



Infection Prevention and Control Expert Group – Guidance on the use of personal protective equipment (PPE) for health workers in the context of COVID-19

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Contents

| | |
|--|----|
| Background..... | 2 |
| Scope..... | 2 |
| General considerations..... | 3 |
| Risk assessment to inform use of PPE..... | 3 |
| Types of PPE | 4 |
| Surgical masks | 4 |
| Particulate filter respirators (PFRs) | 5 |
| Fit testing and fit checking | 6 |
| Powered air-purifying respirators (PAPRs)..... | 6 |
| Gloves | 7 |
| Protective eyewear | 7 |
| Goggles or Safety Glasses..... | 8 |
| Face shields..... | 8 |
| Cleaning and disinfection of protective eyewear..... | 9 |
| Donning and doffing PPE | 10 |
| Donning PPE | 10 |
| Doffing PPE | 10 |
| Extended use of PPE | 11 |
| Reporting breaches in PPE | 12 |
| APPENDIX 1: Disposable Mask Types and Protective Eyewear | 13 |
| Particulate filter respirators | 13 |

Background

This document from the Infection Prevention and Control Expert Group (ICEG) has been endorsed by the Australian Health Protection Principal Committee. It provides guidance on the use of personal protective equipment (PPE) for health workers¹ during the COVID-19 pandemic.

The recommendations in this document were developed with advice from the National COVID-19 Clinical Evidence Taskforce Infection Prevention and Control Panel (IPC Panel) and are consensus recommendations based on the combined expertise and experience of the IPC Panel and ICEG members. They reflect emerging evidence concerning all potential modes of viral transmission and the increased transmissibility of SARS-CoV-2.

The recommendations contained in this document describe the minimum national standard for PPE for health workers in the context of COVID-19.

Given the variability across and within health care settings, decisions around the use of PPE may require a nuanced and flexible approach, guided by evidence, contextual factors, and consideration of health worker preferences. This guidance is not meant to be exhaustive but aims to supplement detailed guidance available at a state, territory and institutional level.

PPE is a critical part of infection prevention and control. However, PPE should be considered the last line of defence within a broader '[hierarchy of controls](#)' framework, which includes minimisation of risk through the implementation of administrative and engineering controls and other interventions in combination with appropriate PPE.

These consensus recommendations will be revised as new research evidence and information emerges. This guidance should be read in conjunction with the [Australian Guidelines for the Prevention and Control of Infection in Healthcare \(2021\)](#), whilst acknowledging the unique circumstance of COVID-19 and requirements for additional PPE in some circumstances.

Scope

This document provides guidance on the use of PPE by health workers who work in a health care setting. This may include in hospitals, non-inpatient settings, managed quarantine facilities, residential care facilities, COVID-19 testing clinics, in-home care and other environments where clinical care is provided.

For additional guidance on infection prevention and control during the COVID-19 pandemic, see the [Department of Health and Aged Care website](#).

For current COVID-19 case definitions and testing criteria, see the [Communicable Diseases Network Australia National Guidelines for Public Health Units](#).

¹ Health worker (HW): a person who works in a health care setting, whether paid or unpaid, clinical or non-clinical, permanent or casual (includes visiting, sessional and agency), full-time or part-time, in the facilities or services in scope for this guidance. The terms HW and staff are interchangeable.

General considerations

All health workers should follow both standard and transmission-based precautions as described in the [Australian Guidelines for the Prevention and Control of Infection in Healthcare \(2021\)](#).

Employers or persons in control of workplaces have a responsibility to manage risks in the workplace. Risk management should be in accordance with work health and safety regulations,² and jurisdictional occupational health and safety legislation. Staff should be:

- a) trained in infection prevention and control (IPC) practices relevant to infection risks and their individual roles, including use of PPE if appropriate, and
- b) provided with working conditions and an environment that minimise risk and are conducive to compliance with appropriate IPC practices.

To protect clients/residents/patients and co-workers, health workers designated as close contacts may be required to wear a mask or particulate filter respirator (PFR), P2/N95 or equivalent, when working in a healthcare setting, as per jurisdictional guidance.

Surgical masks are generally appropriate for source control and PFRs are primarily for the wearer's respiratory protection, as part of a broader suite of PPE.

