



Respiratory Protection Equipment and COVID19: How to correctly wear and use a respirator

Learning Overview

- Respiratory hazards in a non-health related environments
- How respiratory protective equipment fits within a risk management framework
- The differences between P2/N95 respirators and surgical or cloth masks
- Respirator fit testing and fit checking
- How to put on (don) and remove (doff) a P2/N95 respirator
- Managing respirator and skin discomfort

Respiratory hazards in non-health related environments & tasks

The most common respiratory hazards in occupational environments are **airborne particulates and aerosols** such as dust, mist, fumes, fibres, smoke and biological contaminants

These tiny particles float in the air but are often not detectable by sight or smell

When inhaled, they can become trapped in your respiratory system and cause irritation or health problems

Aerosol particles may be contaminated with SARS-CoV-2, the virus that causes COVID-19



Respiratory Protective Equipment

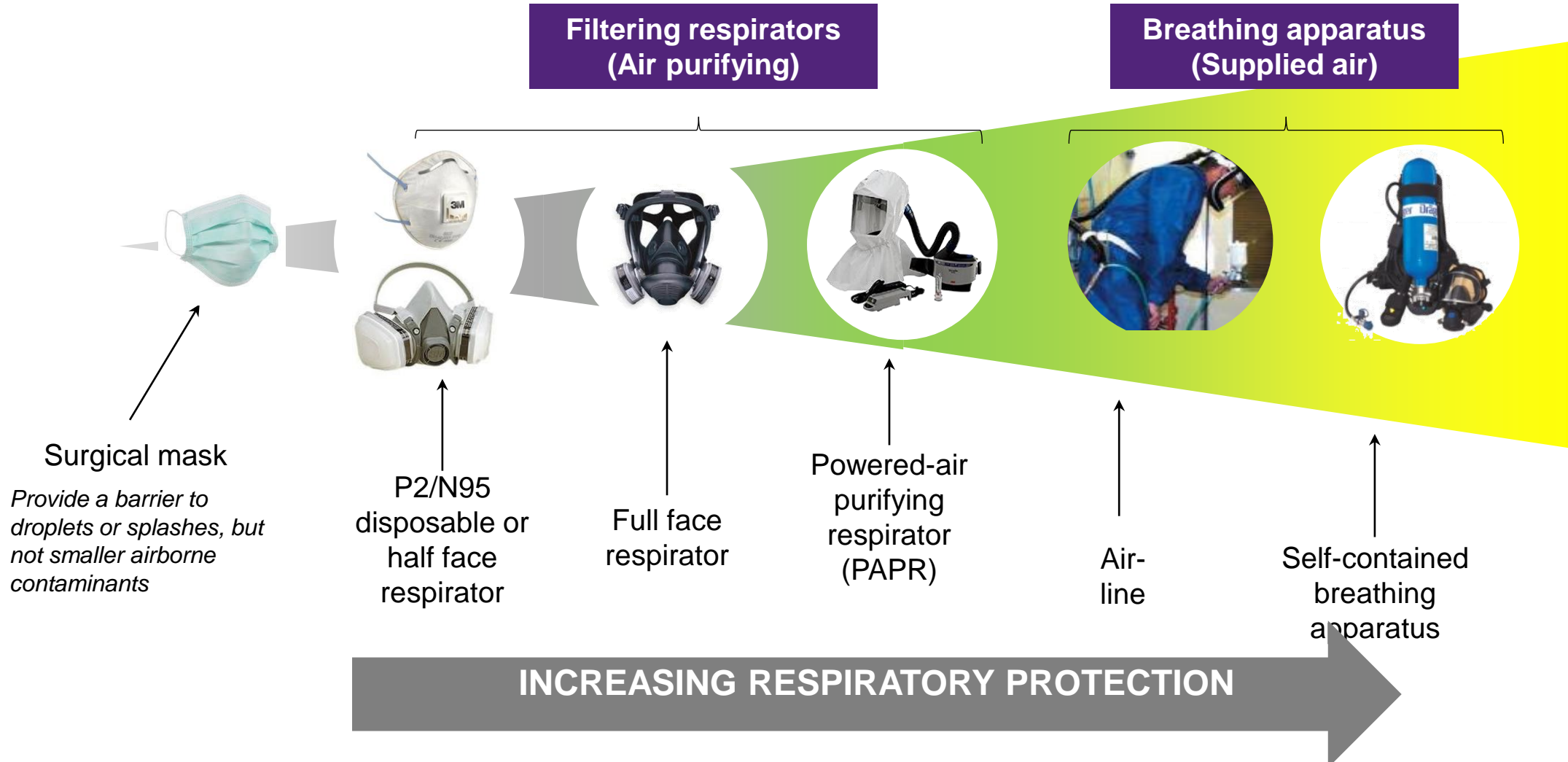
Respiratory protective equipment (RPE) should not be used in isolation, it is one component of a wider risk management process guided by the hierarchy of control

