



NEBOSH NATIONAL DIPLOMA UNIT B

Introduction

This Supplement has been prepared to update your study material for Unit B of the NEBOSH National Diploma. You should study it in conjunction with your existing course material.

Element B1: Principles of Toxicology and Epidemiology

The Classification of Chemicals According to Health Effect

Health Effects

Siliceous Dust (Silica-Containing Dust)

At the end of this subsection, please insert the following **More box**:



More...

Further information and guidance on **silica dust** is contained in the HSE publication INDG463 *Control of exposure to silica dust: A guide for employees*, which is available from the HSE website at:

<http://www.hse.gov.uk/pubns/indg463.pdf>.

Element B3: Hazardous Substances and Other Chemicals – Engineering Controls and Personal Protective Equipment

Personal Protective Equipment (PPE)

Respiratory Protective Equipment (RPE)

Please delete the text under this subheading and substitute the following:

“The use of respiratory protective equipment to prevent the inhalation of harmful airborne contaminants constitutes an extensive subject in its own right, so here we shall concentrate on the various types of respiratory protection available and the factors affecting selection. An important point to note about respiratory protection is that there are two fundamentally different types:

- **Respirators** (filtering devices) use filters to remove contaminants from the air being breathed in. They can be either:
 - non-powered respirators – relying on the wearer’s breathing to draw air through the filter; or
 - powered respirators – using a motor to pass air through the filter to give a supply of clean air.

The main issues affecting choice of respirator are:

- The suitability of the purifying medium, i.e. filtration of dust particles and absorption of gases and vapours.
- How well it purifies the air, i.e. efficiency and protection factor.
- Leakage of contaminant into the respirator, i.e. face fit and seal.

- **Breathing apparatus (BA)** supplies pure respirable air from an uncontaminated source (such as an air cylinder).

The main issues affecting choice of BA are:

- Ergonomic matters arising from the work and location of use.
- The duration of use.



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Respirators and BA are available in a range of styles, dividing into two main groups:

- Tight-fitting face-pieces (often referred to as masks) rely on having a good seal with the wearer's face. These are available as both non-powered and powered respirators and BA.

A face-fit test should be carried out to ensure the RPE can protect the wearer.

- Loose-fitting face-pieces rely on enough clean air being provided to the wearer to prevent contaminant leaking in (only available as powered respirators or BA). Examples are hoods, helmets, visors, blouses and suits."

Types of Respirator

Please delete all the text under this subheading (including the subsections) and substitute the following:

"Half-Mask Respirator

This type of face-mask covers the nose and mouth only, leaving the eyes exposed. Half-mask respirators can be subdivided into two types:

- particle filters; and
- gas filters.

The simplest form of half-mask respirator is the **disposable half-mask type**. This consists of a piece of filtering material worn over the nose and mouth and secured by twin elastic headbands. A flexible metal strip enables the user to bend it over the bridge of the nose to fit. A typical example is illustrated below.



Disposable Half-Mask – Particle Filter

Source: HSG53 Respiratory protective equipment at work – A practical guide, HSE, 2013 (<http://www.hse.gov.uk/pubns/priced/HSG53.pdf>)

The simple structure is designed to provide a cheap, disposable unit. They are light to wear, permit ease of breathing and speech, do not interfere excessively with vision and can be worn with eye protection but are only designed to protect against particles. **Disadvantages** include:

- An adequate face-fit test (see later) cannot be carried out.
- Face seal cannot be fully achieved over beards.
- Can be uncomfortable to wear due to moisture build-up on the filter material.
- Used respirators may need a safe disposal procedure.

Other types of **half-mask respirators** are made with a flexible rubber or plastic face-piece which covers the nose and mouth, fitted with a replaceable **cartridge filter** to remove the airborne contaminant. Filters are available to protect against particles and gas/vapour.

Some respirators have a single cartridge, others have twin cartridges. The respirator is strapped to the head with adjustable headbands. Exhaled air is released through non-return exhaust valves.

See the following illustration.



Reusable Half-Mask – Particle Filter

Source: HSG53 Respiratory protective equipment at work – A practical guide, HSE, 2013 (<http://www.hse.gov.uk/pubns/priced/HSG53.pdf>)



Reusable Half-Mask – Gas/Vapour Filter

Source: HSG53 Respiratory protective equipment at work – A practical guide, HSE, 2013 (<http://www.hse.gov.uk/pubns/priced/HSG53.pdf>)



A worker wears a half-mask respirator to seal asbestos lagging around a pipe

Face seal is achieved in good quality respirators by the use of a pneumatic cushion around the outer edge. As with disposable respirators, beards and unshaven faces reduce face-fit efficiency.

