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## Understanding Face Mask Protection

With the coronavirus pandemic affecting almost every corner of the planet and more than half the world's population in some form of lockdown; the images of people going about their lives wearing face masks is becoming the new norm. But how effective are face masks and how do you determine which would be suitable as protection from such a virus? With a global shortage of respiratory devices of varying degrees and unjustifiable price hiking creating even more problems, it's important to understand what you are actually buying.

For the purposes of this article we will focus on the more cost effective single use face masks; and in this category the most effective in protecting against virus particles such as those found in the coronavirus should be the particulate filtering face masks rated FFP2, FFP3 and N95 Surgical masks.

The standard surgical/medical/three ply masks that can be brought in most pharmacies is a disposable medical device that protects against the transmission of "droplets" that may contain infectious agents, such as saliva or phlegm. These droplets are generally larger particles which cannot penetrate the masks layers. However, a surgical/medical/three ply mask does not sufficiently protect against airborne infectious agents which are often found with a virus such as Covid-19. When worn by an infected person they may limit the exposure to others to a degree, but the extent of limitation is unknown.

Effective and accredited face masks are actually filtering respirators that protect the wearer from inhaling aerosols such as dust, smoke and mist, as well as vapours and/or gases that may be hazardous. Depending on their rating these face masks may protect wearers from bacteria and viruses, including those airborne.

In South Africa, for face masks to achieve recognized accreditation they need to meet the applicable SABS specification, in this case SANS50149-2003. This largely mirrors the European specification and is broken up into the categories of FFP (Face Filtering Piece) 1, 2 and 3. In South Africa these accreditations and ratings need to be displayed on the product, without which you have no way of telling the level of protection on offer.

- FFP1 offers the lowest aerosol filtering efficiency of at least 80% filtration. These face masks are more effective against the filtration of larger particles and used mainly as dust masks for various applications such as sanding, drilling and general maintenance.
- FFP2 accreditation has a minimum filtration efficiency of 94% and this is used widely in more industrial applications such as construction, mining, agriculture and in

medical fields. These have been shown to be effective against virus particles such as those that may be associated with the coronavirus.

- FFP3 masks have the highest filtration efficiency of the FFPs with a minimum 99% efficiency and are used against very fine hazardous particles such as asbestos, as well as being effective against the previously mentioned hazards. The FFP2 variants do come with the option of a valve which operates as a one-way filtration system for air coming in but then allows for easier ventilation when the wearer is exhaling. For this reason it is often preferred in hot and humid environments to minimise breathing resistance and avoid fogging up associated eyewear; however it is not recommended for medical purposes.

Is the valved option then not effective protection against a virus? *“In medical usage a filtering face mask is usually worn by both the medical staff and the patient so as to protect against infected particles being inhaled by the staff and exhaled by the patient. The valve however is a one-way filtration so would only protect the staff from inhaling the infected particles, it wouldn’t prevent the particles being exhaled by an infected patient. So although it is still effective for a healthy wearer, to avoid confusion it is not a recognised option for medical use.”*

The other popular accreditation you may find on face masks is the N95. The N95 is available as an industrial or surgical option and is closely comparable to the FFP2 rating in that it requires a minimum 95% filtration efficiency (in comparison to 94% of FFP2) but with a lower flow rate (Please see below table for comparison). The only difference with the surgical version is that it has also been tested against penetration by blood splatters, which is unlikely in the case of a coronavirus infection.

### **Standards Comparison by Region**

REGION SPECIFICATION TYPE FILTER PERFORMANCE FLOW RATE (Litres per minute)  
TIL (Total Inward Leakage) Human subject tested

- South Africa EN149:2001 (SANS50149-2003) FFP2 ≥ 94% 95 ≤ 8% leakage
- Europe EN149:2001 FFP2 ≥ 94% 95 ≤ 8% leakage
- USA NIOSH CFR N95 ≥ 95% 85
- Not tested China BG2626-20 06 KN95 ≥ 95% 85 ≤ 8% leakage

Please note: all single-use/disposable respirators should only be used for a maximum of 8 hours, after which they should be disposed of. In the case of virus prevention, no mask can be reused, once removed the mask should be disposed of irrespective of the period used.

Homemade face masks and alternatives The latest trend seems to be homemade face masks and/or fabric masks. There is very little scientific research to determine if these offer any significant protection. Our opinion is there may be slight assistance against larger droplets but social distancing and hygiene may be more effective in these instances so please practice these as standard.

Stay safe and please adhere to all the current regulations and recommendations.