COMPARISON OF INTERNATIONAL RESPIRATOR STANDARDS

WITH CURRENT HEAVY DEMAND ON SUPPLIES OF MASKS INTERNATIONALLY, SUPPLIERS AND USERS ARE FINDING IT IS NOT EASILY POSSIBLE TO OBTAIN MASKS CERTIFIED TO THE AS/NZS1716:2012 STANDARD THAT IS NORMALLY ACCEPTED IN NEW ZEALAND.

Respirator masks most commonly used in NZ industry are certified to AS/NZS1716:2012 and conform to the European P2 standard. The standard has a number of international equivalents:

- **FFP2 (Europe)** EN149-2001 Filtering Halfmasks to Protect Against Particles
- **P2 (Australia/New Zealand)** AS/NZS1716:2012 Respiratory Protective Devices
- **N95 (United States/Canada)** NIOSH-42CFR84 Respiratory Protective Devices
- **KN95 (China)** GB2626-2006 Respiratory Protection—Non-Powered Air-Purifying Particle Respirators
- **Korea 1st class (South Korea)** KMOEL - 2017-64 Korean Food and Drug Administration Protocol
- **DS2 (Japan)** JMHLW-Notification 214, 2018 Ministry of Health, Labour and Welfare Notification

Respirators certified as meeting these standards can be expected to function very similarly. A detailed comparison of the different standards is given in the chart below. The main point in which they vary is the flow rates specified for inhalation and exhalation resistance tests. Some countries require testing to be performed at multiple flow rates, others at only the high or low end of the ranges. But because pressure drop across any filter will be higher at higher flow rates and lower at lower flow rates, in practice the standards' various pressure drop requirements are actually quite similar.

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Certification/ Class (Standard)	N95 (NIOSH-42C FR84)	FFP2 (EN 149-2001)	KN95 (GB2626-2006)	P2 (AS/NZ 1716:2012)	Korea 1st 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
Total inward leakage (TIL)* – tested on human subjects each performing exercises	N/A	≤ 8% leakage (arithmetic mean)	≤ 8% leakage (arithmetic mean)	≤ 8% leakage (individual and arithmetic mean)	≤ 8% leakage (arithmetic mean)	Inward Leakage measured and included in User Instructions
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 – see above	85 L/min	Varied – see above	Varied – see above	40 L/min
Exhalation resistance - max pressure drop	≤ 245 Pa	≤ 300 Pa	≤ 250 Pa	≤ 120 Pa	≤ 300 Pa	≤ 70 Pa (w/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	Depressurization to 0 Pa ≥ 20 sec	Leak rate ≤ 30 mL/min	visual inspection after 300 L /min for 30 sec	Depressurization to 0 Pa ≥ 15 sec
Force applied	-245 Pa	N/A	-1180 Pa	-250 Pa	N/A	-1,470 Pa
CO2 clearance requirement	N/A	≤1%	≤ 1%	≤1%	≤ 1%	≤ 1%

Filter performance – the filter is evaluated to measure the reduction in concentrations of specific aerosols in air that passes through the filter.

Test agent – the aerosol that is generated during the filter performance test.

Total inward leakage (TIL) – the amount of a specific aerosol that enters the tested respirator facepiece via both filter penetration and faceseal leakage, while a wearer performs a series of exercises in a test chamber.

Inward leakage (IL) – the amount of a specific aerosol that enters the tested respirator facepiece, while a wearer performs a normal breathing for 3 minutes in a test chamber. The test aerosol size (count median diameter) is about 0.5 micro meter (micron).

Pressure drop – the resistance air is subjected to as it moves through a medium, such as a respirator filter.

Sources:

Assessment of Filter Penetration Performance for Non-NIOSH Approved Respirators
Comparison of FFP2, KN95, and N95 and Other Filtering Facepiece Respirator Classes
FDA Emergency Use Authorisation March 28, 2020