



**Basic Training Program**

# Personal Breathing Protection



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## **CONTENTS**

Overview of breathing protection .....	4
Personal breathing protection .....	4
Why should I use breathing protection? .....	4
How can something I breathe reach my body organs? .....	4
What are the hazards? .....	5
But the fumes don't bother me — do I still have to wear a mask? .....	6
Won't breathing through a mask hinder my work and make me feel uncomfortable? .....	6
If you can't smell it, it's not dangerous, right? .....	6
Do I have to wear the breathing gear all the time? .....	6
Why should I keep wearing the mask after I've finished working? .....	7
Is personal breathing protection really necessary? .....	7
If personal protection must be used, what are the choices? .....	8
Pros and cons .....	9
Can anyone wear a respirator? .....	10
Summary .....	11

# Overview of breathing protection

## Personal breathing protection

Your work involves one or many procedures during which you may be exposed to harmful dust or gas. That's why your employer has taken a number of steps to protect your health and well-being from possible effects caused by those substances.

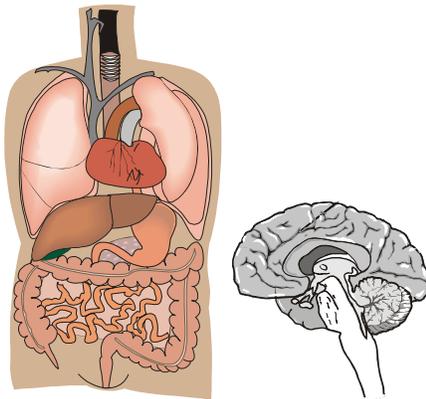
One of the steps is *personal breathing protection* in the form of a respirator and one or more filters.

But remember: your employer can only SUPPLY the breathing equipment and instruct you how to use it correctly. **It is up to YOU to use it, and use it in the proper manner!**

In this training program, we will answer some important questions about personal breathing protection. If you have any additional queries, please ask your supervisor or nurse.

## Why should I use breathing protection?

Because your health and well-being may be at risk if you don't. It is as simple as that. Depending on which harmful substances are present in the air you breathe, every single breath you take may increase the risk of:



- Lung damage (bronchitis, oedema, pneumonia, etc.)
- Damage to vital organs (kidneys, liver, brain, etc.)
- Cardio-vascular illness (heart conditions, blood disease, etc.)
- Cancer
- Permanent disabilities and chronic disease (asthma, silicosis, etc.)
- Death

These are only a few of the problems you may encounter if you don't use your personal safety equipment.

***Remember that it is not only your own well-being that is at stake. Your health will also affect everyone around you: your family, your friends, your work partners.***

## How can something I breathe reach my body organs?

The lungs are a very vulnerable organ: this is where oxygen in the air enters the blood stream. If you inhale harmful substances, these may also enter the blood stream and can be transported to vital organs, including the kidneys, liver, spleen, heart, reproductive glands and the brain.

## What are the hazards?

### **Dust**

By dust we mean solid air-borne particles. Large amounts of dust are formed in various procedures, such as drilling, sawing, milling, polishing, and sandblasting. You are also exposed to dust when handling chemicals in powder form.

Dust usually causes annoying irritation to the respiratory tract, which results in coughing, sneezing, sore throat, etc. However, dust can also contain toxic chemicals, asbestos, silica, lead and many others.

These materials can cause serious illness.



### **Aerosols**

By aerosols we mean 'liquid dust', that is, wet air-borne particles in the form of spray or mist. Aerosols are generated in spray painting, pesticide spraying, surface treatment and many other procedures. The aerosol spray may contain a wide variety of toxic substances.

### **Smoke and fume**

Smoke is the result of incomplete burning of flammable materials. Fumes are commonly formed when solid materials (especially metals) are heated.

Welding and smelting are two areas where fumes commonly occur.



### **Gas and vapour**

Gases occur normally in gaseous form at room temperature. Vapours may be formed by evaporation of a liquid, or by heating various materials. Gases and vapours may be extremely toxic by themselves. They may also form hazardous compounds when heated or by coming into contact with other materials.

### **Oxygen deficiency**

This term means that there is not enough oxygen in the air for human breathing. This causes unconsciousness, followed by death if the lack of oxygen continues.

Oxygen deficiency can be caused by vapours that are heavier than air, and therefore displace the air in a room. It can also be caused by fire consuming the oxygen in the air; or by a person breathing the air of a confined space until the oxygen is spent.



