AFNOR SPEC S76-001

27 March 2020

Barrier masks

Guide to minimum requirements, methods of testing, making and use

Serial manufacture and artisanal making (or DIY)

www.afnor.org

Acknowledgements

Standardization is an activity serving the general interest for the purpose of providing reference documents developed on the basis of consensus by all interested parties, concerning rules, characteristics, recommendations and examples of best practices relative to products, services, methods and processes or to organizations.

These guidelines have been developed at the initiative of AFNOR in the framework of its general interest mission.

Please note that this specification was produced, without any physical meeting, in a period of national confinement and in the space of one week, shortly after qualification of COVID-19 as a pandemic by the WHO. These guidelines, the result of in-depth work, have been drawn up in an emergency situation, in an open way and shared by a large number of parties and involving collaboration by more than 150 experts.

This document will be shared with our counterparts in other countries, both French speaking and non-French speaking, within the international ISO community, wholly mobilized to fight the pandemic.

I would personally like to thank all the contributors who gave their very best to this cause, in particular the drafting team led by Ewa MESSAOUDI (HONEYWELL Respiratory Safety Products and Chairperson of the AFNOR/S76A commission “Respiratory protective devices”), comprising Rim CHAOUY, Christian MAYEUR, Rémi REUSS and Matthis ROUSSEL (AFNOR) and also Laurent HOUILLON (BNITH/IFTH) and Olivier VILA COBARSI (APAVE SUDEUROPE) for their expert contributions. Lastly my thanks to CD, DF, DM and YM for their invaluable assistance.

Olivier Peyrat, CEO of AFNOR

Contents

Foreword

The “barrier mask” device is intended to complement protective measures and social distancing rules. It is intended for the general public and in particular any healthy or asymptomatic person.

The barrier mask in no way exonerates the user from routine application of the protective measures, which are essential, and of the social distancing rules.

This device is not intended to be used by health workers in contact with patients. FFP2 type filtering masks and masks for medical (or surgical) use are intended to be used by and are reserved for health workers.

This device is not a medical device in the sense of Regulation EU/2017/745, nor is it personal protective equipment in the sense of Regulation EU/2016/425.

This document has not been subject to the approval procedure and cannot under any circumstances be regarded as a French standard. Barring any regulatory provision to the contrary, its use is entirely voluntary and it is published in the collection of standardization documents with the status of AFNOR-SPEC.

This document may change in terms of both content and form. This would be to correct any errors or imprecisions and naturally to make any improvements arising from feedback from experience that AFNOR may receive. Readers are therefore encouraged to read the document critically, to regularly consult the versions made available on the AFNOR website and on the AFNOR site itself that will usefully complement the content of this document.

More information here: https://bit.ly/barrier-masks

Download the most recent version of the AFNOR Spec – Barrier masks document

The signatories shall not be held liable in any respect whatsoever.

1. Scope

A barrier mask is intended for use by healthy people not presenting any clinical symptom of viral infection and not in contact with people presenting such symptoms.

Wearing of the mask is restricted to half a day and constitutes a protective barrier against possible penetration of the virus in the user's mouth and nose area or from a nearby person. It is intended to protect this area against any contact with the hands.

Use of the barrier mask is envisaged for example for a person leaving their home to go to their place of work or to shop for essential items in authorized establishments. This device can contribute to the protection of a whole group wearing this barrier mask.

Only limited protection against the said risk is claimed.

Unless otherwise stipulated in regulatory requirements, wearing of the barrier mask is not mandatory.

This document specifies the minimum requirements for the manufacture, design and performance of the barrier masks and also the testing methods for the barrier masks, which may be reusable, intended to reduce the risk of general transmission of the infectious agent.

It harmonizes the minimum requirements applicable to devices that are alternative to respiratory protective masks and surgical masks and provides support for potential makers of these barrier masks.

This document contains design and use recommendations for industrial serial manufacture that could be performed by non-specialists in the design of barrier masks, and also for artisanal making (or DIY) by people having the necessary materials and competences.