Cartridge-type half-mask respirators can be used for protection against particles or gas and vapour, therefore cartridges are colour-coded by manufacturers to help reduce the possibility of their incorrect use. Manufacturers also provide charts to indicate the correct type of cartridge for specific hazards.

Owing to the quite substantial structure of half-mask respirators and the cartridge protection system, breathing is not easy, speech communication is reduced and vision is slightly impaired, especially in twin-cartridge types.

Another issue with the use of cartridge filters is knowing when their working life has ceased.

Full-Face Respirator

This type of face-mask covers the nose and mouth in a face-piece and has a visor with full-face seal to completely enclose the eyes and much of the face.



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Full-face respirators can be subdivided into two types:

- particle filters; and
- gas filters.

They have replaceable cartridges and the face-piece is secured to the head by a set of flexible, adjustable headbands. Wide vision is provided in most modern face-masks by a large tough Perspex visor.



Full-Face Mask – Particle Filter

Source: HSG53 Respiratory protective equipment at work – A practical guide, HSE, 2013 (<http://www.hse.gov.uk/pubns/priced/HSG53.pdf>)



Full-Face Mask – Gas/Vapour Filter

Source: HSG53 Respiratory protective equipment at work – A practical guide, HSE, 2013 (<http://www.hse.gov.uk/pubns/priced/HSG53.pdf>)

The main reason for choosing a full-face respirator over a half-mask respirator is that the former offers eye and face protection. There will be various work scenarios where this might be necessary, e.g. when the work activity involves exposure to an irritant vapour or dust that will irritate the eyes and cause tear production (which in turn will cause the nose to run – not great when wearing a respirator of any type). Alternatively it might be necessary to protect the eyes simply from nuisance dust.

One of the most significant drawbacks with all of the above respirators is that in order to draw air in through the filter the wearer has to breathe in. This creates negative pressure inside the face-piece. Any leaks (due to poor face-fit or damage) will allow contaminated air inwards because of this negative pressure.

Powered Respirators

With this type of respirator air is pumped into the face-piece, so alleviating the problem of negative pressure. This positive air pressure also reduces user fatigue and allows longer work periods between rests.



There are **two main designs** for the system:

- **Masks** - full- or half-masks connected directly or by flexible tube to a centrifugal pump, which draws air through a filter.



Powered Mask

Source: HSG53 Respiratory protective equipment at work – A practical guide, HSE, 2013 (<http://www.hse.gov.uk/pubns/priced/HSG53.pdf>)

- **Helmets** - with a wide vision, high impact visor secured to the head by a harness and chin strap. The system is loosely sealed by a fabric skirt around the neck and over the shoulder. A motorised fan set in the helmet or on a belt draws contaminated air through a filter. The motors are usually powered by rechargeable batteries.



Powered Helmet

Source: HSG53 Respiratory protective equipment at work – A practical guide, HSE, 2013 (<http://www.hse.gov.uk/pubns/priced/HSG53.pdf>)



More...

Simple guidance on respirators aimed at employees is contained in the HSE pocket card INDG460 *Is your mask protecting you?* which is available at:

<http://www.hse.gov.uk/pubns/indg460.pdf>."



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Types of Breathing Apparatus (BA)

Please delete the 1st paragraph under this subheading and the subsections headed **Fresh Air Hose BA** and **Compressed Airline BA** and substitute the following:

"Breathing apparatus (BA) can be classified into three general categories.

Fresh Air Hose BA

Fresh air hose BA can be described as a breathing apparatus which provides a supply of **unpressurised** fresh air from an uncontaminated source. The user is connected to a fresh air supply by an air hose of up to 20 metres and draws air through by breathing effort. The system is not self-contained, so it enables work to be carried out over an indefinite period, provided it is only a short distance from fresh air.

The apparatus usually consists of a full-face mask with a short length of wide-bore hose joined to a metal elbow, secured to a waist belt. The wire-reinforced air hose is connected to the elbow and the free end secured in uncontaminated air. Breathing air down the length of hose can be difficult (especially if it is kinked). This can be overcome to a degree using fan-assisted face-masks or powered hoods.



Fresh Air Hose Breathing Apparatus

Source: HSG53 Respiratory protective equipment at work – A practical guide, HSE, 2013 (<http://www.hse.gov.uk/pubns/priced/HSG53.pdf>)

Compressed Airline BA

Compressed airline breathing apparatus is similar in design to fresh air systems but the respirable air comes from a compressed air source. The compressed air supply may be from a cylinder or from a compressor. Cylinders are often mounted on a trolley and provide a mobile supply unit. Air from compressors is more usual in static situations where it can be piped around a site with outlet connectors at convenient points.

