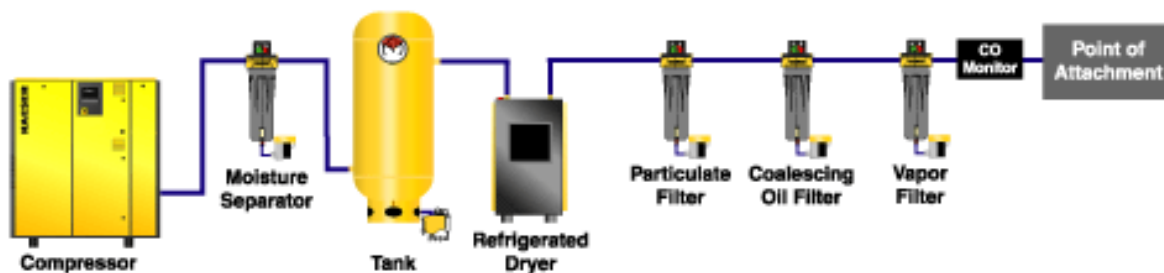


## Components of a Typical Breathing Air System

All compressors take ambient air and compress it internally. It is critical that the compressor used for breathing air be located in a clean-air environment away from harmful dusts and gases. A separate compressor room with ample fresh air ventilation is recommended in certain dusty or contaminant-prone environments.



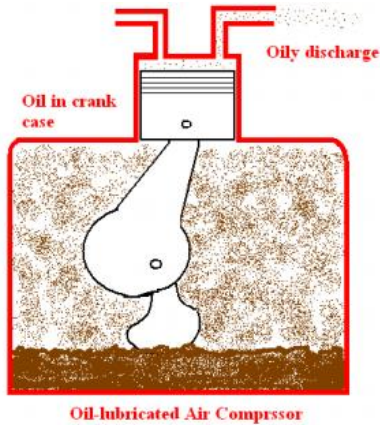
Components of the system remove the moisture and filter the air. As a final precaution, a carbon monoxide monitor is used in-line prior to the point for low non-ambient compressors where the worker hooks up to the supplied air system.

There are actually different grades of air. Grade D air is the type that is used in industrial workplaces supplied air systems.

| CGA grade | Typical uses  |
|-----------|---|
| A         | Industrial compressed air                                 |
| I         | Self-contained breathing apparatus (SCBA) air             |
| D         | OSHA breathing air  |
| E         | Self-contained underwater breathing apparatus (SCUBA) air |
| J         | Specialty grade air, analytical applications              |
| N         | Medical/USP air   |

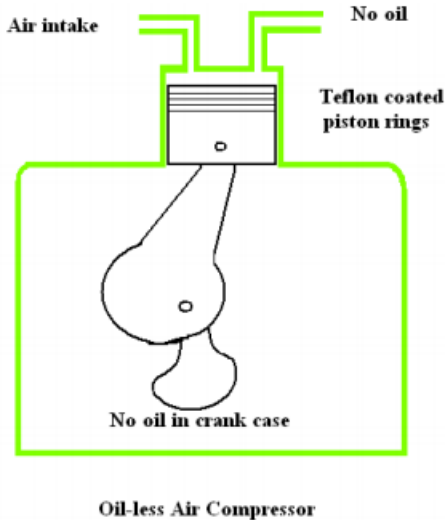
## Types of Breathable Air Compressors

### Oil-Lubricated Compressors



Oil-Lubricated Compressors - Reciprocating compressors (piston compressors) are the workhorses of the workplace. Most are oil-lubricated to extend service life. When oil is in the crankcase, it will predictably be discharged into the compression chamber. Compressors are either oil-lubricated or non-oil-lubricated. Most non-oil-lubricated compressors use Teflon® parts.