> **IMPORTANT The barrier mask is not subject to a conformity assessment by notified bodies or laboratories. Its design in accordance with accepted best practices and production quality control remains the manufacturer's sole responsibility.**

> **IMPORTANT The manufacturer is permitted to conduct verification and validation tests within its enterprise or in collaboration with a test laboratory that has the appropriate means of testing.**

> **IMPORTANT We draw attention to the fact that the barrier mask will have maximum effectiveness if it is worn in direct contact with bare skin.**

This document does not apply to filtering half masks used as respiratory protective devices against particles and covered by NF EN 149:2006+A1:2009, nor to medical face masks covered by NF EN 14683+AC:2019.

> **WARNING The barrier mask does absolutely not exonerate the user from application of the protective measures and social distancing measures which are essential.**

2. Terms and definitions

For the purposes of this document, the following terms and definitions apply.

2.1. Exhaled air

Air breathed out by the wearer

2.2. Inhaled air

Air breathed in by the wearer

2.3. Head harness

Means of holding a barrier mask in place on the head

2.4. Barrier mask

Facepiece covering the mouth, nose and chin fitted with a head harness

2.5. Breathing resistance

Resistance of a barrier mask to the flow of air inhaled (inhalation resistance) or exhaled (exhalation resistance)

2.6. Exhalation valve

Non-return valve which allows the escape of exhaled air from the facepiece

2.7. Inhalation valve

Non-return valve which allows breathable gas to enter the facepiece and prevents exhaled air from leaving via the inlet path

3. Description

A barrier mask covers the nose, mouth and chin (protection area see Figure 1) and shall not incorporate any exhalation and/or inhalation valve(s).

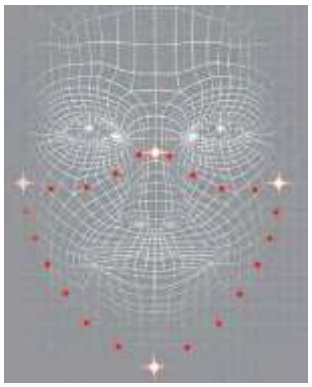


Figure 1 — The barrier mask's protection area

The barrier mask is a single layer or a multi-layer composite made of fabrics (nonwoven, woven, knit) with or without film. It has a device for adjustment on the user's head (head harness).

It shall be able to be adjusted to fit closely over the nose, cheeks and chin of the wearer to ensure sufficient sealing of the user's face against the ambient atmosphere, when the user's skin is dry or damp or when the user moves his/her head.

Inhaled air mostly penetrates the barrier mask through the single layer or multi-layer composite and arrives directly in the region of the nose and mouth. Exhaled air is discharged via the same route directly into the ambient atmosphere.

The barrier mask may have different shapes and structures as described in section 8.

4. Designation

The barrier masks against COVID-19 that meet the requirements of this document shall be designated as follows:

Barrier Mask AFNOR SPEC S76-001:2020

5. Requirements

5.1. General

5.1.1. Visual inspection

Visual inspection of the mask or of its components and verification of the corresponding technical documents shall be carried out.

5.1.2. Dimensions

The barrier mask against COVID-19 shall be sized in such a way as to correspond to the average morphology of the target French population.

The proposed dimensions are based on certain anthropomorphic data in ISO/TS 16976-2:2015 “Respiratory protective devices - Human factors - Part 2: Anthropometrics”.

			
Bigonial breadth 132.5 – 144.5 mm	Menton-sellion length 123 – 135 mm	Interpupillary distance 65 – 71 mm	Bitragion chin arc 295 – 315 mm

Figure 2 — Diagram of the dimensions to be taken into account

5.1.3. Packaging

The barrier masks shall be packaged in such a way as to protect them against any mechanical damage and any contamination before use. Individual or grouped packaging solutions are at the manufacturer's discretion.

Testing shall be performed in accordance with 6.1.1.

5.1.4. Materials

The materials used shall be able to withstand handling and wear throughout the lifetime of the barrier mask, indicated by the manufacturer.

There is a list of recommended materials for making the barrier mask in Annex A. The source making claims about performances is given.