At UQ a combination of control measures are used to minimise risks posed by COVID-19, including:

- vaccination
- physical distancing
- adequate ventilation
- occupant density restrictions
- strongly encouraging use of a surgical or cloth mask at all times whilst indoors
- respiratory hygiene
- hand and personal hygiene
- environmental cleaning
- ill people staying at home, and
- provision of information

RPE, which includes surgical masks and particulate filter respirators such as a P2/N95 respirator, can be used to manage residual risk remaining after implementation of these higher order controls

Respiratory protection spectrum



Surgical and cloth masks

Surgical Mask



Image: [Harcor](#)

Cloth Mask



Image: [MedCart](#)

Surgical and cloth masks fit loosely over the mouth and nose of the wearer, creating a physical barrier from potential contaminants in the environment.

They:

- Provide source control by reducing exposure to others from the wearer's respiratory secretions e.g., during talking, singing, breathing, coughing
- Stop large droplets, sprays and splatters from reaching the wearer's mouth and nose
- Will filter out some aerosols for the wearer but are not as efficient as a P2/N95 respirator
- Do not filter or stop very small particles from entering the mouth and nose

Surgical masks also provide varying levels of fluid resistance

Particulate filter respirators

Particulate filter respirators, such as disposable P2/N95 respirators, fit closely to the face, forming a seal around the edges, they:

- Reduce the wearer's exposure to airborne contaminants by filtering out at least 95% of airborne particles and aerosols of all sizes
- Rely on an effective fit against the wearer's face to ensure that inhaled air is forced through the respirator filter and does not leak through gaps around the edges of the device
- Require fit-testing to ensure a specific make, model and size of respirator achieves an adequate seal on an individual's face
- Must be worn on a face that is clean shaven along the sealing surfaces of the respirator because facial hair can compromise the fit



Images: [Trident](#)

Particulate filter respirators

P2/N95 respirators with an exhalation valve should not be used in a COVID-19 risk management context because they allow potentially infectious respiratory aerosols of the wearer to pass unfiltered through the valve



P2 Respirator with exhalation valve



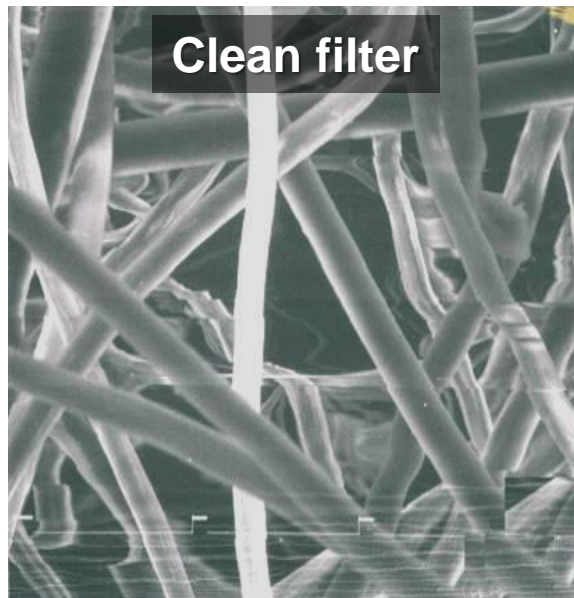
Images: [3M Australia](#)

How do particulate respirators work?

A particulate filter is NOT a sieve and particles are not collected by layering on 'top' of a filter

Instead, they are captured as they pass through the filtering material

Filters are made of many layers of randomly oriented fibers - the more fibers and the thicker the filter the more efficient the filter at capturing particles



Medical Assessments

A medical assessment may be required to determine if a person is able to wear a tight-fitting respirator:

- **Physiological considerations** - Regular wearing of P2/N95 respirators imposes an extra burden on the cardiac and respiratory systems. Thus, a person with a history of disorders in these areas should be medically assessed by a medical practitioner or an occupational health physician, especially where heavy work or prolonged wearing of RPE is anticipated.
- **Psychological considerations** - Helmet, hood and full facepiece RPE, especially when combined with full body protection, may give rise to feelings of claustrophobia, isolation and anxiety in some people. Such people may find it difficult to perform their work satisfactorily under these conditions.