## **But the fumes don't bother me — do I still have to wear a mask?**

The answer is yes. Many hazardous substances cause no annoyance or irritation at all, yet have serious health effects. Other substances have delayed effects: you don't notice anything wrong while you are working, but may become ill later in the evening or on the weekend.

Yet other hazardous substances may not have any immediate health effects, but can accumulate in your body over time and cause disease later in life.

## **Won't breathing through a mask hinder my work and make me feel uncomfortable?**

A respirator will always cause some sort of discomfort, regardless of type or make. You can overcome many problems by selecting the best type and model of respirator for your kind of work, choosing the right size and fit, and by wearing the respirator correctly.

## **If you can't smell it, it's not dangerous, right?**

Wrong. Many of the most hazardous contaminants are completely odourless. This means that it is possible to inhale large amounts of the harmful substance without even noticing.

On the other hand, there are many chemicals that do have an odour — but also have the ability to dull your sense of smell. After some time, you may not be able to detect even high concentrations by smell.

Yet other highly toxic chemicals have a very pleasant fragrance. They might smell like fruit or food or perfume, but are still extremely poisonous, even lethal.



## **Do I have to wear the breathing gear all the time?**

Yes, you must wear your respirator *all the time* you are in or near the contaminated area. Only when you are well away from the area, in a clean and safe environment, can you remove your mask.

Remember: removing the mask for a very short moment (even lifting it off your face to say a word to a workmate) means that you almost instantly lose nearly all of your protection.

## Why should I keep wearing the mask after I've finished working?

If your work generates hazardous vapour or dust (say, if you're sanding or working with tins of chemicals), the danger is not over the moment you stop working or close the containers.

Dust and vapour may stay in the air for a long time. Therefore, you should wear the respirator for as long as you remain in the work area.

## Is personal breathing protection really necessary?

Personal breathing protection is only used as a last resort: ideally, human contact with hazardous materials should be avoided altogether. This is sometimes possible by "engineering out" the problem through a variety of methods:

### **Substitution**

Replacing a harmful chemical with a harmless one that does the same thing.



### **Automation**

Avoiding human contact altogether, by using machines (such as pumps) or closed systems (such as pipelines).

### **Ventilation**

Fan systems, vents, floor exhausts, point exhausts, draft hoods, spray booths, and so on



***Remember: personal breathing protection should be considered ONLY if it is impossible or impracticable to eliminate the hazard through substitution, engineering, design or other methods.***

## If personal protection must be used, what are the choices?

If exposure to hazardous materials cannot be avoided by “engineering them out”, there are many ways of tackling the problem of air-borne contaminants, including:

### ***Self-Contained Breathing Apparatus (SCBA)***

Carrying a bottle of clean, compressed air on your back, like a diver



### ***Supplied air***

Pumping clean air from a remote source through a hose to a mask or hood around your head

### ***Fan-supplied Positive-pressure Breath-responsive Respirator (FPBR)***

A motor-driven fan which filters contaminated air and then supplies clean air at over-pressure to a mask



### ***Powered Air Purifying Respirator (PAPR)***

A motor-driven fan which draws contaminated air through a filter and then to your face

### ***Air purifying filter respirator***

Cleaning out contaminants by breathing through a filter



## Pros and cons

Naturally, there are advantages and drawbacks with all types of protection. These must be considered carefully when selecting methods and equipment.

