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IMPORTANT

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There are fibres...

and there are fibres

The word "fibre" means a fine, thread-like piece or filament. But there are many different kinds of fibre used in today's industry — some with serious health effects on the human body. It is important to know the difference between various types of fibre.

- **Mineral fibres**

Mineral fibres occur naturally, for instance asbestos and other fibrous minerals. Mineral fibres can cause severe health problems, as is attested by the various forms of cancer that may be the result of exposure to asbestos.

- **Organic fibres**

Organic fibres also occur naturally. Textile fibre is one type; paper fibre another. These fibres are often considered to be of lesser health importance. However, some organic fibres are capable of causing allergies and asthma.

- **Synthetic mineral fibres**

These fibres are manufactured artificially from molten glass or rock, and have a number of uses. There are several types of synthetic mineral fibres:

- **Mineral wool fibres**

Mineral wool fibres include glass wool, slag wool and rock wool, and must not be confused with mineral fibres. Some mineral wool fibres are extremely fine and can cause lung disease. In order to minimise the risks of the wool dust, oil is often used to bind the fibres together. This process helps significantly in the safe handling of mineral wool.

- **Continuous fibres**

Continuous fibres are extracted from a molten mass which is often pushed through nozzles to achieve a certain diametre of the fibre. The fibres are used to manufacture fibre glass fabrics. Since continuous fibres are relatively thick, they are not considered to cause any health problems.

- **Fire resistant ceramic fibres**

This type of fibre is used instead of asbestos for heat insulation in ovens, kilns etc. The material often cause a dust problem. Animal tests have shown fire resistant ceramic fibres to have the same health effects as asbestos. Precautions should be taken when handling this type of fibre.

- **Special fibres**

Special fibres include very thin fibres used in aviation industry. The thinness of the fibre warrants special handling techniques. Whiskers is a new type of advanced special fibres. These fibres are very similar to asbestos, and should be handled with extreme care.

Source: Krantz, S. (Prof.), 1995, Forskning Pågår, Arbetslivsinstitutet, Solna, Sweden, No. 5/1995 p. 1

Have you got that animal magnetism?

Researchers fail to set limit levels for magnetic fields

Scandinavian researchers and health experts cannot discern any conclusive relation between magnetic fields and cancer. Yet, they are unable to discard magnetic fields as a possible health risk. They have settled for a recommendation that employers try to keep the levels down as much as possible.

Magnetic fields have been under discussion for more than ten years. Three years ago, a Swedish study, conducted by university lecturer Birgitta Floderus, generated a lot of controversy around the world. The epidemiological study found a connection between magnetic fields and certain types of cancer. Floderus estimated that magnetic fields were responsible for 40 to 50 cancer cases annually in Sweden.

But how?

The problem is that the researchers cannot explain how the fields can cause cancer in humans. Some experts believe that the magnetic fields do not cause tumours directly, but are promoting or speeding up the development of cancer. However, so far, no experiments have conclusively established that this is the case.

A research group, headed by professor Bengt Knave, has explored available current findings, and only arrived at the conclusion that it is too early to place any concrete limit levels on exposure to magnetic fields. The group does not exclude the possibility that the fields could cause blood cancer and brain tumours. Their recommendation is that general caution be practised, and that exposure to magnetic fields be kept to a minimum.

Source: Bergqvist, U., 1995, *Arbete & Hälsa* 1995:11, 1995:12, 1995:13, as reported in *Forskning pågår*, No. 5/1995, p. 1

Are you handling

Pigs in Pokes?

Correct labelling of chemical containers is essential. Faulty labelling is a road to disaster. Incomplete or missing information, torn and smudged labels, even wrong labels on the wrong containers are a sure way to create confusion, false sense of security, mix-ups and even serious accidents. What's the situation at your work place? Are the right labels in the right place and, more importantly, do you read them?

In Australia, all containers holding hazardous substances should be clearly marked in English. The label should be affixed on the face of the container, must be durable, and of a size that is easy to notice and easy to read. The colour of the label and text should be different from the background — in other words, it must STAND OUT!