Risk assessment to inform use of PPE

Risk assessment to inform the use of PPE should be conducted within a standardised risk management framework. This risk assessment should be used as the last layer of protection, in conjunction with higher order controls in accordance with the '[Hierarchy of Controls](#)' framework.³ The following factors should be considered as part of the risk assessment:

- a) Patient/client/resident pre-existing likelihood of COVID-19
 - COVID-19 status (probable or confirmed)⁴
 - Close contact status
 - Symptoms consistent with COVID-19.
- b) Patient/client/resident factors
 - Potential for behaviours that increase the risk of SARS-CoV-2 transmission (e.g., cognitive impairment, are unable to cooperate, or exhibit challenging behaviours, unprotected coughing or increased work of breathing).
 - Ability/appropriateness of the patient/client/resident to wear a surgical mask.
- c) Nature of the care episode
 - Duration and proximity of contact between health worker and individual.

² [Safe Work Australia Model Work Health and Safety Regulations. December 2021.](#)

³ Refer to [The hierarchy of controls for minimising the risk of COVID-19 transmission](#)

⁴ Refer to Communicable Disease Network Australia's [National Guidelines for Public Health Units](#) for definitions on confirmed and probable COVID-19 cases.

- Types of care that may increase the risk of SARS-CoV-2 transmission (e.g., cough inducing, nebulisation and some other respiratory treatments/procedures).
- d) Physical location
- The presence of multiple individuals with probable/confirmed COVID-19 in an enclosed space including a transport vehicle.
 - Whether the environment has low levels of ventilation or unexpected air movements which may facilitate wider distribution of droplets and/or aerosols in the air (or e.g., opening of doors between spaces of differential air pressure or temperature).
 - Complex or less controlled care settings, including transport, home, or community-based care.

Health workers providing direct care or working within the patient/client/resident zone for individuals with probable or confirmed COVID-19 should use particulate filter respirators (PFR), e.g. a P2 or N95 and protective eyewear in line with standard and transmission-based precautions, as specified in the [Australian Guidelines for the Prevention and Control of Infection in Healthcare \(2022\)](#).

Health workers who wear a PFR should undertake a fit test prior to first use and perform a fit (seal) check each time a PFR is put on. See guidance on fit testing and fit checking below. In situations where fit testing has not yet been carried out, and a PFR is recommended for use, a fit-checked PFR is preferred to a surgical mask.

If tolerated, a surgical mask should also be worn by a patient/client/resident with confirmed or probable COVID-19, on transfer within or between facilities and the community.

Types of PPE

Surgical masks

Varying levels of fluid resistant surgical masks are available. When the likelihood of exposure to blood or body fluid is low, in routine care, a level 1 surgical mask is acceptable. Level 2 or 3 masks should be used when there is a risk of blood or body fluid exposure and in the operating theatre.

When putting on a surgical mask:

- Check for defects in the surgical mask, such as tears or broken loops.
- If present, make sure the metallic strip is at the top of the mask and positioned against the bridge of your nose.
- If the mask has:
 - Ear loops: Hold the mask by both ear loops and place one loop over each ear.
 - Ties: Hold the mask by the upper strings. Tie the upper strings in a secure bow near the crown of the head. Tie the bottom strings securely in a bow near the nape.

- Dual elastic bands: Pull the top band over your head and position it against the crown of the head. Pull the bottom band over your head and position it against the nape.
- Mould the bendable metallic upper strip to the shape of the nose by pinching and pressing down on it with fingers.
- Pull the bottom of the mask over the mouth and under the chin.
- Ensure the mask fits snugly on the face.
- Don't touch the mask once in position.
- If the mask gets soiled or damp, replace it with a new one.
- Always perform hand hygiene after removal of a surgical mask or if the front of the mask is accidentally touched.

Particulate filter respirators (PFRs)

Health workers who use PFRs (P2 or N95 equivalent) should be trained in their correct use and undergo a fit test to select the most suitable PFR for their face, prior to first use. Health workers should perform a fit (seal) check each time a PFR is put on. PFRs must be used correctly to provide protection against airborne pathogen transmission. A respiratory protection program should be developed to guide the selection, testing and use of PFRs, to determine which staff require fit testing and to manage the logistics of timely fit testing.

When using a PFR:

- it must be certified (i.e., 94-95% removal of small airborne particles), including meeting Australian Standard AS/NZS 1715-2009 (for P2 respirators), or NIOSH-42CFR84 standard (for N95 respirators)
- the balance of benefits and potential harm (e.g., skin irritation, headache, and increased work of breathing) associated with wearing PFR must be discussed with the wearer
- health workers must continue to observe other IPC measures.

