

# A Short Guide to Your Air-Purifying Respirator

*When, How, and Why to Use It*



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## Introduction

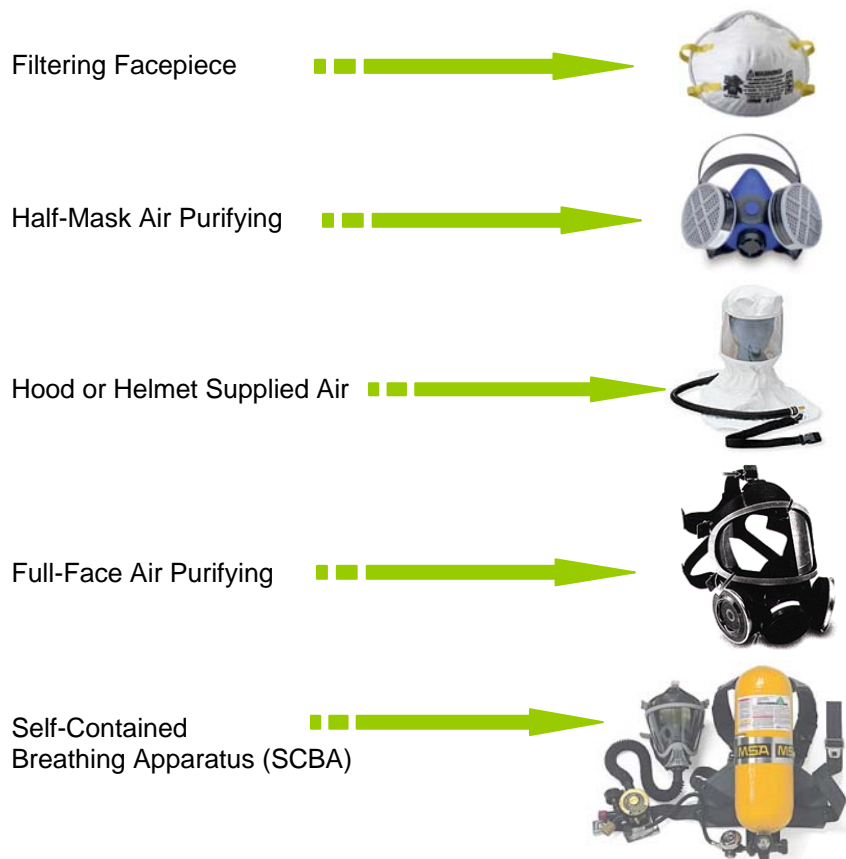
The MIT Environment, Health, & Safety (EHS) Office strives to control respiratory hazards at their point of generation by using engineering controls (e.g., ventilation) and good work practices. In keeping with this goal, the use of respirators as the primary means of protecting employees from airborne hazards is considered acceptable only in very specific situations. These situations include short term, temporary experiments or projects where engineering controls are not feasible; use of respiratory protection as an added or supplemental control; and emergency conditions. You have been issued a respirator because your situation falls within one of the categories listed above.

This guide book covers basic concepts in air-purifying respirator use and care. Read it before using your respirator! It should be kept with your respirator as a quick reference. Any questions you have regarding your respirator and its use should be directed to the EHS Office (N52-496, x2-3477, [respirators@mit.edu](mailto:respirators@mit.edu)).



## Types of Respirators

There are many types of respirators available. Each type of respirator can protect against specific contaminants. For example, a filtering facepiece will protect an individual from exposure to low levels of non-hazardous dust but will not protect an individual from exposure to vapors. Some types of respirators are shown below.



The respirator you have been issued is known as an “Air-Purifying Respirator” and was specifically selected based on the hazard you are anticipated to be exposed to. Should the hazard change, the respirator type you use may also need to be changed.

Air-purifying respirators have filters or “cartridges” that filter out or absorb contaminants in the air. These filters/cartridges often look something like this



Filters/cartridges are designed for specific types of contaminants. For instance, some filters/cartridges will filter out particulate while others absorb solvent vapors. The filters/cartridges you have been issued with your air-purifying respirator were selected based on the contaminant(s) you may be exposed to and the known or anticipated levels of those contaminants. If contaminants and/or the levels of contaminants in your environment change, call the EHS office to make sure the filters/cartridges you have will work.

Also keep in mind that filters/cartridges expire with use and time. Filters designed to handle particulate can essentially clog after being used in environments with high levels of particulate or after being used over and over again. When filters become clogged, you may find that it's more difficult to inhale when you're wearing your respirator.

