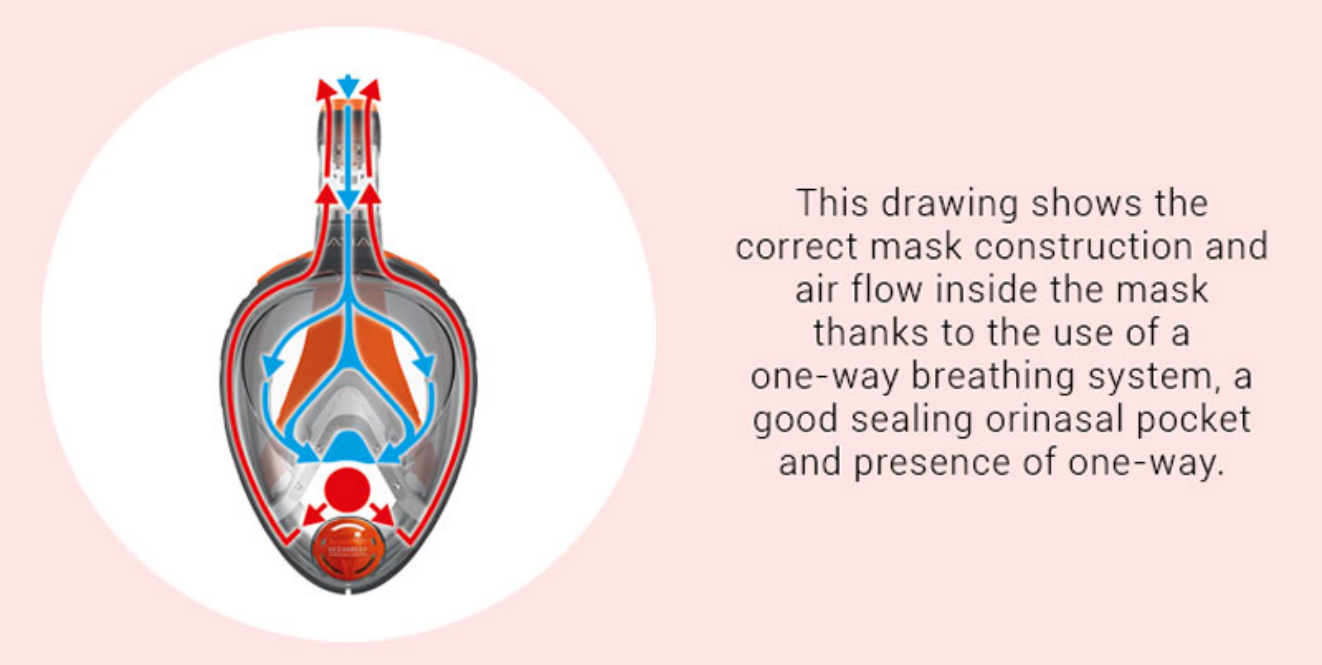
Are Full Face Snorkeling Masks dangerous?

Accidents involving Full Face Snorkel Masks (FFSM) in the US have led to several posts and articles on Social Media suggesting FFSM are dangerous to use. But is this really so? To answer this, we need to understand how these masks work and which risk is present.



The problem

The air we breathe contains about 21% oxygen (O_2) and up to around 0,04% carbon dioxide (CO_2). Many do not realise that it is the CO_2 that is primary responsible for our breathing rate & depth and not O_2. CO_2 is therefore a very important component of the air in our lungs and increased CO_2 levels could lead to unconsciousness which, if happening while in the water, can result in drowning.

O_2 is consumed (metabolized) and CO_2 is produced by our body, resulting in an increased level of CO_2 (to about 4%) and a decreased O_2 level (to about 16%) in the air we exhale. As we breathe out, we do not empty our airways completely. A small amount of air (CO_2 enriched) remains in the airways. This volume of a breath that does not participate in gas exchange is called the dead space. Therefore, when we inhale again, we are actually breathing in a mix of “fresh air” and CO_2 enriched air.

When breathing through a snorkel we are increasing “the length of our airways” and consequently increase the volume of dead space. Should this total volume become too big, we would end up with a high concentration of CO_2 in the inhaled air, leading to the risk as described earlier. This is also the reason why snorkels are limited in length and diameter, and EN standards require the inner volume of a snorkel not to exceed 230ml for adults (150ml for children). If we now add the inner volume of the mask to this, we could easily double the volume of dead space and this can lead to a dangerous increase in CO_2 levels.





The reality

To reduce the dead space, a FFSM should have an internal orinasal pocket, which seals the mouth and nose (also called lower volume) from the rest of the mask (upper volume). If this orinasal pocket is not present or does not assure a good seal, then the internal volume could become too big, leading to increased CO_2 levels.

However, even if the internal pocket has say a volume of 200ml and the snorkel has the same volume (200ml), we still would have doubled the dead space and could have CO_2 levels that are unacceptable. To avoid this, the mask should have a one-way breathing circulation, which means that the snorkel is divided in into an inhalation and an exhalation part, with one-way valves that prevent exhaled air from mixing with inhaled air. When breathing in you would thus only inhale “fresh air”, while the exhaled air is removed from the mask through a separate channel.

And this is exactly where the problem lies with some of these masks. Some companies copied the original mask, but did not take all these technical issues into account.

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The Answer

FFSMs are safe to use if the mask design is correct. If not, it could lead to potential fatalities. It is however wrong to state that all FFSM are dangerous or that all of them are safe.

In the snorkel industry, FFSM are without a doubt the most innovative invention of the last years, but since they are so innovative, no specific product test or quality standard (such as an EN standard) exists. Some manufacturers do test their products, using an existing snorkel, gas mask and/or full face diving masks standards to ensure their mask can be safely used. However, tests done on these specific masks, do not guarantee that all FFSMs are equal – even those seemingly identical.

So how to know a mask is safe? Check whether the mask has a one-way breathing system, verify that one-way valves are in place both in the snorkel as well as in the orinasal mask section, and last but not least check if the orinasal mask makes a good seal on your face. If these checks are positive, then it is a good indication the mask is safe to use.





About the Author

Guy Thomas is an expert Diving and First Aid Instructor Trainer and works full-time as Director of Safety Programs at DAN Europe, where he is responsible for the development and implementation of the DAN Europe Safety Initiatives. He also is a member of the Special Rescue Team of the Italian Red Cross and operates as a Helicopter Rescue Swimmer/Diver Medic, onboard a SAR helicopter of the Italian State Police.