PERSONAL PROTECTIVE EQUIPMENT - MASKS

The need for PPE should be based on the precautions required to protect against infectious agents based on the mode of transmission. In the majority of situations where standard respiratory protection is needed, a single use surgical mask (minimum level 2 barrier) is appropriate.

SURGICAL/PROCEDURAL MASKS

<table>
<thead>
<tr>
<th>Characteristics*</th>
<th>Level 1 barrier</th>
<th>Level 2 barrier</th>
<th>Level 3 barrier</th>
</tr>
</thead>
<tbody>
<tr>
<td>Application</td>
<td>For general purpose medical procedures, where the wearer is not a risk of blood or body fluid splash, or to protect staff and/or the patient from droplet exposure to microorganisms</td>
<td>For use in emergency departments, dentistry, changing dressings on small wounds or healing wounds where minimal blood droplet exposure may occur</td>
<td>For all surgical procedures, major trauma first aid or in any area where the healthcare worker is at risk of bloody or body fluid splash</td>
</tr>
<tr>
<td>Bacterial filtration efficiency (BFE), %</td>
<td>≥95</td>
<td>≥98</td>
<td>≥98</td>
</tr>
<tr>
<td>Differential pressure, mm, H_2O/cm²</td>
<td>&lt;4.0</td>
<td>&lt;5.0</td>
<td>&lt;5.0</td>
</tr>
<tr>
<td>Resistance to penetration by synthetic blood, minimum pressure in mmHg for pass result</td>
<td>80 mmHg</td>
<td>120 mmHg</td>
<td>160 mmHg</td>
</tr>
</tbody>
</table>

*Note that these characteristics are based on unworn masks, and may differ or not meet performance expectations due to individual fit characteristics.

Source: Standard AS 4381: 2015

Considerations when using a surgical mask include:

Masks should be changed between patients and when they become soiled or wet & never reapplied after they have been removed; masks should not be left dangling around the neck; touching the front of the mask while wearing it should be avoided; hand hygiene should be performed upon touching or discarding a used mask.

Example surgical/procedural masks: NB this is not an endorsement of any specific brand but example pictures for reference.
HIGH PARTICULATE RESPIRATORS (P2/N95) MASKS

Healthcare workers should prioritise the use of P2 respirators and other respiratory protection, wherever available. For 2019nCoV the use of P2/N95 masks should be reserved for aerosolised generating procedures (AGP) or where the risk assessment places the patient in airborne precautions.

When there is a high probability of airborne transmission due to the infectious agent or procedure (e.g. bronchoscopy), sound scientific principles support the use of P2 respirators to prevent transmission. P2 respirators are designed to help reduce the wearer’s respiratory exposure to airborne contaminants such as particles, gases or vapours.

While the terms ‘P2 respirator’ and ‘N95 respirator’ are often used interchangeably in the healthcare setting, they are required to meet different standards. In Australia, the requirements for P2 respirators are stated in Standard AS/NZS 1716:2012. The United States (US) National Institute of Occupational Safety and Health (NIOSH) specifies N95 respirator requirements.

### Properties of different types of mask

<table>
<thead>
<tr>
<th>PROPERTIES</th>
<th>P2 RESPIRATORS</th>
<th>N95 RESPIRATORS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Other names</td>
<td>N95 respirator, respiratory protection device, particulate respirator</td>
<td>P2 respirator, respiratory protection device, particulate respirator</td>
</tr>
<tr>
<td>Characteristics</td>
<td>• Raised dome or duckbill</td>
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</tr>
<tr>
<td></td>
<td>• 4–5 layers (outer polypropylene, central layers electret [charged polypropylene])</td>
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</tr>
<tr>
<td></td>
<td>• Filtration through mechanical impaction and electrostatic capture</td>
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</tr>
<tr>
<td></td>
<td>• Designed to provide a good facial fit to minimise aerosol contamination of the mucous membranes of the nose and mouth</td>
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</tr>
<tr>
<td></td>
<td>P2 particulate filtering respirators/masks must have a filter efficiency of at least 94% when tested with Sodium Chloride aerosol at a flow rate of 95 litres/minute.</td>
<td>NIOSH classified N95 particulate filtering respirators/masks must have a filter efficiency of at least 95% when tested with Sodium Chloride aerosol at a flow rate of 85 litres/minute.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>N95 respirator masks can only be used for oil free aerosols. The particle size of this aerosol ~0.3 micron.</td>
</tr>
</tbody>
</table>
PROPERTIES OF DIFFERENT TYPES OF MASKS

Under the EN system, aerosol testing is similar to Standard AS/NZS 1716: 2012, but have additional filter efficiency testing with paraffin oil aerosol that must also meet the minimum 94% filter efficiency to be classified as P2.

The particle size of this aerosol has a mass median diameter of 0.3 to 0.6 microns with a range of particles in the 0.02 to 2 micron size range.

Sealing

- Ties at crown and bottom of head, pliable metal nose bridge
- Fit testing and fit checking required

Ties at crown and bottom of head, pliable metal nose bridge
- Fit testing and fit checking required

Australian Standards

Standard AS/NZS 1715: 2009
Standard AS/NZS 1716: 2012

Set by the US NIOSH classification (NIOSH Guidelines – Procedure No. TEB-APR-STP-0059)

Intended use

- Routine care of patients on airborne precautions
- High-risk procedures such as bronchoscopy when the patient’s infectious status is unknown
- Procedures that involve aerosolisation of particles that may contain specific known pathogens

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- High-risk procedures such as bronchoscopy when the patient’s infectious status is unknown
- Procedures that involve aerosolisation of particles that may contain specific known pathogens

Notes

- Care must be taken if placing respirators on patients and must suit clinical need (i.e. if the patient has chronic obstructive airways disease [COAD] or is in respiratory distress, the respirator will exacerbate symptoms).

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Source: Australian Guidelines for the Prevention and Control of Infection in Healthcare, 2019

FIT CHECKING

Healthcare workers must perform fit checks every time they put on a P2 respirator to ensure it is properly applied.

Fit checks ensure the respirator is sealed over the bridge of the nose and mouth and that there are no gaps between the respirator and face.
PROPERTIES OF DIFFERENT TYPES OF MASKS

Example P2/N95 masks: NB this is not an endorsement of any specific brand but example pictures for reference.

REFERENCES
Australian Guidelines for the Prevention and Control of Infection in Healthcare, Canberra: National Health and Medical Research Council (2019).


ADDITIONAL INFORMATION
NSW Health

Clinical Excellence Commission

The Healthcare Associated Infections (HAI) Program provides expertise in Infection Prevention and Control and assists local health districts and specialty networks in NSW to manage and monitor the prevention and control of HAIs.