Frequently Asked Questions (FAQ)

“Citizen Mask for Mutual Protection”

Open source website:
https://www.opensourceagainstcovid19.org/fr/

Answers to questions about the making, care and day-to-day use of the “Citizen Mask”.

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1. Objective: Mutual Protection against the risk of air transmission of SARS-CoV2

This FAQ section presents certain simple rules and recommendations for making a Citizen Mask with internal air filters, based on field experience in Africa where following these simple rules of protection against infection is a question of survival.

The Citizen Mask is intended for any healthy or asymptomatic person and aims to reduce the transmission of the SARS-CoV2 virus from asymptomatic or mildly symptomatic carriers. The critical point is that a mask, if worn by two people who cross paths on the street or in a large area, largely neutralizes the risk of viral transmission by an infected person, for the benefit of society as a whole. It is essentially a system of two-way or MUTUAL PROTECTION.

Wherever one person is unknowingly infected and another is not, the wearing of a mask prevents the infected person from spreading the virus while the mask worn by the uninfected person protects them from contamination by the infected person.

The wearing of the Citizen Mask is proposed as a complementary protection method to barrier methods of self-protection such as hand washing and physical distancing, which are essential elements in the control of transmission of the virus.

The mask protects the two main gateways of the virus into the body: the mouth and nose! It is therefore an important area to shield, even if the eyes are not covered.

Knowing that, even before the patient becomes symptomatic for COVID-19, the nose is both the gateway for the virus into the body and the primary path of its spread, it is essential to establish the first line of defense at this point. The wearing of the Citizen Mask is therefore proposed as a PRELIMINARY protection before "barrier measures" (hand washing, social distance), which are themselves essential elements in the control of transmission of the virus. Wearing a mask also reduces the often-unconscious impulse that makes us touch our mouth or face with our hand.

The mask is washable, reusable, very simple (therefore easy to sew for non-professionals) and very low cost, which makes it affordable for all our fellow citizens.

Those who wear spectacles have the problem of the glass fogging up when wearing a mask. If this is a problem, a plastic or metal nose clip inserted into the top of the mask over the nose will effectively solve the problem. This can easily be done when hand-making a Mask. This is shown in the pattern given in the open source internet link

https://www.opensourceagainstcovid19.org/fr/
This mask is recommended for use in **non-medical occupations** that are not protected by current legislation which requires the wearing of a mask e.g.

- Bakers, butchers, grocers and others involved in the preparation or sale of take-out meals and food items to the public;
- Cashiers in supermarkets, grocery stores, department stores and gas stations
- Personnel assigned to civil protection e.g. police officers providing law and order, firefighters and security personnel.
- Medical and nursing staff employed in aged care facilities;
- Staff employed in prisons;
- Out-of-hospital medical staff;
- Magistrates, their staff and lawyers dealing with litigants.

It can be **produced by small local units** (clothing companies, neighborhood groups) uniting and mobilizing citizens in a collective effort to combat the current crisis. The pattern can be adapted to take into account particular measurements and requirements.

In this time of crisis and fear, **it allows the citizen, alone or collectively, to be actively involved in risk management**, making them a key player in a community’s response. This undertaking of responsibility for a collective response is a **major factor in maintaining social cohesion in a pandemic**.
2. Risk of SARSCoV2 transmission through the air and the protective role of individual masks

As the diagram below clearly shows, the dispersal of the virus through the air from a contaminated individual can occur over long distances of up to 6 to 9 meters, well beyond the minimum recommended social distance of 1.5 meters!

Source of illustration: Jean-Luc Gala.

**Figure:** Dispersal distances of aerosol particles produced by spluttering, sneezing, coughing, or just breathing and talking. This model is based on the knowledge gained from the most recent numerical modelling and simulations.

**References:**

A recent video made by Japanese scientists also distinctly shows how these micro-droplets can stay suspended in the air and travel quite a distance.


Note the aerosol particle projection between individuals; modelling by ANSYS, which specializes in numerical simulations. Source: Getty images. https://www.futurasciences.com/sante/actualites/coronaviruscoronavirusseparationmetrenesuffitpas80445/
Nebulizing cloud **2 minutes after a dry cough**

Nebulizing cloud **5 minutes after a dry cough**

3. How can the risk of SARS-CoV2 transmission by air be effectively controlled?

As shown below, wearing a mask drastically reduces the risk of contamination through incidental contact between an infected individual (the source patient or asymptomatic carrier) and an uninfected person.