When putting on a PFR:

- check for any defects
- remove glasses/headwear
- tie back long hair so it does not become tangled in the straps of the respirator
- put the mask on the face, ensuring the nose piece is at the top of the mask
- place the headband over the head and at the base of the neck
- ensure mask fits comfortably on the nose and under the chin
- compress the mask against the face to ensure a seal across the bridge of the nose
- compress the mask to ensure a seal across the cheeks and the face
- conduct a fit check.

PFRs are available in several different designs globally. Information on how to perform a fit test, perform a fit check and don and doff a PFR is available through jurisdictional resources.

Fit testing and fit checking

Health workers who wear PFRs should complete fit testing before first use and perform a fit check each time they are used. A range of styles and sizes of PFRs may need to be fit tested to find one that achieves a protective seal.

Fit testing:

- should be performed by an appropriately trained person
- is a validated method for matching PFRs with an individual's facial shape
- ensures the PFR fits the user's face snugly (i.e., creates a seal) to minimise the number of particles that can bypass the filter through gaps between the user's skin and the respirator seal. A fit check is performed by gently inhaling and exhaling. If the mask is not drawn in towards the face, or air leaks around the face seal, readjust the mask and repeat process or check for defects in the mask.
 - If a suitable PFR cannot be found, an alternative (e.g., elastomeric or Powered air-purifying respirators (PAPRs)) should be considered.

When a PFR is worn with facial hair, an airtight protective seal is difficult to achieve, which may allow infectious airborne particles to leak in and out of the PFR.

- The face must be smooth and/or clean-shaven to achieve a good airtight seal.
- Facial hair should be removed or an alternative type of PFR be considered.
- The NSW Clinical Excellence Commission provides resources on beard wrapping techniques.⁵

In situations where fit testing has not yet been carried out, and a PFR is recommended for use, a fit checked PFR is preferred over a surgical mask if airborne precautions are required.

Fit testing does not guarantee a respirator will not leak, particularly if a different type or size is used to one previously fit tested.

A repeat fit test is required for each different PFR utilised.

Powered air-purifying respirators (PAPRs)

A PAPR may be considered as an alternative to a PFR in some circumstances (e.g., when the fit of a PFR is compromised or when extended use is required). The following should be considered:

- several different types of relatively lightweight, comfortable PAPRs are available
- the use of a PAPR may not provide additional protection compared to a well-sealed PFR
- PAPRs should only be used by health workers trained in their use, including safe application and removal using the correct sequence
- instructions including battery use, filter position and reprocessing of re-usable components

⁵ <https://www.cec.health.nsw.gov.au/about-the-cec/news/beard-wrapping-can-improve-safety-for-health-staff-unable-to-shave>

- if a health worker is required to remain in the patient's room continuously for a long period, the use of a PAPR may be considered for additional comfort and visibility
- PAPRs used during sterile procedures should be suitable for use to maintain sterile field
- PAPRs designed for use in settings outside of health care are not recommended.

Manufacturers' instructions for reprocessing of reusable PAPR components and management of filters, should strictly be followed.

Gloves

Gloves are not a substitute for the five moments for hand hygiene. Vinyl gloves are not recommended for the clinical care of patients in the context of COVID-19. Gloves should be selected and worn in line with the [Australian Guidelines for the Prevention and Control of Infection in Healthcare \(2021\)](#).

Protective eyewear⁶

The eye is a potential route of transmission for SARS-CoV-2. Protective eyewear can protect the eye from contamination with particles and body fluids that may contain SARS-CoV-2 and prevent people from touching their eyes and face and spreading virus from their hands to their face and eyes.

Ideally, protective eyewear should be issued for individual use only and should only be shared if thoroughly cleaned/disinfected between wearers.

Options for eye protection include closely fitted wrap-around goggles, safety glasses, and face shields. The type of eye protection most suitable for an individual health worker will depend on the brand/style of the eye protection, the setting in which the individual is working, the tasks they are required to complete, and individual preferences.

Protective eyewear must comply with Australian/New Zealand Standards AS/NZS 1336:2014 and prescription protective eyewear with AS/NZS 1337.6:2012 to prevent impact injury.

There are many varieties and styles of each of the eye protection options. The usability, comfort, and impact on ability to communicate and deliver care can vary markedly both between options, and between versions of each option. Individuals may need to trial several types of eye protection to find one that meets their needs.