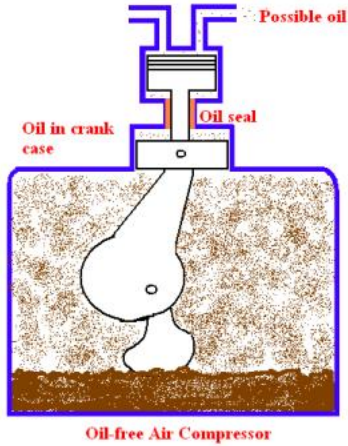
### Oil-Less Compressors



Oil-less is another name for non-oil-lubricated compressors because they have no oil in the crankcase. Oil-less reciprocating compressors use sealed bearings and the piston rings are made from self-lubricating Teflon®. The Teflon® rings seal the cylinder bore and reduce friction. To further reduce heat, “force-compensated piston ring” design is used in which the Teflon® rings ride on a cushion of air, sealing during compression stroke and releasing during intake stroke, which reduces friction and pressure forces on the rings. Teflon® thermally decomposes at 752o F. However, compressor manufacturers set their high temperature

alarms to shut off the compressors well before this temperature is ever reached. Particles of Teflon® (median size 1.1 micron) will be produced especially during the early use of new compressors, but these are filtered out by the mechanical filtration system required on the compressors. Residual heat from compression and friction is removed by forced-air cooling - usually by a blower wheel mounted on the end of the motor shaft directing air over the pistons, cylinders, and bearings to cool them. Oil-less, piston air compressors are available with 1/12 to 15 horsepower and with pressure rating up to 220 psi.

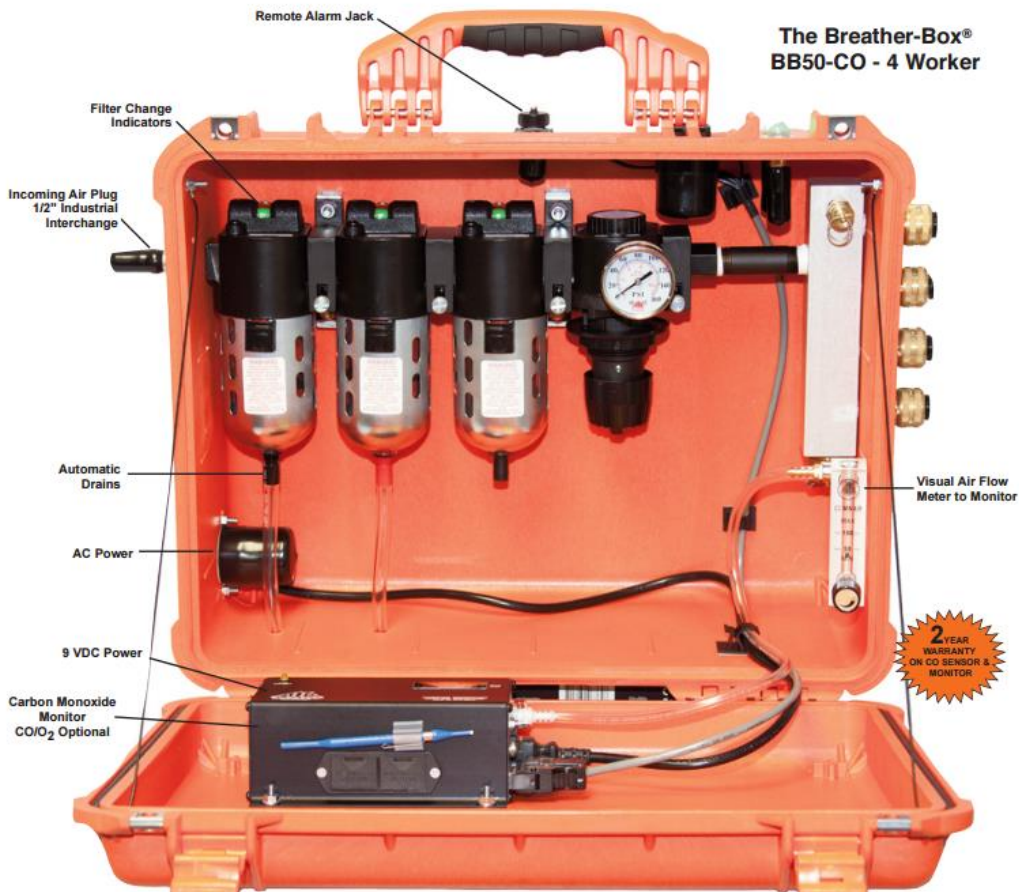
## Oil-Free Compressors



The term, oil-free compressor is misleading. These compressors actually have oil in the crankcase but are sealed such that oil cannot contaminate the compression chamber until the seals eventually wear or break