The perfect label

The ideal label contains the following information:

- **Signal words and/or Dangerous Goods Class and Subsidiary Risk**

  That is, the words **WARNING, POISON** and **DANGEROUS POISON** according to the SUSDP (Standard for the Uniform Scheduling of Drugs and Poisons) if the substance is included in that Standard, and **HAZARDOUS** if it is not. The dangerous goods class should be assigned according to the ADG Code (Australian Code for Transport of Dangerous Goods by Road and Rail).

- **Identification**

  Product name

  Chemical name

  UN-number

  Ingredients and formulation details

- **Risk phrases**

  For instance, **Flammable or Irritating to skin or Harmful if swallowed.**

- **Directions for use**

- **Safety phrases**

  That is, information on the safe handling, use and storage of the product, such as **Keep container dry** or **When using do not eat or drink** or **Wear suitable protective clothing and gloves.**

- **First aid procedures**

  Include all possible poisoning instances, e.g. inhalation, ingestion, skin absorption, eye splashes etc.

- **Emergency procedures**

  That is, instructions for how to handle spills, leakages and fire emergencies

- **Details of manufacturer or importer**

  Must be Addresses and telephone numbers in Australia

- **Expiry date**

- **Reference to MSDS (Material Safety Data Sheet)**

  Tell the user where he or she can find out more information about the product

Selection of phrases

In order to avoid confusion and vague or unclear instructions, there are lists of standardised phrases to be used on the label. There are 49 Risk Phrases and 53 Safety Phrases to choose from. These phrases can be found in Worksafe Australia's *National Code of Practice for the Labelling of Workplace Substances.*

Each of these phrases have a special application, and a certain meaning. All workers involved in the handling of hazardous substances should be made aware of the phrases, and should understand fully the meaning and implication of any phrase stated on the label of chemicals used in the workplace. Special attention should be paid to ensure that workers with English as a second language have a full understanding of the label information.

Special labelling difficulties

The information oudined in the above points relates to containers holding more than half a litre (or half a kilogram) of hazardous substances. If there is not enough space to display all the information on smaller containers, you may exclude the UN number, ingredients/formulation, directions for use, emergency procedures, and expiry date.

Very small containers should at the very least carry the signal words, the product name, and manufacturer/importer details.

Decanting

Decanting of chemicals from large containers into smaller ones is a common practice in industry. There are a few simple rules concerning decanted substances:

- **If the product is used *immediately*, no labelling is required.**
- **If the chemical is to be stored for any length of time, it must be labelled with at least the product name, risk phrases and safety phrases. Make sure the label is firmly affixed to the container, that the information is clearly legible, and that it won't be rubbed or bleached off**
- **The container should remain clearly labelled as long as the contents are completely used/discarded, and the container is cleaned**

Home safety

Labelling of chemicals is not only an important part of industrial chemical handling — perhaps the danger of inadequate labelling is even greater in the home. Containers are rarely properly locked away, and even more seldom clearly marked. Moreover, empty food containers or kitchen jars are often used to hold anything from lawnmower fuel to garden pesticides. Many home owners are guilty of keeping petrol or kerosene in an unmarked glass jar, or turps in an old soft-drink bottle. This is a recipe for disaster — especially if you have children.

Source: National Occupational Health and Safety Commission/Worksafe Australia, 1994; *National Code of Practice for the Labelling of Workplace Substances*; [NOHSC:2012(1994)]; Australian Government Publishing Service, Canberra

CHEMICAL FACTS

Xylene (o-, m-, p-isomers)

Synonyms:	Dimethyl benzene (1,2-; 1,3-; 1,4-)
Characteristics:	Colourless liquid, aromatic odour
Aust. TWA:	80 ppm (350 mg/m^3); STEL; 150 ppm (650 mg/m^3)
Fire:	Flammable. Vapours may form explosive mix with air.
Health hazards:	Inhalation may cause headache and nausea. Higher concentrations may cause loss of consciousness. Extended, repeated exposure may cause permanent damage to the central nervous system. Liver and kidney damage (temporary) may occur. Blood damage may occur if benzene concentration exceeds 0.3%.
Inhalation:	Fresh air and rest
Eye splashes:	Rinse immediately with water. Seek medical advice if discomfort continues.
Skin absorption:	Remove soiled clothing. Wash with soapy water.
Ingestion:	Administer a couple of tablespoons of cream or cooking oil if the patient is fully conscious. Do NOT induce vomiting. Transport to doctor.
Advice to doctor:	Inhaled xylene can cause pneumonia. Do not administer adrenalin, noradrenaline, ephedrin or similar — risk of heart arrhythmia.
Prevention:	Good ventilation. Mechanical ventilation or local exhaust may be required. Vapours gather in low-lying areas. Keep containers tightly closed. Avoid any direct contact with the material. Eye rinse stations should be available. No smoking, open flame, sparks or welding in the area. Eliminate static electricity. Electrical plant should be insulated. Use protective gloves and eye protection. Full face mask with Organic Gas Filter type A or supplied air respirator may be required.