When selecting the type of protective eyewear, consider:

- durability and appropriateness of the PPE for the task
- type of anticipated exposure
- fit.

Personal prescription glasses are not considered protective eyewear. Eye protection for wearers of prescription glasses include goggles which are designed to be worn over

⁶ Adapted from 'Use of eye protection for healthcare workers' Coronavirus (COVID-19) update © State of Victoria, Australia, Department of Health and Human Services, 1 December 2020.

prescription glasses, a face shield, or prescription protective eyewear, as per AS/NZS Standard 1337.6:2007.

Goggles or Safety Glasses

To be effective, closely fitted wrap around goggles and safety glasses must fit snugly. Antifog coating can improve clarity. Normal prescription glasses, contact lenses or safety glasses that are not wrap-around do not provide adequate protection and are not suitable for use as eye protection.

| Advantage | Disadvantage |
|---|--|
| Durability and appropriateness of the PPE for the task | Wearing them for prolonged periods may increase the risk of skin injuries, particularly if they seal too tightly |
| Some types of safety glasses have a clear plastic lens with fog and scratch resistant treatment | They do not deter the wearer from touching the front of their mask, face, or respirator |
| Prescription safety glasses may be ordered | They may not be able to be worn over prescription glasses (depending on style) |
| They have a flexible frame to easily fit contours of the face | They may become scratched over time |
| They provide good eye protection by enclosing the eyes | There is a higher risk of fogging |

Face shields

- Face shields may be used as an alternative to goggles or safety glasses. They are NOT a replacement for wearing a surgical mask or PFR.
- All face shields should provide a clear plastic barrier that covers the face, which extends below the chin and to the ears, and there should be no gap between the wearer's forehead and the shield's headpiece.
- Face shields are particularly useful in situations where there may be splashes or sprays of blood or body fluids.
- Certain face shields may be cleaned, disinfected, and reused (depending on the manufacturer's instructions).

NOTE: face shields with foam bands are single use, as they CANNOT be cleaned and disinfected for re-use. This should be considered during purchase.

| Advantage | Disadvantage |
|---|--|
| They have an adjustable band to attach firmly around the head and fit snugly against the forehead | Gaps on the sides and underneath the face shield may allow virus-contaminated droplets to reach the eyes (or the nose and mouth if not worn with a well-fitting mask at the same time) |
| They provide additional blood or body fluid splash/spray/droplet protection to the face and | Some face shields do not wrap-around the eyes and these types are not as protective as other forms of eyewear |

| Advantage | Disadvantage |
|--|--|
| mask/respirator (prolonging the life of the mask/respirator) | |
| The wearer's eyes can be seen more easily which may be important when caring for some residents/patients/clients | Face shields may make communication more difficult by muffling the wearer's voice, especially when used, as should be the case, with a mask. |
| There is less risk of fogging and can be worn over prescription glasses (which do not provide adequate protection alone) | |
| The wearer is less likely to touch their face/mask | |

Cleaning and disinfection of protective eyewear

Do not re-use single-use items; discard after use. Clean reusable protective eyewear following the manufacturers' instructions.

If they require disinfecting, use a disinfectant that has virucidal properties against SARS CoV-2 listed on the [Australian Register of Therapeutic Goods](#).

Additional considerations:

- Discard protective eyewear when it is difficult to see through or damaged.
- Provide staff with education on how to put on, take off and clean and disinfect the eyewear.
- If reusable protective eyewear is worn, provide a cleaning and disinfection area.
- Monitor cleaning compliance.

For further information on cleaning reusable protective eyewear, refer to the [Australian Guidelines for the Prevention and Control of Infection in Healthcare \(2022\)](#).

Donning and doffing PPE

All PPE should be used in line with the [Australian Guidelines for the Prevention and Control of Infection in Healthcare \(2021\)](#) and in accordance with jurisdictional requirements. Health workers should be trained in the correct procedure for donning (putting on) and doffing (taking off) of PPE. All PPE, excluding protective eyewear that is labelled reusable, is single use only and is to be discarded once removed. Follow jurisdictional waste disposal guidance.

Donning PPE

PPE should be donned in the following order before entering the patient/client/resident zone:

- Perform hand hygiene
- Put on gown/apron⁷
 - long-sleeved, preferably fluid-resistant
 - a plastic apron is adequate when direct physical contact is minimal and/or the risk of blood or body fluid splash is low (e.g., observations, medication delivery)
- Put on surgical mask or PFR (whichever is applicable)
- Put on eye protection (see
- Protective eyewear, below)
- Put on disposable non-sterile gloves **Error! Bookmark not defined.** (the cuff of the glove should extend over the sleeve of the gown).