As the supply uses higher pressures than fresh air systems, much smaller and longer supply hoses can be used, up to 80 metres for some. The airline can be connected via a pressure-reducing valve to full or half face-piece respirators, hoods, coverall suits or protective visors. Positive pressure helps to reduce work-rate fatigue and the ingress through leaks of harmful airborne contaminants.

A very important safety control for compressed airline systems is the purity of the air. Filters must be incorporated into the system to prevent contamination from dusts, toxic and corrosive gases, and vapours. The filters must be situated to control flow of air to the user and for control of air into the inlet of a compressor unit.

Compressed airline systems give complete respiratory protection in dusty, toxic and oxygen-deficient atmospheres.

There are **two types** of respirator design for compressed airline systems:

- The **constant flow BA**, which receives a continuous flow of air from the supply. Any air not used for respiration is exhausted from the face-piece. This system is used only where there is a compressor supply considered to be inexhaustible. It cannot be considered a very economical way to use compressed air.



Constant Flow Airline Breathing Apparatus with a Mask – Light Duty

Source: HSG53 Respiratory protective equipment at work – A practical guide, HSE, 2013 (<http://www.hse.gov.uk/pubns/priced/HSG53.pdf>)

- The **demand flow BA**, which is a very economical system in that respirable air only flows into the mask when the user inhales.



Demand Valve Breathing Apparatus

Source: HSG53 Respiratory protective equipment at work – A practical guide, HSE, 2013 (<http://www.hse.gov.uk/pubns/priced/HSG53.pdf>) "

Self-Contained BA (SCBA)

At the end of this subsection, please delete the table entitled Example of the RPE Selector Tool and its source.



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Assigned Protection Factor (APF)

Please amend the 3rd paragraph under this subheading to read:

“The following table gives general values for the types of equipment we have discussed here. Remember that these values are indicative only; the actual APF will depend on manufacturer, filter type, etc.”

PF required	Respirators						Breathing apparatus		
	Half-mask, particle filters	Half-mask, gas filters	Full face mask, particle filters	Full face mask gas filters	Powered (fan-assisted) masks	Powered (fan-assisted) hoods	Fresh air hose	Constant flow airline BA	Demand valve BA
4	FFP1, FMP1, P1		P1						
10	FFP2, FMP2, P2	FF gas, FM gas, Gas	P2		TM1	TH1		LDH1	
20	FFP3, FMP3, P3			Gas	TM2	TH2		LDH2, LDM1, LDM2, Half-mask	
40			P3		TM3	TH3	Full face mask, Hood	LDH3, LDM3, Hood, Full mask	
200								Sult	
2000									Airline, self-contained

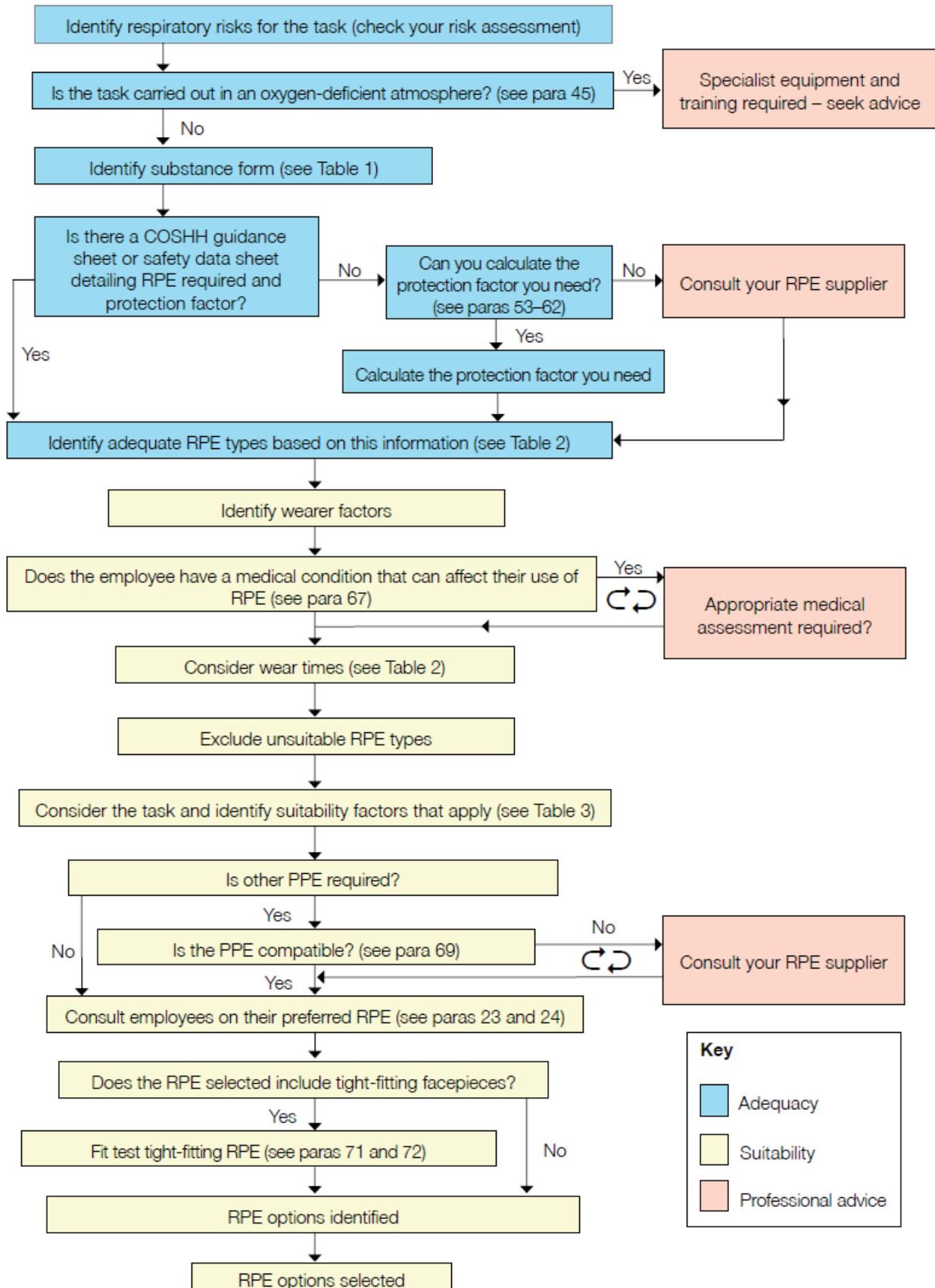
Source: Based on HSG53 Respiratory protective equipment at work – A practical guide, HSE, 2013