5.1.5. Cleaning and drying

The barrier mask is designed to be reusable; the materials used shall withstand the cleaning and drying products and methods specified in sections 5.2.1 or 5.3.1.

The test described in 6.1.1 shall be carried out after each wash cycle. If any damage to the barrier mask is detected (less well-fitting, deformation, wear, etc.) after a wash cycle, the barrier mask is deemed non-compliant.

5.1.6. Surface condition of the parts

The parts of the barrier mask likely to be in contact with the user shall be free of sharp edges and burrs.

Testing shall be performed in accordance with 6.1.1.

5.1.7. Penetration of the single layer or multi-layer composite

Penetration of the barrier mask shall have either a filtering capacity of 70% for solid particles or for liquid particles (droplets) with size as indicated below:

	Solid particle	Liquid particle (droplet)
Test method	EN 13274-7, section 6 Sodium chloride test method	EN 13274-7, section 7 Paraffin oil test method
	In accordance with the test protocol of the French Directorate General of Armaments (DGA) circulated in a letter of 25 March 2020.	
NOTE The particle size spectrum can extend to a limit of 3 µm.		

Table 1 — Penetration of the single layer or multi-layer composite for a barrier mask

The retention efficiency applies to masks that have undergone the number of washes indicated by the manufacturer.

Testing shall be performed in accordance with 6.2.2.

Specific requirements for artisanal making (or DIY) are described in section 5.3.2.

5.1.8. Harmlessness as regards the skin and inhaled air

Materials that may come into contact with the user's skin shall not present known risks of irritation or adverse effects on health.

Materials that may release irritating substances into the inhaled air shall not constitute a hazard or nuisance for the user.

Testing shall be performed in accordance with 6.1.1.

5.1.9. Head harness

The head harness shall be designed such that the barrier mask can be easily put on and removed.

It shall be sufficiently robust to hold the barrier mask in place in such a way as to avoid excessive tightness and discomfort when worn.

The head harness can go around the user's head or ears.

It can be made using an elastic strip or a fabric tie of the bias tape-type or other type, attached to the single layer or multi-layer composite. It can be sewn or welded. Other attachment methods are permitted.

NOTE Use of staples can constitute a hazard or nuisance to the user.

Testing shall be performed in accordance with 6.1.1 and 6.1.2. (see also 6.2.3 for serial manufacture).

5.1.10. Breathing resistance

The material used for the barrier mask shall not present inhalation resistance exceeding the following limits:

a/ Method 1: Determined by experts consequent to the technical specifications for the single layer or composite multi-layer:

— Splash resistance pressure of 160 mbar;

— Differential pressure of the material used shall not be greater than 0.6 mbar/cm².

Or

b/ Method 2: Dynamic sinusoidal flow test

— Inhalation resistance: 2.4 mbar;

— Exhalation resistance: 3 mbar.

Or

c/ Method 3: Constant flow test

— Inhalation resistance: 2.4 mbar;

— Exhalation resistance: 3 mbar.

Testing shall be performed in accordance with 6.2.4.

Specific requirements for artisanal making (or DIY) are described in section 5.3.3.

5.2. Specific requirements for serial manufacture

5.2.1. Cleaning and drying

It is recommended that the barrier mask withstands at least 5 wash cycles. The full wash cycle (wetting, washing, rinsing) shall be at least 30 minutes (laundry or other) with a wash temperature of 60°C and professional products. See the detailed recommendations in section 9.4.

5.3. Specific requirements for artisanal making (or DIY)

5.3.1. Cleaning and drying

The barrier mask is designed to be reusable; the materials used shall withstand the cleaning products and methods specified by the manufacturer of the single layer or multi-layer composite.

It is not recommended to use specific products other than those normally used for washing without being certain beforehand that they are non-toxic in terms of inhaled residues, and that their use does not damage the materials. The full wash cycle (wetting, washing, rinsing) shall be at least 30 minutes with a wash temperature of 60°C.

See the detailed recommendations in section 9.4.