What is fit testing?

Fit testing is a validated method to determine whether a specific make, model and size of respirator achieves an adequate seal on an individual's face. There are two types of fit-testing:



Image: [TSI](#)

Quantitative: uses a fit testing machine that counts the microscopic particles inside and outside the respirator to ensure a good face fit.



Image: [3M Australia](#)

Qualitative: uses a hood and relies on the wearer's ability to taste or smell a sour or sweet test agent.

Preparing for your fit testing session

Before attending a fit testing session, please ensure you familiarize yourself with the following points to achieve a quality fit, failure to do so may prevent your mask sealing properly:

1. Clean shaven - No beards or any stubble length
2. Long hair tied back
3. No heavy foundations/makeup

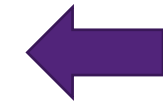


What to expect during the fit testing process

QUALITATIVE



QUANTITATIVE



Click on
photograph to
play video

Film: <https://www.youtube.com/watch?v=YflxRI2QDw8>

How to put on a P2/N95 respirator (donning)

- 1** Separate respirator edges (put a small bend in nose wire if needed)
- 2** Ensure nose piece is at the **top** and bottom is completely unfolded
Cup the respirator under your chin and pull the head bands up and over your head.
- 3** Pull the top strap over your head. Position it high on the back of your head, above your ears
Holding the respirator, pull the bottom strap over your head and position around your neck and below your ears



Reference: Donning & Fit Checking of Respirator in NSW Healthcare Settings: Duckbill style P2 or N95 Respirator <https://www.youtube.com/watch?v=OloUcaHPKSQ>

How to put on a P2/N95 respirator (donning)

- 4** Check that the respirator is not folded as that will prevent you from achieving a seal



- 5** Starting at the bridge of your nose and using fingertips on either side of your nose, firmly conform the nose piece to your nose and across cheek bones (pushing inward) - Do not pinch the nose piece with one hand as this may create a gap!



- 6** Continue to adjust the respirator and secure the edges until you feel you have achieved a good facial fit.

Proceed to fit checking.

Fit checking must be performed every time you put on a N95/P2 respirator

CAUTION
An incorrectly fitted respirator will not provide you with the intended level of protection from airborne contaminants!

Fit checking



POSITIVE seal fit check

- Exhale sharply. While doing so, feel for air seeping through the edges of the respirator.
- An unsatisfactory seal is indicated by the feel of an airstream channelling through a leak

NEGATIVE seal fit check

Disposable respirators

- Inhale sharply (face-piece may collapse onto face)
- An unsatisfactory seal is indicated by the feel of an airstream channelling through a leak

If you find a leak, adjust the respirator and repeat until you get a good fit!

Respirator removal (doffing)

- 1** Bring bottom strap overhead to front of respirator, keeping the respirator seated against your face



- 2** Lift off the top strap and carefully remove the respirator by the straps, without allowing the outside to touch you.



- 3** Do not touch the front of the mask as this is likely the most heavily contaminated part
Wash hands with soap and water after disposing of respirator

Respirator or skin discomfort

Respirators can be hot and uncomfortable to wear. You may experience some skin discomfort when wearing RPE for a prolonged period of time. This can be managed by:

1. **Take time** to fit your respirator. Ensure all folds in your respirator have been used to optimise the correct fit for you and do not over-tighten following fit check procedures.
2. **Increase** the frequency of application of moisturisers and emollients and consider using a richer and thicker type to protect dry skin. Apply before going to bed.
3. **Hydrate** Make sure you are drinking plenty of water as this can easily be forgotten.
4. **Sleep** Getting plenty of sleep and a skin-friendly diet with plenty of omega-3 and omega-6 fatty acids all support a healthy skin barrier.
5. **Take regular breaks** from wearing the respirators to relieve pressure, reduce moisture build up and allow the skin time to recover. Ideally hourly.
6. **Seek advice** If you experience severe skin problems, please seek medical advice from your GP.

Summary of requirements for wearing a P2/N95 respirator

Training

- You must have training in the selection, care and use of the respirator

No facial hair

- You must be clean shaven on the respirator seal line

Fit checking and fit testing

- You must understand the processes of donning and doffing a P2/N95 respirator
- You must fit check every time you put on a P2/N95 respirator
- You must have passed a fit test for any P2/N95 respirator you wear
- Fit testing should be repeated annually

Other considerations

- Some medical or psychological conditions may restrict the wearing of a respirator, e.g., chronic lung disease, claustrophobia and anxiety