**Figure:** Comparison of risk in wearing the mask by the patient source/asymptomatic carrier AND by the individual at risk of contamination.

Source of illustration: Prof. JL Gala & André Delvaux.

- No mask: bad attitude!
- Wearing a mask: good attitude!
Cumulative number of confirmed cases per million inhabitants

Graphic source: JL. Gala et J. Ambroise, UCLouvain

Cumulative number of confirmed cases (nasal swab RT-PCR analysis) per million population. The curves for Germany and France are superimposed.

Cumulative number of deaths per million inhabitants.

Graphic source: JL. Gala et J. Ambroise, UCLouvain

Cumulative number of deaths per million inhabitants. The curves for the Asian countries (South Korea and Taiwan) are superimposed. They are superimposed on those of other Asian countries not shown on the chart (e.g. Singapore, Hong Kong, Thailand).

Figure:
These two figures illustrate the inverse relationship between the prevalence of the wearing of individual masks and the reduction of viral transmission and mortality. As clearly indicated in the two graphs above, the wearing of individual masks in Asian countries (Taiwan and South Korea) and in our neighbor Luxembourg has made it possible to reduce the number of deaths (data from 15/05/2020).
Source of photo: Prof. JL Gala.

**Figure:** Photo of a Citizen Mask

Source of photo: Prof. JL Gala

**Figure:** Photo of the Citizen Mask and examples of disposable filter pape to use inside

Photo taken BEFORE cutting or folding i.e. BEFORE trimming to the shape of the mask.

On the left is the cloth mask with elastic ear loops. On the right are examples of potential absorbent paper to use as filter e.g. paper towel, Torq-type paper and coffee filter.
Figure: Photos of the Citizen Mask showing the pocket to allow the insertion of four or three layers of absorbent filters inside.
4. What is a Citizen Mask?

The Citizen Mask is a fitted, barrier mask covering and protecting the nose, mouth and chin in the closest way possible.

A barrier mask like this has maximum effectiveness if it is a close fit and worn in direct contact with bare skin. Wearing a mask should be comfortable and should not prevent normal breathing, nor should it cause itching.

A beard decreases the mask’s adhesion to the skin and decreases its protective effect against the risk of transmission of the virus. The ideal is a clean shaved skin.

No hair of any sort should get between the mask and the wearer’s skin.

Adjusting the mask to the shape of the face is essential. To do this, the mask must fit firmly behind the head by securing it comfortably around the ears or the back of the head with elastic bands or cloth ties. This should not hurt. It is essential to avoid excessive tightening or creating any discomfort when wearing the mask (see diagram below).

The fastening must also be able to be removed easily!

Source of illustration: Prof. JL Gala

Figure: Fixing the citizen mask around the ears by elastic bands or cloth ties or by fastening to the back of the head (occiput). The mask should cover the nose, mouth and chin perfectly.
Figure: Rules for wearing a mask in complete safety and for maximum mutual protection.

To ensure maximum efficiency and safety, the mask must be handled, worn and used correctly. Avoid repetitive manual handling and ensure that the nose, mouth and chin are ALWAYS properly covered by the mask (Source of the illustration: Jean-Luc Gala).

**What is at stake in wearing the mask correctly?**

This is critical: If the mask is not worn correctly over the nose in particular, the risk of contamination of the external surface of the mask increases sharply. Don’t forget that, for COVID-19, the NOSE is both the gateway for the virus to enter the body and its main source of diffusion even before the patient becomes symptomatic.

If the outside surface of your mask is contaminated, your breathing, coughing and sneezing may spread the virus in the air outside your mask to people around you and thus contaminate all those people within a few meters of you. The distance of spread also depends on outside conditions of humidity, temperature, air flow inside a building, and wind outside.
5. What types of fabric can be used to make the Citizen Mask pocket?

a) Washable fabric

Woven polyester 100% and woven polyamide 100%

These two synthetic fibers are very tough, absorb little moisture - or wick moisture to the outside, and are flexible yet resist over-stretching like elasticized fabric.

Polyamide, even when wet, is the strongest textile and has high elasticity.

Polyester, thanks to its specific structure, allows good evaporation of moisture while retaining heat. In addition, it is a very lightweight material, retains its shape and resists sweat. However, it starts to break down at temperatures above 40°C.