5.3.2. Penetration of the single layer and multi-layer composite

So as to ensure that the penetration requirement for the single layer or multi-layer composite is met, the barrier mask shall be composed of one of the single layers or multi-layer composites listed in Annex A. This list is likely to change and manufacturers may if they wish view the updated list at the address given in Annex A.

5.3.3. Breathing resistance

So as to ensure that the breathing resistance requirement for the single layer or multi-layer composite is met, the barrier mask shall be composed of one of the single layers or multi-layer composites listed in Annex A. This list is likely to change and manufacturers may if they wish view the updated list at the address given in Annex A.

6. Test methods

6.1. General

6.1.1. Visual inspection

Visual inspection is carried out by the manufacturer or test laboratory on brand new samples.

6.1.2. Head harness strength test

Verification of the tensile strength of the head harness is done by putting on and removing the barrier mask 5 times.

Specific tests for serial manufacture are described in section 6.2.3.

6.2. Specific test methods for serial manufacture

6.2.1. General

There is a list of French laboratories able to carry out tests on the barrier mask in Annex B.

The test methods for the purpose of validating the performance of barrier masks are based, in particular, on the existing methods and test equipment available in France.

6.2.2. Single layer or multi-layer composite penetration test

Validation of the material can be done in accordance with the following requirements of:

- EN 13274-7:2019 on 3 samples after the number of washes specified by the mask manufacturer;
- In accordance with the French Directorate General of Armaments' (DGA) test protocol on 3 samples after the number of washes specified by the mask manufacturer;
- Determined by experts consequent to the technical specifications for the single layer or composite multi-layer.

The tests are conducted either with an aerosol flow of NaCl (solid particle) or of paraffin oil (liquid particle) with samples that have undergone the number of washes recommended by the manufacturer.

6.2.3. Head harness strength test

Verification of the tensile strength of the head harness is done on at least 3 test subjects with different morphologies.

6.2.4. Breathing resistance test

Verification of breathing resistance is done, for method 2, on a breathing machine set to 30 l/min (20 x 1.5) l/min.

Verification of breathing resistance is done, for method 3, for a constant flow of 160l/min.

7. Marking and information/instructions

The barrier masks shall be clearly and durably marked on the smallest marketable package available or shall be legible through the packaging if the packaging is transparent.

a/ The name, trademark or any other means of identification of the manufacturer or supplier.

b/ The number of this document and the visible wording “Barrier mask”.

c/ The recommended period of use for the barrier mask.

d/ The cleaning instructions (number of washes, washing and drying method).

e/ The following instruction: “This device is not a medical device in the sense of Regulation EU/2017/745 (surgical masks) nor is it personal protective equipment in the sense of Regulation EU/2016/425 (filtering masks type FFP2).”

f/ A pictogram of how to put the barrier mask in place may be substituted for the instructions.

Figure 3 — Instructions on putting on the barrier mask

8. Making a barrier mask

8.1. General

The dimensions and shape of the pieces of the single layer or multi-layer composite shall be designed such that on completion of assembly with the head harness (and if applicable the nose bridge), the barrier mask can be adjusted to the user's morphology.

Assembly of the pieces can be done by ultrasonic welding or by stitching.

At the time of making, the hygiene conditions shall be controlled such as to reduce risks of contamination. The hygiene conditions are at the manufacturer's discretion.

Making shall be followed by cleaning of the barrier masks before packaging and before use.

An example of a "duckbill" type barrier mask is given in 8.2. An example of a "flat-fold" barrier mask is given in 8.3.

Examples of 1:1 to-scale patterns (ready to print or cut out) are available on the website: https://bit.ly/barrier-masks.