NOTE

- Use of boots or shoe covers is not recommended unless gross contamination is anticipated, or they are required as standard attire in operating theatre or trauma room.
- If using head covers, long hair should be securely tied back and off the neck. Head covering is not required except as part of standard operating theatre attire or when performing a sterile/aseptic procedure (e.g., central line insertion). A head covering may be used to contain hair or for comfort reasons (e.g., to form a barrier for straps from masks or face shields).
- As per [Australian Guidelines for the Prevention and Control of Infection in Healthcare \(2021\)](#), artificial fingernails and jewellery below the elbow should not be worn. Artificial nails impede effective hand hygiene and can interfere with the safe use and correct donning and doffing of PPE.

Doffing PPE

The correct and safe removal of PPE is necessary to avoid self-contamination of clothing, skin or mucous membranes (including the eyes) with potentially contaminated PPE. In some

⁷ may be required based on assessment of the risk of exposure of staff skin and clothing to blood, body substances, secretions, or excretions. Refer to the [Australian Guidelines for the Prevention and Control of Infection in Healthcare \(2021\)](#),

situations, an additional person (a PPE buddy), wearing appropriate PPE, can assist in the guidance and supervision during the doffing sequence.

The following sequence is recommended but alternative sequences can be performed safely. Do not touch the front of the gown, eye protection or mask and perform hand hygiene between each step:

Remove gloves without touching the outside of the glove and perform hand hygiene.

Remove gown/apron, without touching the front of the gown, by folding it so that the external (exposed) side is inside; perform hand hygiene.

Remove eye protection and perform hand hygiene. To take off eye protection, the wearer should remove them using the tip of the goggle arms or the elastic band/garter that secures them to the wearer's head. Avoid touching the face near the eyes and perform hand hygiene following removal. Protective eyewear labelled single use, should be discarded.

Remove surgical mask or PFR by only handling the ties or ear loops, then discard in appropriate waste and perform hand hygiene. Do not touch front of the mask.

NOTE

- Eye protection, and surgical masks or PFRs, should only be removed outside of the patient/ /client/resident zone.
- Local jurisdictional regulations for waste disposal should also be followed.
- Demonstrations of safe removal of PFRs are available via jurisdictional resources.

Extended use of PPE

The extended use of some forms of PPE may be considered where a local risk assessment has occurred in conjunction with staff training. This is a suitable option in cohort wards. This strategy can be applied to masks, protective eyewear and face shields and gowns.

Gloves must always be removed, hand hygiene performed and new gloves applied in accord with the [five moments for hand hygiene](#).

Surgical masks and PFRs do not need to be removed between each patient. These masks can remain in place until they become damp with the wearer's respirations, or they are visibly soiled. Care should be taken not to touch the mask whilst in use. If a health worker touches the front of a mask, hand hygiene should be performed immediately after removing the gloves, and the mask replaced.

Protective eyewear does not need to be removed between each patient. These items can remain in place for extended periods. Care should be taken not to touch protective eyewear whilst in use.

Gowns do not need to be removed between patients unless they are visibly soiled or high risk/close contact tasks are being performed.

All PPE is required to be changed when leaving the COVID-19 clinical area or moving between COVID-19 clinical areas and non-COVID-19 areas.

Reporting breaches in PPE

If there is a concern about a potential breach in PPE or potential self-contamination, follow your workplace protocol for reporting a breach. Notify the direct supervisor for advice on next steps. The incident reporting process usually involves notification of workplace health and safety and immediate risk mitigation, where possible.

APPENDIX 1: Disposable Mask Types and Protective Eyewear

AS 4381:2015 is the Australian standard for single-use face masks for use in health care. The standard requires different levels of performance at each mask level. Masks that achieve level 2 or 3 certification under this standard would generally be surgical masks and masks that offer significant fluid resistance.