Polartec fabrics (100% polyester) and fine polartec (micropolar)

A very soft, moisture-resistant, insulating, synthetic textile used in modern clothing manufacture.

Cotton fabric and cotton poplin

Cotton poplin is a thin, tightly woven cloth. It is absorbent, supple and slightly silky. Cotton cloth popularly used for bed sheets is often found in our grandparents’ cupboards.

It is important to avoid using coated/plasticized, waxed or waterproofed fabric, whether synthetic or cotton, as it will cause difficulty breathing. The aim is obviously not to stop the breath while wearing the mask, but to be able to breathe as normally and as comfortably as possible. Also avoid open-weave cloth such as lace, embroidered fabric and double cotton gauze.
The following table compares the strengths and weaknesses of the two most common types of fabric, Cotton and Polyester.

<table>
<thead>
<tr>
<th>COTTON</th>
<th>Weaknesses</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Strengths</strong></td>
<td><strong>Weaknesses</strong></td>
</tr>
<tr>
<td>- Absorbs ~20% water</td>
<td>- Absorbs ~20% water</td>
</tr>
<tr>
<td>- A light wetting improves by 5% its ability to capture &lt;0.3 μ particles - the size of a virus smaller than SARS-CoV-2 - after 3 hours, and immediately improves its ability to stop microdroplets from the mouth.</td>
<td>- What was positive becomes a disadvantage only if the mask is worn for many, many hours and becomes saturated.</td>
</tr>
<tr>
<td>- Natural, flexible and breathable fiber</td>
<td></td>
</tr>
<tr>
<td>- Washable at high temperature</td>
<td></td>
</tr>
<tr>
<td>- Not conducive to easy breakdown</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>POLYESTER</th>
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<tbody>
<tr>
<td><strong>Strengths</strong></td>
<td><strong>Weaknesses</strong></td>
</tr>
<tr>
<td>- Does not absorb moisture</td>
<td>- Synthetic fiber</td>
</tr>
<tr>
<td>- Electrifies easily so attracts particles to adhere to it</td>
<td>- Rough touch</td>
</tr>
<tr>
<td>- Good resistance to friction</td>
<td>- Loses its form and wrinkles above 30-40 degrees</td>
</tr>
</tbody>
</table>

Source of table: (with additions) following:


(b) Using other synthetic fibers

Viscose
Sometimes called artificial silk, viscose was originally a plant-based fabric but is now produced artificially. The properties of viscose are similar to those of cotton: not very elastic, creasing quickly, but having strong absorbent power and resistant to felting.
Other non-woven material
These are made from short fibers and long continuous fibres, bound together by chemical, mechanical, thermal or solvent means. The term is used in the textile industry to refer to fabrics such as felt that are neither woven nor knitted. There are polyester and polypropylene types.

Source: internet

**Figure:** grey polypropylene fabric
6. What types of filters are best for use in the Citizen Mask design?

Certain studies show that, even without a filter, handmade masks can capture up to 50% of micro-particles. A mask with filter therefore provides some significant and useful protection.

References:

https://smartairfilters.com/en/blog/category/masks/


Protection against viruses can be greatly increased if absorbent filters are added. There are many options depending on the absorbency of the filter. Here are several examples of absorbent materials:

a) Paper towel, Kleenex-type paper tissue, toilet paper, or Torq-type paper

These items are available in supermarkets, DIY stores and drug stores.

Sheets from a roll or pack are cut or folded carefully to fit the internal dimensions of the mask.

The more layers of paper towel added, the more the filtering power! However, make sure that the fit of the mask remains comfortable and that the type and number of filters do not prevent normal breathing.

Figure: Typical packs of pre-cut or folded sheets of paper towel or wipes. (Source pictures: Internet)
b) Coffee filters

![Coffee filter image]

Source of picture: Internet

**Figure:** Example of filter to use inside the Citizen Mask. The two sides pressed together can be inserted into the pocket, creating a double filter.


c) HEPA vacuum cleaner bag (HEPA 13 or HEPA 14)

![HEPA vacuum cleaner bags image]

Source of picture: Internet

**Figure:** Examples of vacuum cleaner bags for fitting inside the Citizen Mask. If the bag has a cover over the opening (see above), it must be removed.

**Vacuum cleaner /HEPA filter : Explanation of Use**

Note: The acronym HEPA means High Efficiency Particulate Air, or High Efficiency Particulate Absorbing Filter.