8.2. "Duckbill" type barrier mask

8.2.1. Dimensioning

8.2.1.1. Single layer or multi-layer composite

It is recommended to use the following sizing for the single layer or multi-layer composite of the "duckbill" type barrier mask:

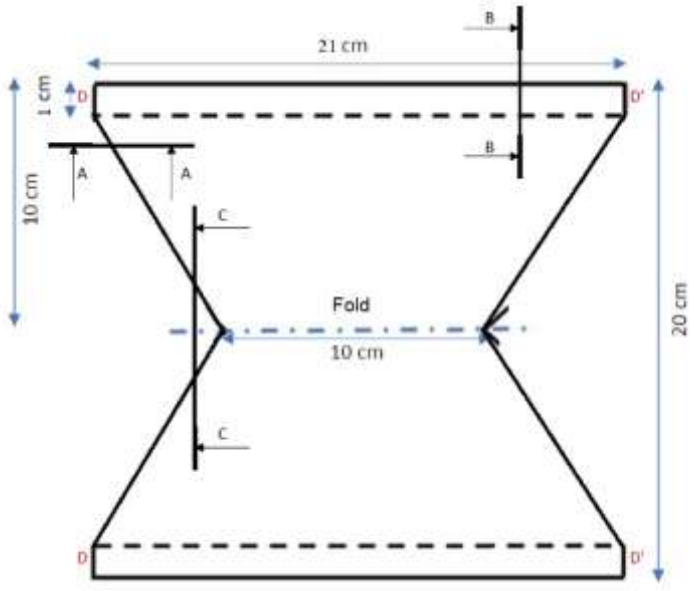


Figure 4 — Duckbill - Sizing for the single layer or multi-layer composite

8.2.1.2. Head harness

It is recommended to use the following sizing for the head harness of the "duckbill" type barrier mask:

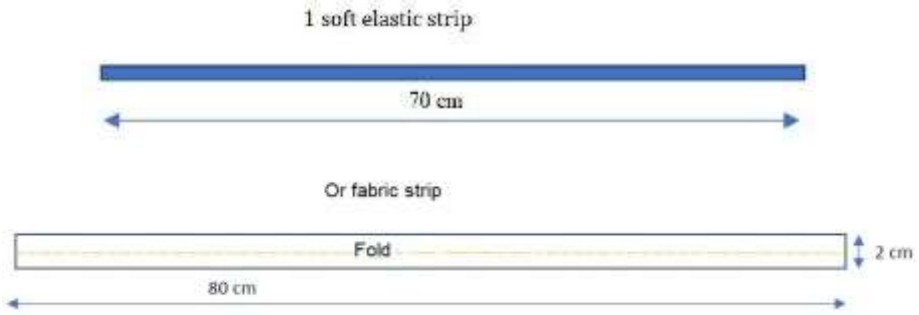
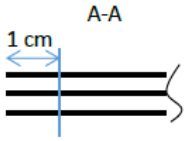
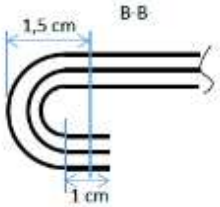
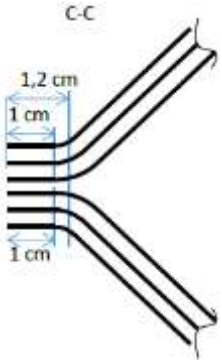


Figure 5 — Duckbill - Sizing of head harness

8.2.2. Procedure

To make a “duckbill” type barrier mask, it is recommended to follow the following steps. The stitch types described for serial manufacture follow the standard NF ISO 4915:2015.

		Necessary equipment
a) Prepare the single layer piece or multi-layer composite pieces as shown in section 8.2.1.1;		Industrial: Cutting table Artisanal (or DIY): Scissors
b) Make up, if applicable, the multi-layer composite;		
c) Edge stitch (pre-stitch) all around the piece 1 cm from the edges;		Industrial: stitch 301 or 401 or 504 Artisanal: flatbed sewing machine, straight or zigzag stitch
d) Hem the 2 long edges, so that the hem is on the inside;		Industrial: stitch 301 or 401 Artisanal: flatbed sewing machine, straight stitch
e) Fold along the fold line, right sides together (outer fabric surface against outer fabric surface) and stitch the edges. Turn;		Industrial: stitch 301 or 401 or 504 Artisanal: flatbed sewing machine, straight stitch
f) Prepare a head harness (two soft elastic strips or two fabric strips) as indicated in section 8.2.1.2.		