Cartridges designed to absorb vapors can expire when they become “full” and can't absorb any more. When vapor cartridges become “full”, vapors can travel right through the cartridges rather than becoming absorbed. This phenomenon is called “break-through”. A cardinal sign of break-through is when you can smell the contaminant while you're wearing your respirator with proper cartridges for the contaminant.

Call the EHS Office to figure out how often you need to change your filters/cartridges or if you experience filter “clogging” and/or break-through as described above.

*Hint: Store all vapor-absorbing cartridges in a sealed plastic bag to prevent them from becoming “full” prematurely.*

## Inspecting Your Respirator

Regardless of what type of respirator you use, you should always inspect it before putting it on and using it. The manufacturer of your respirator often supplies a booklet (usually located in the respirator's storage box) that provides information about your respirator including a diagram of the parts of the respirator. Familiarize yourself with the parts of your respirator before inspecting it. The following are some guidelines on how to inspect your respirator:

### Step #1 – Inspect the Facepiece

- Is the facepiece grimy and dirty? If so, clean it (a cleaning procedure is discussed later in this booklet).
- Check for any obvious cracks, tears, or holes. If there are any, obtain a new facepiece from the EHS Office.
- Check for distortion or warping of the facepiece. If you notice any, allow the facepiece to sit on an open surface for 30 minutes to see if the distortion/warping disappears. If not, obtain a new facepiece from the EHS Office.
- For full facepieces, check the viewing lens for cracks or scratches. If scratches/cracks are noted, call the EHS Office to replace the lens.



### Step #2 – Inspect the Headstrap(s) and Neckstrap

- Check for breaks, tears, loss of elasticity, and/or broken buckles/attachments. If any of these are noted, call the EHS Office for replacement straps.
- Check the ridges on the plastic head harness. If they are very worn, they may slip when you're wearing the respirator. Call the EHS Office for a replacement.
- Check the tightness of all strap connections before wearing your respirator.

### Step #3 - Inspect the Valves

- Check for detergent residue, dust, grime, or dirt on the valves or valve seats. Remove deposits with mild soap and water – rinse thoroughly.
- Check for tears in or distortion of the valves/valve seats. If noted, call the EHS Office for replacement valves.

### Step #4 – Inspect Filters/Cartridges & Associated Elements

- Check that you have the proper cartridge/filter for the hazard.
- Ensure that the gaskets inside the cartridge/filter receptacles are in place and in good shape.
- Check the threads on both the cartridge/filter and the cartridge/filter receptacles. If they are worn, call EHS to replace the cartridge/filter and/or the receptacles.
- Check the cartridge/filter housings for dents or cracks. If you detect any imperfections, call EHS to replace them.
- Ensure that the cartridge/filters and the receptacles are tightly connected before putting on the respirator.



## User Seal Check

Always perform a “user seal check” before entering the hazardous environment with your respirator on. This check helps to ensure that an adequate seal is achieved between the facepiece and your face. Always remember – if the respirator isn’t properly sealed to your face, it will not be effective in protecting you from the hazard.

The following are instructions on how to perform a user seal check:

### Step #1 – Perform a Positive Pressure Test

- Cover the exhalation valve with your palm and exhale gently (you may need to remove the exhalation valve completely to perform the check – remember to replace it when you’re done). While covering the valve, try not to press so hard that the fit of the facepiece changes on your face.
- You should see & feel the facepiece bulge slightly
- Hold your breath for about 10 seconds, keeping the facepiece slightly pressurized
- If pressure is maintained in the facepiece without leakage, you’ve achieved a satisfactory fit
- Proceed to Step #2



- Inhale gently so that you feel/see the facepiece collapse slightly
- Hold your breath for about 10 seconds while the facepiece is collapsed
- If the facepiece remains collapsed without leakage, you’ve achieved a satisfactory fit.

If you achieved a satisfactory fit during both tests, you’re ready to wear your respirator. If not, tighten or adjust your respirator and perform the user seal check again until you’ve achieved a proper fit.



### Step #2 – Perform a Negative Pressure Test



- Gently place your palms over the cartridges/filters. Try not to press so hard that the fit of the facepiece changes on your face. If you can’t completely cover the cartridges/filters with your palms, you can perform the test by covering the cartridge/filter with a thin nitrile or latex glove.



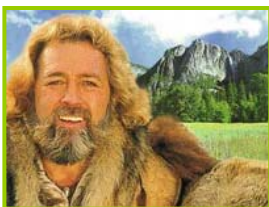
## Fit Testing

To ensure that your respirator fits your face well enough and offers adequate protection, MIT EHS administers a “fit test”. This test consists of you wearing your respirator while it is outfitted with a special adaptor and hooked up to a fit testing machine. The

machine monitors the levels of harmless particles inside the facepiece of your respirator and compares them to the levels of harmless particles in ambient air around you - the lower the levels of particles inside your mask, the better the fit. During your fit test, you will be asked to perform some activities while wearing your respirator (e.g., breathing normally, breathing deeply, talking, bending at the waist).