HEPA filters are able to trap very small particles of about 0.3 microns or 300 nanometers. The size 0.3 micron has special importance: particles smaller than 0.3 microns move erratically (termed Brownian movement) while from 0.3 microns, they move linearly. However, paradoxically, the smallest particles are better captured; in this case, viruses smaller than 0.3 microns.

To give an idea of what this means, if a human hair has a diameter of about 100 microns, a HEPA filter is therefore able to stop the transmission of particles 300 times smaller than the diameter of a human hair!
Note:
There are several classes of HEPA filters based on their effectiveness (defined by Standard NF EN 1822).

Not all HEPA filters have the same filtering power. They stop a proportion of the smallest particles, ranging from 85% for the H10 filter to 99.995% for the H14, depending on the capacities of the filter used.

<table>
<thead>
<tr>
<th>FILTER</th>
<th>CLASS</th>
<th>FILTERING POWER (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>HEPA (Standard NF EN 1822)</td>
<td>HEPA 10 (H10)</td>
<td>85</td>
</tr>
<tr>
<td></td>
<td>HEPA 11 (H11)</td>
<td>95</td>
</tr>
<tr>
<td></td>
<td>HEPA 12 (H12)</td>
<td>99.5</td>
</tr>
<tr>
<td></td>
<td>HEPA 13 (H13)</td>
<td>99.95</td>
</tr>
<tr>
<td></td>
<td>HEPA 14 (H14)</td>
<td>99.995</td>
</tr>
</tbody>
</table>

The H13 and H14 filters will stop at least 99.5 and 99.95% respectively of the 300 nanometer (0.3 micron) particles.

**How do you use a vacuum bag filter in making the Mask?**

Cut the bag into several pieces to fit the internal dimensions of the mask or fold it to size to create a good fit inside. Be sure to cover or fit the inside surface carefully to the outer edges.

**d) 100% polypropylene anti-static dust wipes**

Antistatic dust wipes (Swiffer type) are lighter and easier to use for this purpose. They are fit for purpose: the technology for making them is the same as used for the protective paper layer in surgical masks! The polyester component of the electrostatic dust wipe "electrifies" quickly, attracting everything that passes near the filter. This explains why electrostatic dust remover wipes catch dust so well.

Source: internet

**Figure:** Antistatic dust wipes
e) Other filter options

Creativity has no limits, but the filters used must not prevent comfortable breathing.

**Cloth diaper material** also provides good, absorbent filter material when trimmed to allow insertion inside the mask pocket.

**Thin, lightweight, synthetic fleece material** or soft woolly fabric is warm, fluffy and slightly felted, like thick flannel.

f) What not to use as filters

If you want to make a comfortable mask, DO NOT use lining material, fleece, sponge, felt, anti-bacterial fabric, or interlock thermoplastic material like PUL. A mask does not provide effective protection if it needs to be adjusted or removed after a few minutes because of breathing difficulties.

Do not use sanitary napkin material. First, the impermeable waterproofing of the pad will make it difficult to breathe, and secondly, this type of fabric is soaked with chemicals.

Information source :
7. Effectiveness of internal mask filters against the passage of SARS-CoV2

SARS-CoV2 virus is for COVID19 disease. The function of the inner filters inside the Citizen Mask is to reduce the transfer towards the nose and mouth of any virus matter present in the air. The more layers of filter it has, the higher the level of protection it gives.

Most importantly, it should be noted that recent dispersal modelling shows that aerosol particles can travel over long distances (up to 6 - 8 meters), well beyond the social distance of 1.5 m imposed by many government authorities.

The velocity values are indicative and based on recent models; however, many atmospheric parameters - humidity, temperature, air flow (wind, air conditioning) – as well as a high viral load can modify the dispersal of aerosol particles and the projection distance!

Source of illustration: Jean-Luc Gala

**Figure:** Model showing dispersal of aerosol particles produced by spluttering, sneezing, coughing, or just breathing and talking. This is based on results from the latest numerical modelling and simulations.

This projection distance is, however, influenced by local climate conditions of humidity, wind and outside temperature as well as by the concentration of virus in the particular air sample (its “viral load”). In effect, the viral load of the infected patient determines the dispersal distance: the higher the viral load, the greater the risk of long-range dispersal.