g) Assemble the head harness on the masks;	On the mask, turn down the point formed at point D (see pattern) to the inside of the mask. Thread the elastic strip under the point. Fix the point in position by sewing it down (parallel to the elastic strip) or by welding it. Repeat this operation with the other point formed at point D' (see pattern). Assemble (or knot) the 2 ends of the elastic strip. Fixed in this way, the elastic strip can slide.	Industrial: ultrasonic (continuous system of electrode wheel type) stitch 301 Artisanal: flatbed sewing machine, straight stitch

Figure 6 — Example of "duckbill" type barrier mask

8.3. “Flat-fold” barrier mask

8.3.1. Dimensioning

8.3.1.1. Single layer or multi-layer composite

It is recommended to use the following sizing for the single layer or multi-layer composite of the “flat-fold” barrier mask:

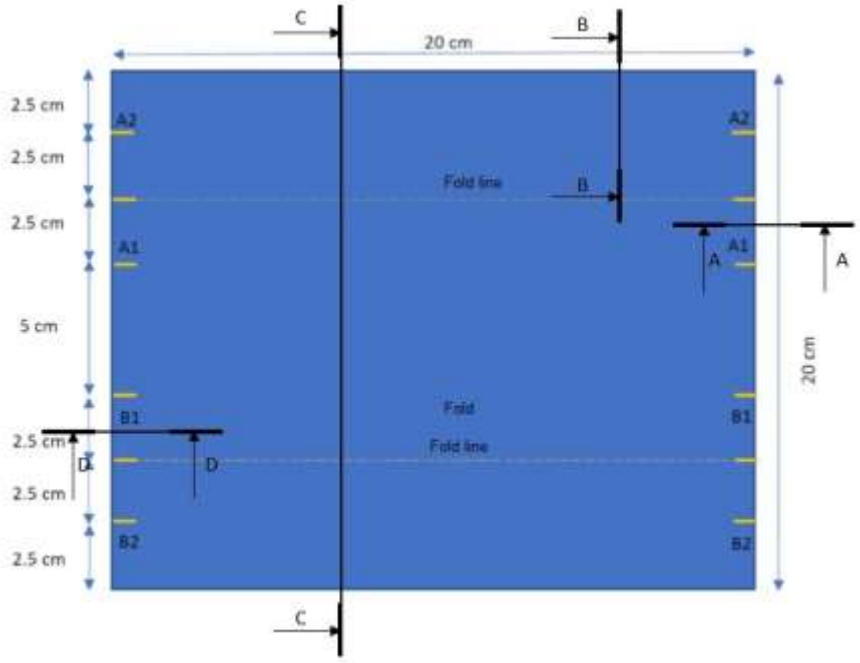


Figure 7 —Flat-fold - Dimensioning of the single layer or multi-layer composite

Making of the fabric mask can also be performed using pattern-making of different pieces assembled by seaming.

8.3.1.2. Head harness

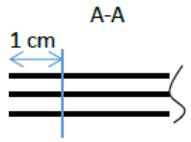
It is recommended to use the following sizing for the head harness of the “flat-fold” barrier mask:

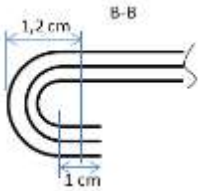
Figure 8 — Flat-fold - Sizing of the head harness

