Employers are bound by the Health & Safety in Employment Act to ensure adequate protection where workers may be exposed to substances with harmful respiratory health effects. In practice, this means employers must implement an appropriate respiratory protection programme.

Respiratory protection programmes must always begin by identifying all substances presenting respiratory hazards, followed by the application of the hierarchy of controls – eliminate, isolate, minimise.

Where elimination or isolation are not possible, the employer must assess exposure risk by measuring employee exposure levels, then use relevant Workplace Exposure Standards (WES) to select appropriate respiratory equipment.

The next step is to implement systems to ensure respiratory protection equipment is suitably managed and maintained. That’s the overview.

However, because industrial situations involving respiratory hazards differ, it isn’t possible to set precise requirements for every situation. Instead, a set of guidelines helps to determine what particular respiratory equipment and systems are required in a given situation to ensure adequate protection for workers.

When selecting a suitable respirator, expert advice and guidance may be required, but always consider the following factors:

**Contaminant-Related Factors** – assess the nature, toxicity, physical form and concentration of the contaminant, and determine the likely impact of respiratory failure. Respirators may also need to work with other protective equipment, such as eye or skin protection. Also identify whether the wearer will have warning of exposure to the contaminant by smelling it (odour threshold) or other means. Flammability of the contaminant is another factor that must be taken into consideration.

**Task-Related Factors** – determine whether the respirator is for regular use or emergency rescue use only, the length of time in the contaminated atmosphere, expected level of physical activity and mobility requirements, vision and communication.
needs, and facilities available to maintain respirators.

Operator-Related Factors – assess the effects of the general environment on the operator, the importance of facial fit – especially if the wearer has facial hair – and the comfort of the respirator over extended periods of use.

Once those factors are assessed, we come to the question of the right respirator for the given application. There are a number of choices. Much is dependent on the type of contaminant encountered.

PARTICULATE RESPIRATORS

Particulate respirators filter finely divided solid or liquid particles from the air. The wearer’s normal breathing action draws contaminated air through a filter that traps contaminant particles on impact, allowing only filtered air through to the user.

A range of particulate filters is available, depending on the characteristics of the contaminant:

- **Class P1 Filter** – mechanically generated dusts, such as sanding, grinding, mining, etc.
- **Class P2 Filter** – thermally generated contaminants and metallic fumes, such as smelting or welding
- **Class P3 Filter** – high-efficiency filter used with full-face piece to prevent toxic or irritant particulate contaminants from leaking into the respirator. Used when handling highly toxic dusts or powders, such as organophosphate insecticides and radionuclides.

GAS/VAPOUR RESPIRATORS

Respiratory protection against gas or vapour contaminants make use of a filter that adsorbs or reacts with the contaminant. They are classified according to the total capacity of the filter, NOT efficiency against a given contaminant, as follows:

- **Class AUS** – Low adsorption capacity (previously designated as a cartridge)
- **Class 1** – Low to medium adsorption capacity
- **Class 2** – Medium adsorption capacity
- **Class 3** – High adsorption capacity (previously designated as a canister)

These filters can be used with various types of respirators (e.g., half-face, full-face, or powered air purifying respirator) depending on specific requirements for contaminants present.

COMBINATION RESPIRATORS

Where both particulates and gas/vapour contaminants are present, dual-purpose filters can be used. These are usually particulate filters or disposable respirators impregnated with an agent that reacts with vapours at low concentration and removes them. Alternatively, a particulate pre-filter may be used with a vapour filter to remove both types of contaminants.

POWERED AIR PURIFYING RESPIRATORS

Powered air purifying respirators with appropriate filters are assisted by a battery-powered blower/fan unit to help air pass through the filtering medium to the face piece. This creates a positive pressure effect, reducing inward leakage and making the respirator more comfortable to wear. Filter selection criteria are still dependent upon contaminant characteristics, but according to AS/NZS 1716, filters for these devices must be designated as suitable for powered air purifying respirators by adding PAPR to the class designation – e.g., Class PAPR P1.

WORKPLACE EXPOSURE STANDARDS

Selection of the right respirator requires knowledge of the physical and chemical properties of the contaminant, workplace concentration of the substance, Workplace Exposure Standard (WES) for the contaminant, and the Respirator Protection Factor.

The most likely source of information about a substance is its Materials Safety Data Sheet (MSDS). This can be obtained from the supplier, who is legally obliged to provide this information.

Workplace environmental monitoring will provide a measurement of workplace exposure concentration. Information about how to conduct workplace monitoring can be obtained from OSH (Department of Labour) or an industrial hygienist.

Workplace Exposure Standards indicate safe workplace environmental concentration limits. A full description can be found in the OSH publication *Workplace Exposure Standards and Biological Exposure Indices for New Zealand 2002* (available from OSH offices or website: www.dol.govt.nz under publications)

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