The most recent data from the scientific literature clearly demonstrates the effectiveness of wearing individual masks as a protective measure against viral transmission, making it one of the most important protective factors there are.

These empirical observations of high protectivity apply equally to Asian populations exposed to the same SARS-CoV2 (Hong Kong, Taiwan, Singapore, South Korea, Japan, China, Thailand and Vietnam) as it does to many European countries!
Protective power of filters inside the Mask? Can they stop SARS-CoV2?

A realistic hypothesis - yet to be confirmed by studies of effectiveness - is that the addition of two or three filter layers gives the Citizen Mask a filtering power close to or even greater than that of an FFP2 Mask as used by hospital staff. It is estimated that the risk of transmission between two people talking face-to-face, each wearing a fabric mask with internal filters, could be close to zero. Laboratory tests are already planned to test this hypothesis.

Controlling the risk of airborne transmission by wearing a personal mask:

Up-to-date scientific references


8. How do you maintain, wash and store your cloth mask?

It is impossible to sterilize a dirty object! This is the first principle of asepsis!

The item must be washed before it is sterilized. In the case of the Citizen Mask, a basic care regime consists of three steps: complete immersion in water, a soap wash and rinsing according to the instructions below:

- For 100% polyester and polycotton (65% polyester / 35% cotton blend).
  - 40°C
  - For 45 minutes
- For cotton
  - 60°C
  - For 30 minutes

Since SARSCoV2 can easily be deposited on the mask - and clothing - through droplet projections, it is possible that viral particles will remain on the item for several hours.

So how do we get rid of it? Above all, practically speaking, on a daily basis, at what temperature should possibly contaminated clothes be washed? 30 degrees or 60 degrees Celsius?

It is an important factor that the SARSCoV2 virus responsible for COVID19 does not withstand heat at all. This knowledge comes from research on other types of human coronaviruses similar to SARSCoV2 that have previously created deadly epidemics:

- SARSCoV (Severe Acute Respiratory Syndrome (SARS) pathogen in 2002-04)
- MERSCoV (Middle East Respiratory Syndrome, developing since 2012).

a) Hygiene rules for the care and cleaning of the Citizen Mask

These are simple and similar to those applying to washing personal linen - the ones usually adopted in homes.

The Coronavirus is already very sensitive to a temperature of 63°C for 4 minutes. Therefore:
  - Set the washing machine for a 30-minute wash in water held at 60°C.
  - Use a regular detergent. Normal laundry soap or liquid is quite adequate.

Alternatively, soaking in a simple tub of hot water, then hand washing is a good procedure. It is simply not necessary to turn on the washing machine to wash one mask.

b) Frequency of mask washing

How often a mask needs to be washed depends on the intensity of its use. If you only use it once or twice a day, for example, to go out shopping, a daily wash is enough. In the evening, wash the mask and let it dry overnight. This is sufficient to ensure good personal sanitation and keeps the fabric of the mask clean.
c) How to dry a fabric mask?

The fabric mask is designed to withstand multiple wash and drying cycles and to be reusable!

Choosing fabrics that tolerate very hot washing and drying cycles is therefore an important requirement. See the list of fabrics in point 5 of this FAQ What types of fabrics can be used to make/sew the Citizen Mask pocket.

Ironing the mask with or without steam can complete the care regime for your mask. Beware, however, of synthetic fabrics that deteriorate at high temperatures! Remember that ironing only does not replace the 60°C water wash for 30 minutes as recommended at the beginning of this section. At best, it complements it.

d) Hand washing as a complementary hygiene measure to wearing a mask

If you touch a potentially contaminated solid surface (door handle, stair rail, shopping trolley), you contaminate your hands. This explains why you need to disinfect (wash) your hands before and after you leave home to go to a place where you may touch potentially contaminated surfaces or objects.

In supermarkets, a cart -especially the handlebar- can retain the virus from cough or sneeze droplets or moisture from a contaminated person. The virus can stay for a few hours on a metal surface (though probably only in small quantities). So, if possible, clean the bar of the shopping cart with a wipe soaked in soapy water (that you carry with you) or use a solution or wipe containing alcohol. These last two are just as effective as soap and water, though more expensive. Remember to wash your hands well after going shopping.