<b>Pros</b>	<b>Cons</b>
<b><i>Substitution</i></b>	
<ul style="list-style-type: none"> <li>Does away with harmful substances altogether</li> </ul>	<ul style="list-style-type: none"> <li>Efficiency of material may be lower</li> <li>New chemicals may be more expensive</li> <li>Substitutes may not be available</li> </ul>
<b><i>Automation</i></b>	
<ul style="list-style-type: none"> <li>Shields workers from contact with hazardous materials</li> </ul>	<ul style="list-style-type: none"> <li>May be noisy</li> <li>May be costly</li> <li>May require extensive construction work and redesign of plant</li> </ul>
<b><i>Ventilation</i></b>	
<ul style="list-style-type: none"> <li>No respirators needed</li> <li>Easy to move around</li> <li>Few communication problems</li> </ul>	<ul style="list-style-type: none"> <li>May cause other health hazards, such as noise</li> <li>May be costly</li> </ul>
<b><i>Self-Contained Breathing Apparatus</i></b>	
<ul style="list-style-type: none"> <li>May be used in oxygen-deficient atmospheres</li> <li>No hose dragging behind</li> <li>Safe even in highly toxic atmospheres</li> </ul>	<ul style="list-style-type: none"> <li>Limited operation time</li> <li>Heavy (adds significantly to work load)</li> <li>Limited or no communication</li> <li>May need specialist service or maintenance</li> </ul>
<b><i>Supplied Air</i></b>	
<ul style="list-style-type: none"> <li>Efficient protection against high concentrations</li> <li>Constant supply of clean air</li> <li>Loose-fitting hoods may be used by bearded people or people with skin conditions</li> <li>Cost-efficient to run</li> </ul>	<ul style="list-style-type: none"> <li>May be cumbersome</li> <li>Restricted mobility; hose dragging behind</li> <li>Limited communication</li> <li>Constant air flow may be annoying and cause noise, draft, dry eyes, etc.</li> </ul>
<b><i>Fan-supplied Positive-pressure Breath-responsive Respirator</i></b>	
<ul style="list-style-type: none"> <li>Positive pressure air supply</li> <li>Good mobility</li> <li>Same protection level as SCBA in air with normal oxygen content</li> <li>Electronic voice communication</li> </ul>	<ul style="list-style-type: none"> <li>Fan unit may be heavy</li> <li>Batteries need replacement regularly</li> <li>Purchase price may be high</li> </ul>
<b><i>Powered Air Purifying Respirator</i></b>	
<ul style="list-style-type: none"> <li>Comfortable; no tight-fitting mask</li> <li>Good mobility</li> </ul>	<ul style="list-style-type: none"> <li>Fan unit may be heavy</li> <li>Batteries need replacement regularly</li> <li>Cannot maintain positive pressure</li> <li>May let contaminant in if breathing heavily</li> </ul>
<b><i>Air purifying filter respirator</i></b>	
<ul style="list-style-type: none"> <li>Light and easy to use</li> <li>Flexible — various filters for different hazards</li> <li>Long lasting use</li> <li>Inexpensive</li> <li>Easy maintenance</li> </ul>	<ul style="list-style-type: none"> <li>Breathing resistance leads to reduce work capacity, especially at hard work</li> <li>Cannot be used in oxygen-deficient areas</li> <li>Cannot be used in highly toxic environments</li> <li>Users must be clean shaven</li> </ul>

## Can anyone wear a respirator?

Almost everybody can find a suitable respirator of one type or another. Some people may not be able to wear a particular type of respirator for a variety of reasons:

### **Beard growth**

If you have any hair growth along the sealing surface of a respirator that relies on facial seal, you CANNOT wear that respirator. Instead, you MUST wear a protective hood with some form of clean air supply.

*Note: this also holds true for stubble. You must shave every day before putting on the respirator. If your beard growth is very vigorous, you may have to shave half way through your shift as well.*



### **Skin problems**

If you have any condition (severe acne, scars, missing teeth, etc.) that may affect the contact between the respirator and your skin, you will have to select a respirator that does not rely on facial seal.

### **Respiratory conditions**

If you suffer from asthma, emphysema or other lung disease, you may not be able to use a filter mask, but could probably work with a supplied air or positive pressure respirator.



### **Circulatory disease**

If you have very high blood pressure or a heart condition, you may be better off with a supplied air or positive pressure respirator.

### **Psychological distress**

Some people experience claustrophobia or anxiety to such an extent that they are unable to wear any kind of respiratory protection. Depending on the severity of the problem, the only solution might be to transfer the sufferer to another job that does not require personal breathing protection.



***NOTE: All physiological and psychological complaints should be evaluated by a competent health professional on an individual basis.***

## Summary

- Take advantage of the protection equipment that has been given to you. Use it correctly for your own sake — and for your family and friends.
- Inadequate protection can lead to serious illness now and in the future.
- Hazardous materials may cause damage not only to your lungs, but to vital organs, blood, nervous system, and almost all other parts of your body.
- Many chemicals cannot be detected by sight or smell. If you don't wear breathing protection, you may become exposed to these substances without noticing, and get sick when it is already too late.
- A correctly used respirator of the right type is not likely to hinder you in your work to a significant degree.
- Some harmful chemicals have a very attractive smell. This does not make them less hazardous.
- Wear your breathing protection **ALL THE TIME** while you are in the hazard area.
- Even a second or two without breathing gear may rob you of almost all protection.
- **DO NOT** wear a filter respirator if you have a beard — even a stubble. Either shave or use another type of breathing protection.
- If your respirator is damaged in any way, report immediately to your supervisor.
- Make sure you know **EXACTLY** how to fit, test, inspect, maintain, clean and store your respirator.

***Your respirator is there to protect you and your health. It is up to YOU to use it, and to use it correctly.***