Source: Skyddsblad; Worksafe Australia 1990, *Exposure Standards for Atmospheric Contaminants in the Occupational Environment*, Aust. Govt Publ. Service, Canberra

Large ears mean greater damage

Measurement of the ear canal could prevent damage

People with large diameter ear canals are more likely than others to sustain hearing damage

A new survey conducted by Swedish research engineer, Per-Anders Hellstrom, has concluded that people with large ears run a greater risk of hearing damage than other people. The findings were presented in the form of a doctorate paper at the University of Gothenburg last December.

"Our survey shows that people with a large diameter ear canal have poorer hearing," Mr Hellstrom said.

"The older you get, the more obvious the connection between the size of the ear and the hearing impairment".

It is the dimension of the ear canal that heightens the risk — not the size of the outer ear itself.

However, there seems to be a relation between large ears and a great ear canal diameter. The risk group is easy to identify, according to Hellstrom.

"By using a simple measuring tool, it would be a quick and easy procedure to measure the size of the ear canal, even on children at an early age.

"It would be possible to create a risk profile of every individual's susceptibility to noise.

"Children, who are most likely to sustain hearing damage, can receive an early warning not to expose themselves to excessive noise, such as disco music, fire crackers, toy guns and so on."

The unique survey involved 300 people, mainly high school students, but also adults whose professions entailed working in a high noise environment, such as road workers and musicians. By inserting miniature microphones into the ear canal and placing them only one millimetre from the ear drum, the researchers could measure the resonance in the ear.

The results showed that people with a large-diameter ear canal — men and women — generated a higher resonance at frequencies around 2,000 Hertz. This increase in resonance occurred at a much higher frequency range in people with smaller diameter ear canals.

"Most noise environments, ranging from offices to mechanical industries, feature much higher noise levels at 2,000 Hz than, say, at 4,000 Hz," Per-Anders Hellstrom said. "This means that those with large-diameter ear canals are always subjected to higher noise levels than those with smaller ones".

The difference was already noticeable in the high school students, but increased with age. From 40 years and upwards, the difference grew even more obvious, according to Mr Hellstrom.

The results of the survey could not only be used to determine the risk factor for an individual, but also to ensure more suitable fitting of hearing aids in patients. The article does not state whether the new findings will be of significance to hearing protection designers and manufacturers.

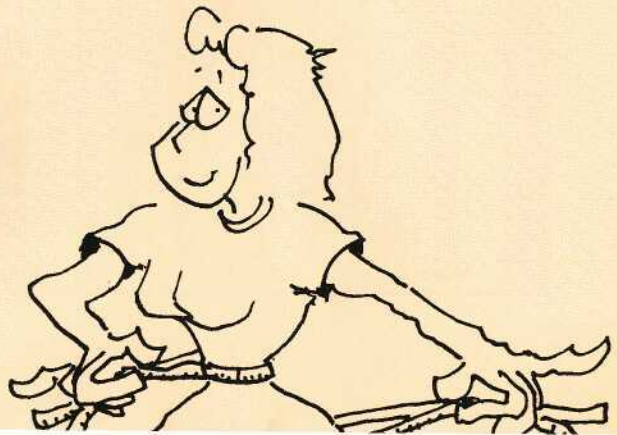
Source: Tjernberg, U., 1995; *Stort ora skadas lättare*, Svenska Dagbladet, 15 Dec

WATCH THIS SHAPE

Being overweight is not only uncomfortable; it can also be damaging to your health.
A 30-year old man weighing 130 kg is about ten times more likely to die prematurely than people of normal weight.
However, new research shows that overweight matters less to elderly people. A 70-year old can easily be 10 kg overweight without health risks.
Try these two simple exercises to see if you have anything to worry about.