Selecting RPE

Please delete the 2nd paragraph under this subheading and the Example of the RPE Selector Tool and its source and substitute the following:

“Consequently the HSE have published guidance on the selection of RPE in HSG53, which sets out the following process:

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Selecting RPE that is adequate and suitable

Source: HSG53 Respiratory protective equipment at work – A practical guide, HSE, 2013 (<http://www.hse.gov.uk/pubns/priced/HSG53.pdf>)



Element B5: Biological Agents

Assessment and Control of Risk

General Hierarchy of Control for Biological Agents

Sharps Control

At the end of this subsection, immediately before the next subsection headed **Immunisation/Vaccination**, please insert the following new paragraph:

“The **Health and Safety (Sharp Instruments in Healthcare) Regulations 2013** require employers in the healthcare sector to:

- Have effective arrangements for the safe use and disposal of medical sharps.
- Provide information and training to employees.
- Investigate and take action following a sharps injury.

The Regulations also introduce a duty on healthcare workers to promptly report any sharps injury to their employer (see **Topic Focus** box on **Needlestick injuries** later in this element).”

Then add the following More box:



More...

Further information and guidance on the safe use and disposal of sharps, training requirements and procedures for responding to a sharps injury is contained in the HSE information leaflet, *HSIS7 Health and Safety (Sharp Instruments in Healthcare) Regulations 2013 - Guidance for employers and employees*, which is available from the HSE website at:

<http://www.hse.gov.uk/pubns/hsis7.pdf>.

Biological Agents and RIDDOR

In the **Topic Focus** in this subsection, please amend the last bullet point to read:

- “If the injury prevents the worker from attending work or carrying out their normal duties for over seven days (as an over-7-day injury).”

Then add the following new paragraph:

“The **Health and Safety (Sharp Instruments in Healthcare) Regulations 2013** introduce a duty on healthcare workers to promptly report any sharps injury to their employer and require employers in the healthcare sector to investigate and take action following a sharps injury.”

Then amend the text in the More box to read:



More...

"The HSE provide lots of guidance and advice on **RIDDOR** at:

<http://www.hse.gov.uk/riddor>.

More detailed information on needlestick injuries is also available from the HSE at:

<http://www.hse.gov.uk/healthservices>

and specifically in the HSE information leaflet, *HSIS7 Health and Safety (Sharp Instruments in Healthcare) Regulations 2013 - Guidance for employers and employees*, which is available from the HSE website at:

<http://www.hse.gov.uk/pubns/hsis7.pdf>."

Element B11: Managing Occupational Health

Managing Occupational Health

Health Assessment and Health Surveillance

At the end of this subsection, immediately before the next subsection headed **Legal Requirements for Health Surveillance**, please insert the following More box:



More...

Further information and guidance on **health surveillance** is available from the HSE online at:

<http://www.hse.gov.uk/health-surveillance/index.htm>.