Lots of changes can happen in one year - your job duties may change,

you may take up running and lose a lot of weight, or you may have acquired a new set of dentures. Because so many changes can take place over a year, the way your respirator fits you may change. Therefore, you must have a fit test annually. MIT EHS will contact you when you're close to your fit test due date. You need to then call the EHS office at x2-3477 to schedule a fit test appointment.



Please remember to shave off any facial hair that may interfere with the respirator-to-face seal before your fit test – if you come with a beard, we may be forced to turn you away until you can return clean-shaven.

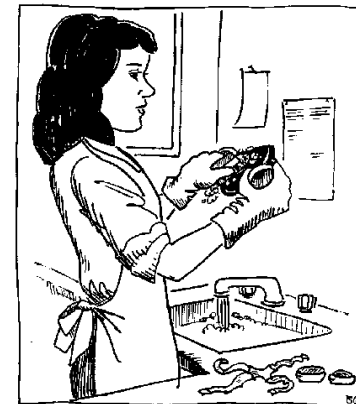


## Maintenance & Storage

The best thing you can do for your respirator is clean it. Respirators that are not cleaned wear out fast, sometimes don't fit well, and can often feel uncomfortable on your face. Storage of your respirator is also a very important consideration.

### How to Clean Your Respirator

- Remove the cartridges/filters and set them aside in a dry area
- Remove the exhalation valve cover, the exhalation valve, the inhalation valves, the head/neck straps, and the cartridge/filter receptacles with gaskets from the facepiece. These components and the facepiece should be wet-cleaned, as described below.
- Fill a small wash tub or sink with warm water mixed with a mild detergent (like Alconox or dish detergent) or with a cleaner recommended by the respirator manufacturer
- Clean the respirator components in the water-detergent solution. A bristle brush (not wire) can be used to facilitate dirt removal.
- If the detergent you use does *not* contain a disinfectant, immerse the cleaned components for 2 minutes in a cleanser or disinfectant that is specially made for respirators.
- Rinse the respirator components thoroughly in warm, preferably running, water. Rinsing completely is very important – detergent residue left on the respirator components can irritate skin or can speed up the deterioration of the respirator.
- Hand-dry the respirator components with a lint-free cloth or air-dry the respirator components by laying them flat on a clean surface. Do *not* hang the respirator up by the straps! This can cause warping.
- After *thorough* drying, reassemble the respirator. Keep the cartridges/filters separate from the facepiece.



### *How to Store Your Respirator*

- Make sure your respirator is completely dry before putting it away
- Put your cartridges/filters in a clean plastic bag and seal it
- Place your respirator inside a plastic bag, seal it, and place it inside a sturdy box (the bag and box your respirator came in are good for storage). Don't put the cartridges in the box if their



presence causes the respirator to be squished.

- Store the box and cartridges in a place that is free from excessive dust, sunlight, extreme temperatures, excessive moisture, and damaging chemicals
- Always keep in mind that the respirator

should maintain its natural position while being stored – avoid storing other items on top of your respirator box that will compress the box!

### **Questions?**

If you have any further questions about your respirator, the MIT Respiratory Protection Program, or any concerns related to your respirator, contact the MIT EHS office at x2-3477 or at [respirators@mit.edu](mailto:respirators@mit.edu).

## Annual Fit Test Quiz

1. It is essential to check the condition of your respirator and its components and perform a user seal check before
  - a) Before your annual fit test
  - b) Before each use
  - c) On a monthly basis
  - d) On a quarterly basis
2. An air-purifying respirator with organic cartridges is
  - a) Effective against all common workplace chemicals
  - b) May be used for spray painting
  - c) Should only be used for protection during processes that EHS has reviewed
  - d) a) and b)
3. Which of the following would not be removed by a particulate filter?
  - a) Solvent vapors
  - b) Cement or plaster dust
  - c) Wood dust
  - d) Fiberglass particles
4. Which parts of an air-purifying respirator are critical for sealing?
  - a) Facepiece
  - b) Inhalation valve
  - c) Headstrap
  - d) All of the above

5. Describe in your own words what “break-through” means.
6. What should you do if you’re wearing your respirator while working and you detect the odor of the substance you’re working with?
  - a) Finish the job
  - b) Leave the area and change your respirator filters/cartridges before returning to the work area
  - c) Adjust the position of the facepiece on your face
  - d) Perform a negative pressure test
7. True or False – the best way to dry your respirator after cleaning it is to hang it up by the head and neck straps.