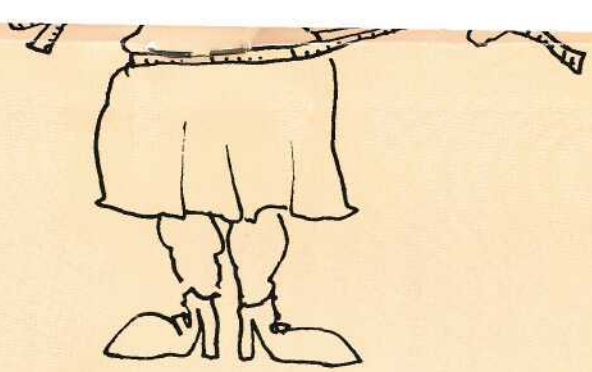
1 WAIST-THIGH RATIO

1: Measure your waist, right between the hip bones and the lowest rib
2: Measure your thighs/buttocks at their widest point



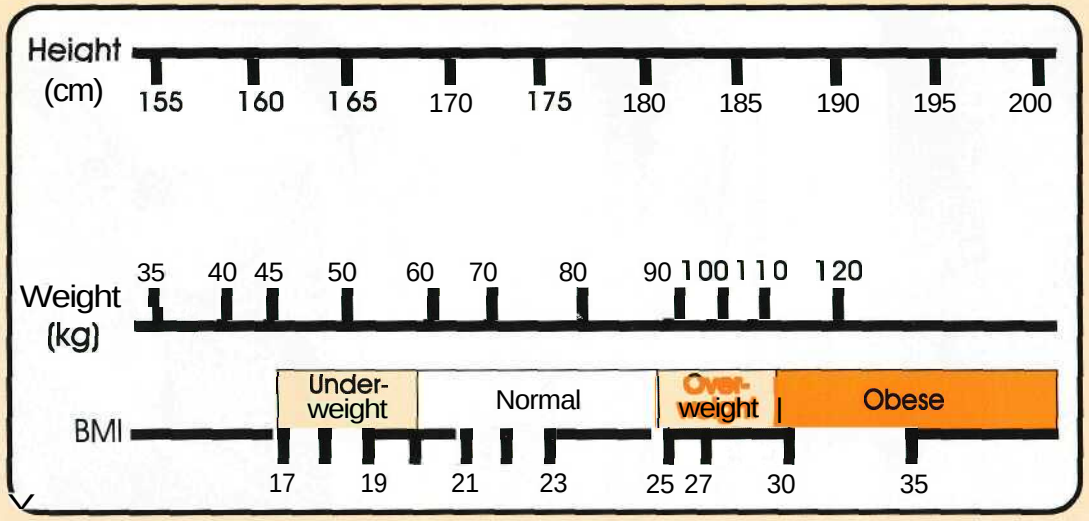
3: Divide the waist measurement by the buttock measurement.

RESULT:
Women — should be below 0.8
Men — should be below 1.0



2 HEIGHT-WEIGHT RATIO

1 :Draw a line between your height on the upper scale through your weight on the middle scale.
2: Your score is where the line crosses the bottom scale.



RESULT:
The result in the bottom scale is your Body Mass Index (BMI). The BMI should only be used for adults. Women may *have a* BMI of 19 without being considered to be underweight. Men should not be below 20.
If your BMI is higher than 30, you should seek medical advice

Source: Folkhälsoinstitutet, Apoteksbolaget, Karolinska Hospital Obesity Unit; as reported in *Kroppen* 4/1995

Back to Basics!

There is a lot of tech-talk about respirators, airflows, breathing resistance, individual jit testing, and much more. But do you really know the basics?

Protection Factor

Different respirators have different characteristics. They may comprise various parts, or be of different sizes, or work in various ways, or be made of varying materials. This means that one respirator might not give you the same level of protection as another.

The *protection factor is* a measurement of how well the respirator can minimise the amount of hazardous substances in the air. In essence, the protection factor tells you how much less contaminants there are inside the respirator, compared to the amount of contaminants in the surrounding air. For instance, if the concentration inside the respirator is a hundred times less than in the air, the protection factor of the respirator is 100.

