



New Danish standard for washable face masks

14. January 2021

It is almost impossible for consumers to assess the quality, function, and safety of washable face masks for use in public. Why? Because no general requirements exist in this area. A new Danish standard will change this situation. The standard went out for consultation on 22 December.

The use of face masks in supermarkets, malls, and other public places due to COVID-19 has led consumers, manufacturers, and authorities to demand specific requirements for the quality and safety of washable face masks. Therefore, Danish Standards, in collaboration with Danish authorities, test laboratories, manufacturers and the Danish Consumer Council, has prepared a proposal for a

Danish standard setting out requirements for face masks for use in public that can be reused after washing, such as cloth face masks.

Consumers need help to choosing the right face mask

“At the Danish Consumer Council, we are very pleased that a standard is underway to help consumers make good choices when they need to buy cloth face masks. Our tests showed that consumers feel like navigating in a jungle, and many cloth face masks are just not good enough. We therefore welcome that consumers will soon be able to get help from the new standard”, says Christel Søggaard Kirkeby, project manager at the Danish Consumer Council.

The new standard also requires that there shall be no unwanted chemical substances in the face mask, so that users avoid being exposed to unwanted fluorides and antibacterial substances. The standard’s overall aim is to ensure that reusable face masks contain no harmful substances.

Documentation of quality and effect

“The Danish objective was to provide specific requirements for washable face masks for use in public spaces in order for consumers to be able to trust the quality of the face mask and its ability to retain more than 70 or 90 % respectively of the particles that it is exposed to”, says Jens Heiede, standardization director at Dansk Standard.

The degree of filtration will be stated on the packaging together with a declaration that the face mask conforms to the Danish standard, which will be designated DS 3000:2021. This means that producers can use the standard to document that the face mask complies with the requirements in the field, and that Danish consumers will find it easier to choose good and safe face masks for use in public.

Need for clear requirements

Both the Danish Medicines Agency and the Danish Safety Technology Authority have participated in the preparation of the standard for washable face masks for use in public:

“Setting minimum requirements for washable face masks is not normally within the Danish Medicines Agency's area of responsibility, but in this unusual situation we have entered into a constructive collaboration with Danish Standards, the Danish Safety Technology Authority, Danish test laboratories and the Danish Consumer Council with the ambition to assist citizens in navigating a market,

which is completely new to most people. It is our hope that this new standard will allow citizens to find good alternatives to disposable medical face masks”, says Katrine Bugge Skou, official at the Danish Medicines Agency.

“As there is an increasing demand for face masks, and as this specific type of face mask is unregulated, there is a clear need for a standard. There is no legal requirement to follow the standard, which is just some help to manufacturers of reusable face masks. However, if the product is marketed as produced according to the standard, it must comply with the requirements”, says Finn Lund Sørensen, official at the Danish Safety Technology Authority. He also points out that even though the product is made according to the standard, it is not personal protective equipment or a medical device that provides protection against viruses or bacteria.

Testing means higher safety

The standard also specifies the testing methods applied to determine whether the face mask meets the requirements. Among other things, the face mask must be tested while worn by users to ensure it fits well and stays in place even while talking and moving.

“To ensure the quality of products on the market, manufacturers need a number of specific requirements they can adjust to. The requirements aim at ensuring good products for consumers but also serve as a guideline to manufacturers, so that all play by the same rules. For consumers, this means that they can be more confident that the products function as intended, and for manufacturers it ensures that the market is not undermined by low quality products. Standardization of the market for face masks benefits everyone, both consumers and manufacturers”, explains Rasmus Forsberg, specialist at Force Technology.

The Danish standard for washable face masks for use in public spaces is up for consultation from 22 December to 22 January and is expected to be published at the beginning of February.

About the standard for face masks: DS 3000:2021

The standard for face masks for use in public spaces provides for several specific requirements regarding quality, efficiency, safety and testing methods. It also includes requirements for instructions for use, e.g., in relation to use and washing. The standard can also be applied to washable face masks for children from five years up.

The standard will both make it easier for consumers to choose a safe cloth face mask and for manufacturers to document the quality because the standard's number DS 3000:2021 and the filtration degree will appear on the packaging.

The sources of inspiration behind the Danish standard include a European guideline on face masks and other European standards for, e.g., medical bandages and protective masks, as well as experience from manufacturers, test laboratories and other experts in the field.

The standard has been prepared by a standardization committee under Danish Standards, whose members include the Danish Consumer Council, the Danish Medicines Agency, the Danish Environmental Protection Agency, the Danish Safety Technology Authority, the Danish Health and Medicines Authority, the National Serum Institute, Force Technology, the Danish Technological Institute, and the manufacturer Keepsafe.

A number of participants from the same committee as well as several other actors are also participating in the preparation of a European technical specification for cloth face masks, which is yet another step towards an actual European standard. Finalization of the European technical specification is expected in the first quarter of 2022. Due to the current urgent need, it was decided to prepare a Danish standard to help ensure the quality and safety of face masks for use in public spaces. The good Danish experiences from this work will be taken into consideration at European level. Everyone with insight into this field is welcomed to participate in the work and have a say in the content of the European technical specification

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Report 993559



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Test of Washable, Reusable Community Face Covering

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November 2021

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1. Assignment

ScanDes ApS has requested the Danish Technological Institute (DTI) to test their community face covering. This was performed in accordance with the guidelines for testing and requirements for community face coverings defined in DS3000:2021 ('Washable reusable community face coverings – Requirements and test methods').

