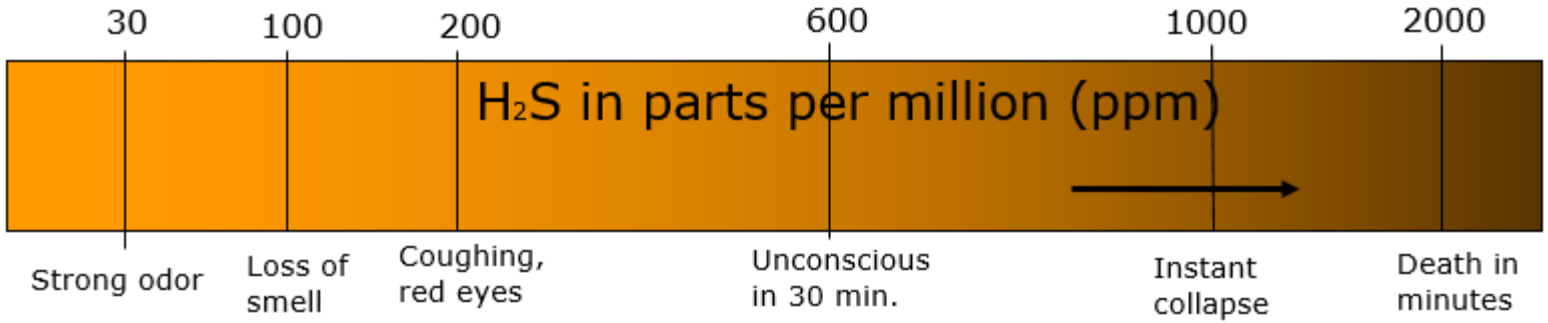
Hydrogen sulfide gas is commonly found in sewers.

It can be instantly fatal at higher levels in a confined space.

IDLH level is 100 ppm.

Disturbing sewage sludge can release more hydrogen sulfide gas.

Supplied air respirators are normally needed to enter sewers.



To safely enter a space with an IDLH atmosphere:

- must use a supplied air respirator,

- must have at least one or two standby persons at entrance,

- standby employees must be trained to conduct emergency rescue,

- appropriate retrieval equipment may be needed.

Escaping an IDLH Atmosphere

In IDLH conditions, a worker may need to escape or immediately leave the area.

An SCBA allows escape at any time.

Airline respirators need a small escape bottle of air attached at the waist.

Escape-only supplied air respirators

Escape-only respirators can be used in situations where chemical releases might occur, but the air is normally uncontaminated.

Photo by NASAKennedy in Creative Commons

They provide 5 to 10 minutes of clean air from a small tank.

Supplied air respirator selection

Conditions	Type of Respirator	
IDLH conditions or oxygen deficiency	SCBA or airline with escape bottle	
Dust/chemical levels up to 1000 times PEL	Airline with tight-fitting full facepiece or full hood	
Dust/chemical levels up to 50 times PEL	Airline with tight-fitting half facepiece	
Dust/chemical levels up to 25 times PEL	Airline with loose facepiece	

PEL = permissible exposure limit

Airline respirator advantages and limitations

Advantages –

- ✓ continuous air supply,
- ✓ lightweight,
- ✓ less maintenance,
- ✓ don't need to buy tank air

Limitations-

- ✓ tied to a 300 ft. hose,
- ✓ depends on output of compressor,
- ✓ needs an attached escape bottle in IDLH conditions

Photo from Scott Safety

More facts about airline respirators

Airline respirators are either constant flow or pressure demand, providing positive pressure inside the facepiece at all times.

Pressure demand means air is provided as needed by a pressure regulator.

These respirators provide 4 cfm of air pressure for tight fitting facepieces, or 6 cfm for loose-fitting facepieces.

Photo from Honeywell/North

Loose-fitting airline respirator

CFM – cubic feet per minute

SCBA advantages and limitations

Advantages

- ✓ highest form of protection,
- ✓ can be used anywhere,
- ✓ allows unrestricted mobility

Limitations

- ✓ heavy & bulky,
- ✓ limited air supply(30 - 60 min.),
- ✓ extensive training required,
- ✓ high maintenance

Using SCBAs

SCBAs are sophisticated respirator equipment used for possible or actual life-threatening situations.

SCBAs should not be used without extensive hands-on training and frequent re-training.

Most SCBA manufacturers or distributors provide this training.