The calculation is simple:

$$\frac{\text{Conc. In the air}}{\text{Conc. Inside mask}} = \text{Protection Factor}$$

For example, if the atmosphere in the work place contains 1,200 ppm of a solvent, and the safe exposure level of the solvent is 80 ppm, you will need a protection factor of 15 (1,200/80). That is, the protection factor must be *at the very least* 15.

Other considerations

- **Comfort**

  A respirator that's uncomfortable will not be worn.

- **Facial fit**

  Mask size, beard growth, shape of nose and other facial features may affect the seal of the respirator. The best way to ascertain correct seal is to perform individual respirator fit testing.

- **Breathing resistance**

  Breathing resistance becomes particularly important if you are using the respirator for long periods, or if you are performing heavy physical work.

- **Deadspace**

  Deadspace means the volume of air inside the respirator when it is fitted to your face. This air is re-breathed every time you inhale. Therefore, the deadspace should be as small as possible.

- **Field of vision**

  Visibility is important for safety reasons. The respirator should not obstruct your vision too much. An impaired field of vision may increase the risk of falls and slips, for instance when climbing a ladder or going down a stair.

Filters

There are a few general rules regarding filters and filter respirators:

- **Particle filters protect you from particles — not gas**

  "Particles" means dust, smoke, mist, and spray

- **"Paper filters" provide poor protection against fine dust, and are useless against gas and vapour**

- **Gas filters protect you from gas — not particles**

- **Gas filters absorb contaminants even when you're not breathing through the filter**

  Keep gas filters in a sealed box or in an area of clean air

- **Filters may not be used in oxygen-deficient areas**

Filter life

A *Particle filter* gathers more and more dust as you use it. Consequendy, it clogs up and becomes harder to breathe through. A particle filter should be replaced according to a schedule, or as soon as you detect an increased breathing resistance.

A *Gas filter* gives no such indication. It simply stops absorbing more gas — and you might not even notice. Certainly, if you start smelling chemicals through a gas filter, it's time to replace it.

The life span of a gas filter depends on three major things: how much contaminant in the air, how much air you breathe, and how much of the contaminant the filter can absorb. If you know these factors, you can approximate the filter's life span according to the following formula:

$$\text{Filter life span (minutes)} = \frac{\text{1,000,000 x absorption rate (g)}}{\text{Breathing rate (l/min) x conc. (mg/m3)}}$$

Maintenance

Before use

- **Check that the equipment is clean, dry, intact and fully functional**
- **If using filters, check expiry date and type**
- **If vising supplied air, check hoses, air quality and available supply**

After use

- **Check all equipment**
- **Replace any worn or expired parts**
- **Clean and disinfect respirator according to manufacturer's directions**
- **Recharge batteries and refill cylinders, if used**

Storage

- **Only store equipment that has been cleaned and dried according to instructions**
- **Avoid moisture and dirt. Store in a clean, dry place**
- **Gas filters should be stored in an airtight container**
- **Personal protection equipment should be clearly labelled to ensure individual use**

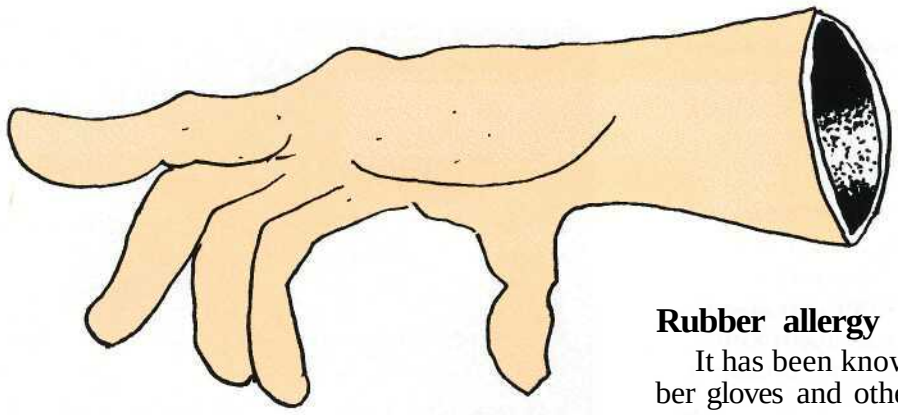
TRAINING PEOPLE comes before UPGRADING EQUIPMENT