Table 1: Levels of surgical masks and their application⁸

| Level 1 barrier | Level 2 barrier | Level 3 barrier |
|---|---|--|
| For general medical procedures, where the wearer is not at risk of blood or body fluid splash, or to protect staff and/or the patient from droplet exposure | For use in procedures where minimal blood or droplet exposure is likely e.g., changing dressings on small or healing wounds | For all surgical procedures, major trauma, first aid or in any setting in which the HW is at risk of bloody or body fluid splash |

Particulate filter respirators

PFRs are certified as having met specific regulatory standards. Such standards specify the required physical properties and performance characteristics which must be met for respirators to claim compliance with the relevant standard.

Around the world, the following performance standards apply:

- P2 (Australia/New Zealand AS/NZA 1716:2012)
- N95 (United States NIOSH-42CFR84)
- FFP2 (Europe EN 149-2001)
- KN95 (China GB2626-2006)
- Korea 1st class (Korea KMOEL - 2017-64)
- DS2 (Japan JMHLW-Notification 214, 2018)

PFRs certified as compliant with these standards have very similar function to one another. There may be some variation in the flow rate specified by different standards; inhalation and exhalation resistance testing flow rates range between 40 and 160 L/min, and 30 and 95 L/min, respectively. However, the standards' various pressure drop requirements are quite similar.

Table 2 (below) shows a summary comparison of the different performance characteristics of PFR certifications under the relevant standard. Based on this comparison, KN95, P2, Korea 1st Class, and Japan DS2 respirators are generally regarded as equivalent to US N95 and

⁸ Adapted from Australian Commission on Safety and Quality in Health Care. Australian Guidelines for the Prevention and Control of Infection in Healthcare. NHMRC. 2019. <https://www.nhmrc.gov.au/about-us/publications/australian-guidelines-prevention-and-control-infection-healthcare-2019>

European FFP2 respirators (60). Purchasers are advised to check the Therapeutic Goods Administration website for further information about individual PFRs.

Table 2: Comparison of PFRs9

| Certification / Class (Standard) | N95 (NIOSH-42C FR84) | FFP2 (EN 149-2001) | KN95 (GB2626-2006) | P2 (AS/NZ 1716:2012) | Korea 1 st Class (KMOEL - 2017-64) | DS2 (Japan JMHLW Notification 214, 2018) |
|---|-----------------------|--|-----------------------------------|---|---|--|
| Filter performance (must be ≥ x% efficient) | ≥ 95% | ≥ 94% | ≥ 95% | ≥ 94% | ≥ 94% | ≥ 95% |
| Test agent | NaCl | NaCl and paraffin oil | NaCl | NaCl | NaCl and paraffin oil | NaCl |
| Flow rate | 85 L/min | 95 L/min | 85 L/min | 95 L/min | 95 L/min | 85 L/min |
| Inhalation resistance – max pressure drop | ≤ 343 Pa | ≤ 70 Pa (at 30 L/min) ≤ 240 Pa (at 95 L/min) ≤ 500 Pa (clogging) | ≤ 350 Pa | ≤ 70 Pa (at 30 L/min) ≤ 240 Pa (at 95 L/min) | ≤ 70 Pa (at 30 L/min) ≤ 240 Pa (at 95 L/min) | ≤ 70 Pa (w/valve) ≤ 50 Pa (no valve) |
| Flow rate | 85 L/min | Varied | 85 L/min | Varied | Varied | 40 L/min |
| Exhalation resistance – max pressure drop | ≤ 345 Pa | ≤ 300 Pa | ≤ 250 Pa | ≤ 120 Pa | ≤ 300 Pa | ≤ 70 Pa (with valve) ≤ 50 Pa (no valve) |
| Flow rate | 85 L/min | 160 L/min | 85 L/min | 85 L/min | 160 L/min | 40 L/min |
| Exhalation valve leakage requirement | Leak rate ≤ 30 mL/min | N/A | Depressurisation to 0 Pa ≤ 20 sec | Leak rate ≤ 30 mL/min | Visual inspection after 300 L/min for 30 sec | Depressurisation to 0 Pa ≤ 15 sec |
| Force applied | -245 Pa | N/A | -1180 Pa | -250 Pa | N/A | -1470 Pa |
| CO2 clearance requirement | N/A | ≤ 1% | ≤ 1% | ≤ 1% | ≤ 1% | ≤ 1% |

⁹ Adapted from 3M Technical Bulletin. Comparison of FFP2, KN95, and N95 and Other Filtering Facepiece Respirator Classes, Revision 3. 2020 19 May 2020.
<https://multimedia.3m.com/mws/media/1791500O/comparison-ffp2-kg95-n95-filtering-facepiece-respirator-classes-tb.pdf>