In the case of a large chemical spill or leak, it may be safer to call professional emergency responders.

Air quality for supplied air respirators

Air for breathing must be “Grade D” air:

- Oxygen content of 19.5-23.5 percent,
- Hydrocarbon (condensed) content of 5 milligrams per cubic meter of air or less,
- Carbon monoxide content of 10 parts per million (ppm) or less,
- Carbon dioxide less than 1000 ppm,
- No noticeable odor.

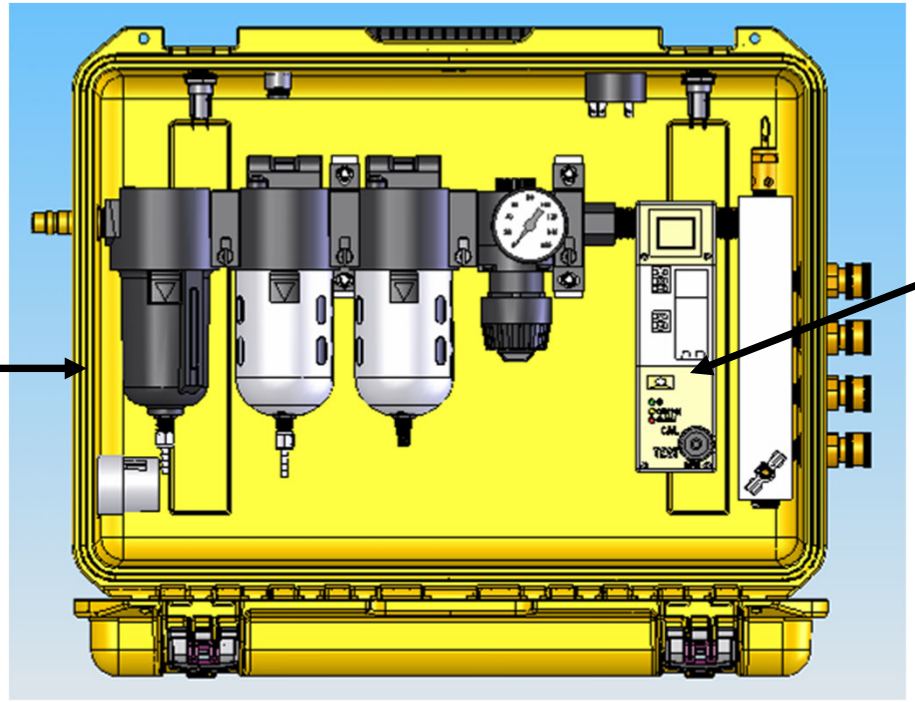
Two options for airline respirators

Oil-lubricated compressor

Ambient air pump

[Ambient air pumps and asbestos removal]

Grade D breathing air quality



If breathing air comes from an oil-lubricated compressor, air filters and a carbon monoxide monitor are required.

Storage and maintenance

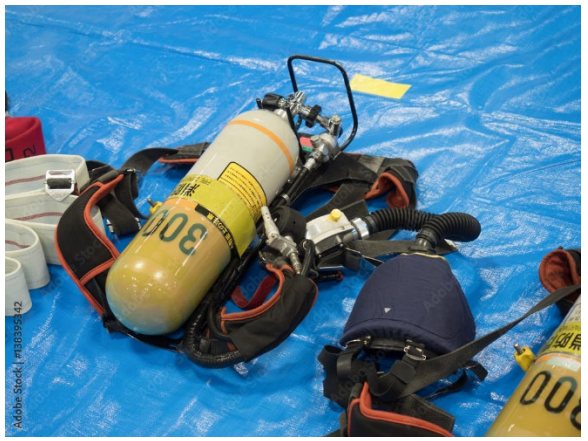
Store facepiece and regulator in clean, dry place.

Coil up airline hose and store in protected area to prevent damage.

Clean as needed before storage – especially the inside of the facepiece.

Inspect facepiece and hose for damage and replace as needed.

Replacement parts must be the same brand.



Where we require the use of supplied air respirators

Describe areas or work situations where supplied air respirators must be used

What supplied respirators we use

Describe or show the supplied air respirators used at worksites

How we provide grade D air to our supplied air respirators

Describe or show the source of Grade D air for supplied air respirator in use

Additional Information

Risk of using plant air

CDC/NIOSH – A guide to atmosphere-supplying respirators

L & I respirator regulations - WAC 296-842