Eight Golden Rules:

- **Do not use a respirator whose protection factor only just covers the requirements. Make sure there is a safety margin**
- **Make sure everyone in a contaminated area uses respiratory protection — not just the person performing the work**
- **If the area requires breathing protection, wear it all the time**
- **If you wear a face seal respirator, make sure you are clean shaven**
- **A respirator should be fitted every time with the same care as when it was originally issued**
- **Filter respirators must never be used in oxygen-deficient atmospheres**
- **Filters cannot be cleaned: they can only be replaced**
- **Change filters regularly — it's better to replace too soon than too late**

Source: The Swedish Work Environment Fund, (publ. Year not stated), *Riskerna med Lösningsmedel, medicinska erfarenheter— tekniska åtgärder,* Stockholm, Sweden

A fat man in busy Lahore,
Said one day, "I've had it! NoMore!";
"I want to be slim!"
He went to a gym,
But couldn't quite fit through the door



Fits like a glove...

...but gives you troubles to boot

There are many types of protective gloves, spanning from thin latex surgical gloves that fit like a second skin to heavy steel-mesh gloves that withstand cuts and slashed of the butcher's knife. But protective gloves can give you more than protection: they can have uncomfortable side effects, too.

Industrial and professional gloves are often worn for extended periods — sometimes all day long. The risk of side-effects increases with the wear time. Problems associated with glove wear include itchiness, skin irritation, eczema, hives and perspiration.

Causes

Skin complaints caused by gloves can happen for the following reasons:

- **Chemicals penetrating the glove (either through holes in damaged gloves, or by affecting and permeating the glove material itself)**
- **Allergens used in glove manufacture, such as substances used in rubber and latex production, anti-bacterial agents in the glove lining, or chromium used in the tanning process of leather gloves**
- **Skin irritation from powder used inside the glove, such as talcum powder or corn starch**
- **Irritation from the material used in the lining of the glove**
- **Occlusion caused by the imperviousness of the glove, leading to increased perspiration**
- **Aggravation of pre-existing hand eczema**

Rubber allergy

It has been known for some time that rubber gloves and other rubber products can cause contact eczema. Usually, the rubber itself is not the culprit, but other substances used in the manufacture of rubber products, such as vulcanising agents, antioxidants and rubber accelerators. In glove manufacture, common substances are zinc dithiocarbamates, such as ZDMC (zinc dimethyl dithiocarbamate), thiurams, such as TMTD (tetramethyl thiuram disulphide), and mercaptobenzothiasol.

Occupations most affected by rubber allergies include cleaning personnel, food workers (manufacture and kitchens), and various types of hospital staff.

Latex allergy

The incidence of contact urticaria (that is, hives or rashes) has lately increased among people who use latex gloves; mainly within the hospital system. The rise in contact urticaria is believed to be connected with increasing use of latex gloves against blood infection, but is not confined to the health care sector alone. There are also reports about patients contracting skin disorders when treated by medical personnel wearing latex gloves.

Minimising the risk

- **Rubber gloves can sometimes be exchanged for plastic gloves**
- **Use an inner glove of plastic, cotton or nylon**
- **Gloves are a personal protection item, and should not be shared with others**
- **Disposable gloves must not be reused**
- **Reusable gloves should be washed thoroughly after each use**
- **Gloves are like shoes: it's a good idea to alternate between a few pairs**
- **The chromium level in leather gloves should not exceed 2 mg/kg. People with chromium allergy should use gloves made of vegetable-tanned leather, plastic or rubber**

Source: Mellström, G, 1994, *Boken om Personlig Skyddsutrustning— Händer*, Arbetarskyddsstyrelsen, pp. 203-205

Dead space

50 ml and critical

The dead space of a respirator is no greater than a nip of scotch, but plays a very important role in the way you breathe and work. The trick is to understand what dead space is, and learn how to minimise its effects.

When we exhale, we cannot empty our respiratory system completely; some air always remains in the nose, mouth, windpipe, and bronchi. When we next inhale, this remaining, "used" air is re-breathed into our lungs. The volume of this air is called the *dead space* of our respiratory system. In short, the dead space is the volume by which we don't exhale completely. In the average human, the dead space is around 150 ml, or about one third of a normal breath.