## Breather Box

Connected to a mobile or plant compressor, the Breather Box<sup>®</sup> provides Grade-D breathing air for 1 to 8 users (based on model) and continuously monitors for Carbon Monoxide (CO).



## The Breather Box® High Performance Portable Grade-D Breathing Air Filtration System

The Breather Box® is a portable Grade-D filtration system designed to provide breathing air for a specific number of workers. The system filters incoming air from a compressor to provide respirator users with Grade-D quality air and monitors for CO and/or Oxygen.

The first stage element filters bulk water and particulate and has an auto drain. The second stage coalescing filter eliminates atomized oils, mists, ultra-fine particulates, and has an auto drain. The third stage filter removes organic vapors and odors and has a manual drain. Filter change indicators are standard on all three stages of filtration. Filtration efficiency is 99.99% @ .01 micron. All Breather Boxes® are designed to be used in the upright and closed position to prevent internal contamination.

The standard carbon monoxide (CO) airline monitor operates on disposable 9-volt batteries, 8-16 volt DC, or 115 VAC for continuous air monitoring. An external audible alarm and light signals the workers of high CO content. A remote alarm jack is provided on all models except for Model BB15-CO. Point-of-Attachment (POA) boxes can extend respirator usage beyond 300 feet.

### Electrical Ambient Air Pumps



Most ambient air pumps are electrical in nature. They come in sizes of ¾ HP to 2 HP. They provide a low pressure (<15 psi) output. Because of their modest size, they have limited air flow so the number of workers on a pump is limited. The number of workers depends on whether they are using loose fitting hoods or tight-fitting facepieces.

### Number of Workers Who can Use an Ambient Air Pump

| HP Rating | # of loose hoods | # of Tight Facepieces |
|-----------|------------------|-----------------------|
| ¾         | 1                | 2                     |
| 1.5       | 2                | 3                     |
| 2         | 2                | 4                     |

\* Example: ¾ can provide air to 1 loose hood OR 2 tight facepieces

Supplied-air (airline) respirators Supplied-air respirators supply the user with clean air through a hose called an airline. The airline is attached to a source of clean, respirable air. The air can be provided by either a high-pressure system (compressor or compressed air cylinder) or by a low-pressure system with a pump to supply ambient air. Only NIOSH-approved airlines can be used—you cannot improvise your own airlines.

There are three types of supplied-air respirators:

- Pressure-demand (or positive pressure)
- Continuous-flow
- Demand (or negative pressure)

### **Pressure-demand (or positive pressure)**

The pressure-demand type normally maintains a positive pressure in the facepiece by using regulators and exhalation valves. Air flows into the facepiece when leakage or inhalation reduces the pressure inside the facepiece. The positive pressure and the supply of clean air flowing into the facepiece reduce the chance of contaminated air leaking in. This type is commonly used where the air supply is from a limited source, such as a compressed air tank with a 30-minute supply of air.

### **Continuous-flow**

A constant supply of air is delivered to the facepiece, hood, helmet, or suit, which are all under positive pressure. This type of respirator is commonly used for painting, welding, and sandblasting. This type is most suitable where the air supply is essentially unlimited, such as a compressor or a low-pressure pump supplying ambient air.

### **Demand (or negative pressure)**

This is the least commonly used type. Air is supplied to the facepiece only when the user inhales, so the facepiece can be under negative pressure. This makes it easier for contaminated air to leak inside the facepiece, reducing the amount of protection provided by the respirator. This type of system is unlikely to be used in the workplace since these respirators are no longer being manufactured and parts are not available.