The product was tested and evaluated based on the following methods and requirements (bracket denotes reference to specific section in DS3000:2021)

Visual & Functional defects (4.2.1)

Filtration (3 micrometer particles) (4.2.3)

Breathing Resistance (4.2.4)

Head Harness – tested durability according to Practical test on subject (4.2.5 / Annex C)

Fit & Comfort – tested according to Practical Test on subject (4.3 / Annex C)

The community face covering was tested as delivered by ScanDes and after one cleaning cycle. The cleaning cycle was defined by assignment. It should be noted that this cleaning cycle differs from the specifications in DS3000:2021.

A total of 12 specimens of the community face covering were used for the above-described tests.

The measurements were performed on the 27th of October to the 3rd of November 2021 at the Danish Technological Institute, Århus.

1.1. Disclaimer:

The report does not conclude on the filtration of viruses and bacteria, but rather on the filtration of aerosols of comparable sizes through the fabric material.

The method aims to assess the permeability of the material. This is a test that provides indicative results for the ability of the face mask to retain airborne particles (aerosols), and not a test of the finished face mask on a face. Thus, this report cannot be used as documentation for compliance as a medical device or personal protection equipment.

2. Conclusion

Table 1: Results for ScanDes ApS Face Covering according to DS3000:2021. Standard deviation in parenthesis.

Test	Visual inspection	Particle Filtration Efficiency	Breathing Resistance	Head Harness	Fit & Comfort
As delivered	OK	80.5% (±5%)	17.7 (±3) Pa/cm ²	OK	OK
After one cleaning cycle	OK	80.7% (±2%)	15.2 (±3) Pa/cm ²	OK	OK

The Danish guidelines (DS3000:2021) for community face coverings recommends filtration efficiency above 70% and breathability lower than 70 Pa/cm². The face mask under test complies with this.

3. Samples

20 specimens of the face coverings were delivered to the Danish Technological Institute (DTI) from ScanDes ApS (Figure 1). It was noted that the specimens were marked with the brand name "IMPACTAR".



Figure 1: Test specimen delivered by ScanDes ApS

4. Methodology and Equipment

The ability of the face mask to retain aerosols was tested in an experimental setup consisting of a specially designed tube assembly with an inner diameter of 8 cm (Figure 2). In the setup, flow is generated with a fan at the end of the test tube and controlled with a flow regulator and anemometer (Testo 435).

The face mask was unfolded and mounted in the setup in a leak-tight manner by clamping between two rubber O-rings in an adjustable closing mechanism. The inner side of the face mask is turned towards the incoming aerosols, hence simulating protection against spreading of droplets from the carrier.

Test aerosols were generated with a Palas AGK 2000 aerosol generator using a solution containing monodisperse Polystyrene Latex Beads with a size of 3,0 μm .

Partide number concentration was measured with an Optical Particle Sizer (OPS, TSI Model 3330).

The measurement was performed by alternately measuring the concentration on the front ("downstream") and back ("upstream") (point 2 and 3, respectively, in Figure 2) of the fabric material for a period of at least 2 minutes. Prior to each test, a stable concentration of aerosols in the setup was ensured.

The filtration efficiency reported here was calculated as.

$$\eta(\%) = \frac{C_{\text{upstream}} - C_{\text{downstream}}}{C_{\text{upstream}}} \times 100$$



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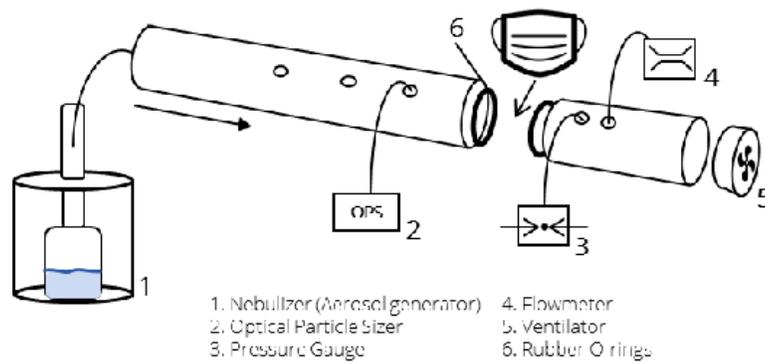


Figure 2: Schematic overview of test setup

The pressure difference (for determining breathability) was measured in the same setup as described above, with no aerosols added. Air was drawn through the face mask and the pressure drop was measured between the ambient air and a measuring port on the suction side of the face mask (point 3 in Figure 2). The pressure difference was measured with a manometer (Testo 521).

The cleaning cycle was performed according to instructions of the assignor. The face covering was placed in a bowl and poured over with boiling water and picked up after 3 minutes and hung to dry at room temperature.



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