A respirator adds to the total dead space, which increases by the interior volume of the respirator. Although the dead space of a respirator is small, around 50 ml, it still increases the total dead space to 200 ml, or about 40% of a normal breath.

This has two main effects: firstly, we have to take deeper breaths in order to get the oxygen we need, and, secondly, that a greater amount of used air (and, consequently, more carbon dioxide) is re-breathed in each breath.

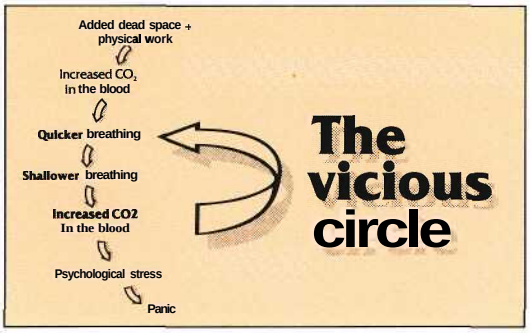
Both of these factors can have significant effects on our work, our breathing, and our well-being.

And round and round it goes...

The increase in the dead space is hardly noticeable to a respirator user — as long as no physical work takes place. At hard work, however, it may soon become obvious that the wearer must take much deeper breaths in order to keep going.

Heavy physical work also means a greater rate of energy burning in the muscles. This in turn means an increase in the generation of carbon dioxide. The greater volume of carbon dioxide results in a higher breathing frequency. The higher frequency tends to lead to shallower breaths. Shallower breaths, along with the greater dead space, result in a higher proportion of "used" air being re-breathed, and therefore a higher concentration of carbon dioxide in the blood. Which in turn means even higher breathing frequency, and even shallower breaths, and so on.

The ultimate effects of this vicious circle may be great psychological stress, severe anxiety, and even panic.



This phenomenon of a steadily increasing level of carbon dioxide in the blood is called *alveolar hypoventilation.*

Learn how to breathe

In many cases, the vicious circle can be avoided through a few simple breathing techniques, namely to consciously take deeper, slower breaths, and to discontinue the hard work as soon as any signs of alveolar hypoventilation occur.

Increased carbon dioxide levels in the blood can occur in both filter respirator and supplied air users.

Inexperienced compressed air users may be particularly at risk. With the knowledge that your air supply is limited, it may be easy to think that you can "skimp" on air by taking as small breaths as possible. But this is false economy, and raises the risk of alveolar hypoventilation. A person with the same limited supply of air, but taking deep breaths, makes much better use of the available oxygen.

This is the paradox of compressed air: deeper breaths mean lower air consumption.

Breathing techniques:

	Shallow & rapid	Deep & slow
Inhalation volume	400 ml	1,000 ml
Dead space	200 ml	200 ml
Alveolar ventilation	200 ml	800 ml
% useful air	50	80

Source: Malmsten, C., Rosander, M., 1987; *Rök- och kemdykning*, Svenska Brandförsvarsföreningens Service AB (Swedish Firefighting Society), Stockholm

SUMMARY

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  There are many different kinds of fibres, both organic and inorganic. Some may be very injurious to your health, others are harmless.

- **Magnetic fields (page 2)**

  European researchers are reluctant to say yea or nay to magnetic field exposure limits. Why?

- **Chemical labelling (page 3)**

  An incorrectly marked container, or a container lacking a label, spells disaster. Avoid mistakes, mix-ups and accidents by learning *the* minimum requirements of labelling.

- **Large ears mean greater damage (page 5)**

  The dimensions of the ear canal are crucial in the extent of hearing damage, say researchers.

- **Wall chart (page 6-7)**

  Are you apple-shaped, or pear-shaped? Are you overweight? Check your Body Mass Index to find out

- **Respirator basics (page 8)**

  Respirator statistics are often very technical. What about the basics? Find out about the ground rules of respirator and filter selection

- **Protective gloves (page 10)**

  The right type of glove can give you the right type of protection; but also the wrong kind of skin disorder

- **Dead space (page 11)**

  The dead space of a respirator is no larger a volume than a nip of spirits... still, it plays a great role in breathing protection

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