Food packaging, if handled by infected patients, can theoretically be contaminated. The risk of contamination through contact with these packages is difficult to assess (probably low) but the precautionary principle prevails: wash or disinfect your hands thoroughly at the exit of the store having finished your shopping and after handling the packaging at home.

e) Recommended soap for hand washing

The best is pure vegetable oil soap made without additives i.e. perfume, dye or chemicals. The simplest and cheapest option is to carry a small water bottle with liquid soap with you, either on a belt or in your bag. If you do not have access to hand washing facilities, rub your hands well with an alcohol-based hand sanitizer.

Source internet

Figure: Example of bottle belt used by joggers
f) Recommended method for disinfecting surfaces

We have just talked about the simplest effective solutions such as liquid soap and diluted alcohol. Human coronaviruses, such as SARS-CoV-2, can also be effectively inactivated by surface disinfection procedures with more sophisticated and expensive agents, particularly in workplaces and hospital settings.

- 70% ethanol, or
- 0.5% hydrogen peroxide, or
- Bleach at a concentration of 0.5%

Note: 1 liter of 2.6% bleach to 4 liters of cold water

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g) The role of the microwave in mask hygiene

**WARNING**

Remember that pre-washing of masks is necessary before sterilizing in a microwave oven.

**Microwave ovens are not standardized and therefore not comparable in terms of power and energy delivered per unit of surface.** The energy is not necessarily evenly distributed either, the problem that occurs when a food being heated may burn on the outside yet remain cold in the inner layers.

Similarly, it is possible that some areas of a mask will not be sufficiently exposed to heat and so not become sterilized.

Beware that some materials can melt, catch fire or even explode. Even though a wide variety may withstand the microwave, this option is **NOT RECOMMENDED** for disinfection.

**ADVICE**

To eliminate the possibility of viral contamination from contamination of your mask and/or clothing, it is better to wash them in the washing machine (or soak them in a tub of hot water, as described above).

If you still want to use the microwave to sterilize your masks, remember to remove the filters you have placed inside them.
h) Role of kitchen ovens in mask hygiene management

We're not talking about a microwave oven here; we're talking about a conventional kitchen oven.

Always remember to wash the mask before sterilizing it.

Yes, baking at **70°C for 30 minutes** can disinfect your mask. However, don’t forget to remove the filters inside the mask before placing it in the oven.

The use of heat and humidity combined (85°C with 60-85% humidity) was apparently used successfully by Stanford University (USA) to disinfect FFP2 type hospital masks. This is not the same case here.

Refer to the work of Stanford University:


**WARNING**

If you wish to try out the use of a household oven, you need to be careful of **synthetic fabrics that do not withstand heat at all well**. Almost all will melt from 40°C!

**TIP**

To avoid this risk, it is better to simply put your masks in the washing machine or soak them in a tub of hot water as described above, to eliminate the possibility of viral contamination from mask and/or clothing.

i) Using UV-C as a method of sterilization

UV-Cs are effective ultra-violet biocides: they destroy a whole range of biological agents found on contaminated surfaces such as bacteria and viruses. However, their use is not recommended to sterilize a fabric pouch given the synthetic composition of many fabrics and the destructive effect of UVC on this type of material. The degradation of textiles depends of course on the intensity of irradiation and the duration of exposure (weakening the fibres and causing discoloration and/or yellowing) but the power and duration of UV-C irradiation cannot easily be standardized and therefore cannot be proposed as a "routine method".

j) Adapting the mask size and number of masks per person

A standard mask size was proposed in these times of urgency. An internet link, [Open Source Against COVID-19](https://opencovid19.org), offers a guide to standardized measurements. These can be altered (depending on the capacities of the production chain) to allow each user to wear a mask fitted to their face in order to make the wearing of the mask as comfortable as possible.

Having one mask per individual is a major goal. But ideally, as our Luxembourg neighbours do, the ideal would be to have a set of three to five masks per person.
9. What about the filters placed inside?

The filters should be changed often if the mask is used all the time, such as for intense outdoor activity.

The easiest and safest way is to replace them outright, especially if the filters are sheets of simple paper towel.

If they are the more expensive paper filters (e.g. HEPA vacuum bag), they can be sterilized in the microwave or oven. Paper is more resistant to the microwave and oven than the synthetic fabrics of the citizen mask (Note: dry heat is commonly used by the hospital sector to sterilize FFP2 type professional masks).

WARNING
The comments above on precautions to be taken when using microwave or conventional ovens and their respective limits are to be taken into account.
10. Acknowledgements

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