

Covmask.cz

PROJECT INTRODUCTION

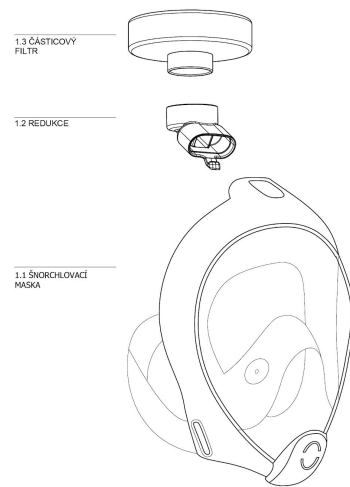
The plastic adapter Covmask.cz allows for the [Decathlon Easybreath](#) full-face diving mask for snorkeling to be modified as an improvised protective device with a certified replaceable filter with a thread Rd 40 1/7", compatible with NATO filters.

The technical solution has been designed for high-volume injection molding and allows the rapid production of a large number of protective equipment pieces. The material used and its surface treatment allow for easy disinfection. The product has high durability, quality and accuracy. Alternatively, the adapter can also be produced using 3D printing.

DESIGN

A complete personal protection device consists of the following parts:

- **Particle filter** compatible with NATO standard military threads Rd 40 1/7". In our case, we use the P3 R particle filter from AVEC, where the maximum penetration of the test sodium chloride aerosol is less than 0.0001% at a flow rate of 95 l/min. The filter is therefore more efficient than FFP3 respirators.
- **The plastic adapter Covmask.cz** is fixed to the particle filter. The adapter is fitted with a clip on the underside to attach to a sports diving mask, the upper side is equipped with an internal standardized thread Rd 40 1/7" to attach to the particulate filter. Also it is possible to use an adapter to attach the HEPA filter from conventional vacuum cleaners.
- **Diving mask** Decathlon Easybreath V1 for snorkeling, commonly available in sporting goods. A newer version for EasyBreath 500 is under development and will be available soon.



TESTS

The presented assembly of diving masks, Covmask.cz adapters and particle filters have been tested for tightness and CO₂ accumulation. In 1kPa vacuum testing, the pressure drop was less than 100Pa over 1 min. The measured CO₂ concentration was 1.5% vol.

The surface of the mask has also been examined under an electron microscope for surface roughness and for disinfection and structure of materials, stating that the materials used were suitable for the purpose.

A control measurement of the aerosol leakage with influenza virus has also been performed with a negative result (no virus leakage was detected).

CURRENT STATUS

At present we have about 10,000 pieces of Decathlon Easybreath diving masks, Covmask.cz adapters produced on a voluntary basis using 3D printing, with a sufficient supply of particle filters being provided directly from the manufacturer.

A printing farm was built directly in ČVUT's (Czech Technical University in Prague) assembly rooms and the project is supported by a large supplier of 3D printers.

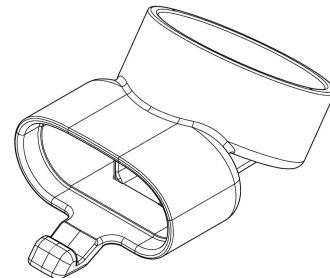


To support the logistics expedition, an ordering system was created and connected to the project website www.covmask.cz. Distribution is provided by a volunteer network of couriers in electric vehicles; distant locations are also served by air transport service. As of 5 April 2020, 8,113 masks have been delivered to 75 hospitals and emergency services branches. Project funding is provided with the support of ČVUT in Prague and a successful crowdfunding campaign.

DEVELOPMENT PLAN

We are increasing the production with the help of injection molded plastic, with current orders set at thousands of units per day and with a possible increase. We plan to strengthen the assembly capacity to produce at least 2000 masks per day.

The ongoing process of intellectual property protection will protect the injection molding variant of the adapter and the method of its production, with the adapter being commercially offered abroad.



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