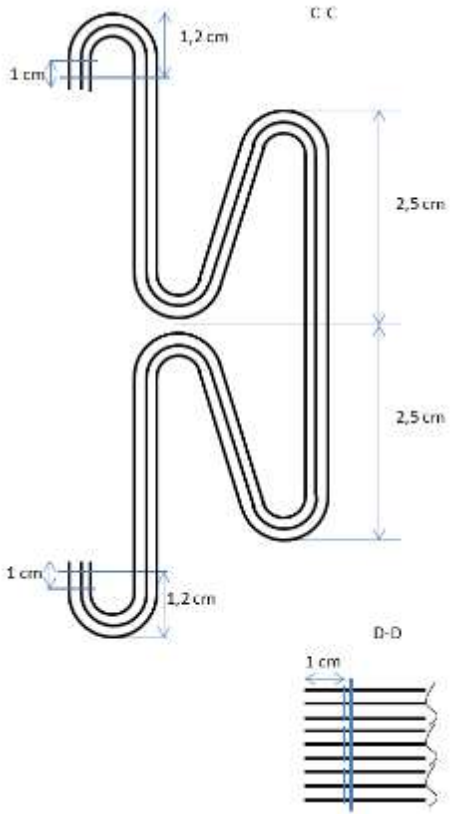
8.3.2. Procedure

To make a “flat-fold” barrier mask, it is recommended to follow the following steps. The stitch types described for serial manufacture follow the standard NF ISO 4915:2015.

		Necessary equipment
a)	Prepare the single layer piece or multi-layer composite pieces as described in section 8.3.1.1;	Industrial: Cutting table Artisanal (or DIY): Scissors
b)	Make up, if applicable, the multi-layer composite;	
c)	Edge stitch (pre-stitch) all around the piece 1 cm from the edges;	Industrial: stitch 301 or 401 or 504 Artisanal: flatbed sewing machine, straight or zigzag stitch
d)	Hem the top and bottom of the barrier mask turning in a 1.2 cm hem;	Industrial: stitch 301 or 401 Artisanal: flatbed sewing machine, straight stitch
e)	Stitch the pleats folding A1 onto A2 then B1 onto B2 for the first edge;	Industrial: stitch 301 or 401 Artisanal: flatbed sewing machine, straight stitch
f)	Stitch the pleats folding A1 onto A2 then B1 onto B2 for the second edge;	
g)	Prepare a head harness (two soft elastic strips or two fabric strips) as indicated in section 8.3.1.2.	







h)	For an elastic harness, for passing behind the ears, edge stitch one elastic strip onto the right edge at the top and bottom (elastic strip facing inward) then edge stitch the other elastic strip onto the left edge at the top and bottom (elastic strip facing inward). For an elastic harness, for passing behind the head, edge stitch one elastic strip onto the right edge at the top then onto the left edge at the top (elastic strip facing inward) then edge stitch the other elastic strip onto the right edge at the bottom then onto the left edge at the bottom (elastic strip facing inward). For a fabric harness, edge stitch one fabric strip on the right edge and another onto the left edge.	Industrial: ultrasonic (continuous system of electrode wheel type) stitch 301 Artisanal: flatbed sewing machine, straight stitch

Figure 9 — Example of “Flat-fold” barrier mask

9. Use of a barrier mask

9.1. General

The barrier mask does absolutely not exonerate the user from application of the protective measures and social distancing measures which are essential.

Please refer to the local regulations for relevant health instructions.

In a French context, the health instructions are given on the French government's website: https://www.gouvernement.fr/info-coronavirus.

Instructions for use, an image and poster bank and links to websites offering tutorials can be found on the AFNOR website: https://bit.ly/barrier-masks

Remember that collective protective measures including social distancing, shall be taken as a priority over personal protective measures.

Use of the barrier mask shall be done taking account of compatibility of its use with the wearing of personal protective equipment (PPE) (protective goggles, protective helmet, personal noise protectors, etc.).

9.2. Putting on a barrier mask

To be effective, the barrier mask must be used correctly. For this, it is recommended to wear the mask on bare skin (in other words without the presence of hair in contact with the user's skin and, for certain people, a shaven skin) and to comply with the following steps:

a/ Wash your hands with soap and water or rub with a hydroalcoholic solution before any handling of the mask;

b/ For reuse of the mask, ensure that it has been properly washed beforehand in accordance with the recommendations in section 9.4;

c/ Locate the top of the mask;

d/ Place the barrier mask on the face, with the nose bridge (if it exists) on the nose;

e/ Hold the barrier mask on the outside and pass the elastics strips or fabric ties of the head harness behind the head, at either side of the ears, without crossing them;

f/ Pull down the bottom of the barrier mask under the chin;

g/ Check that the mask covers the chin properly;

h/ Pinch the nose bridge (if it exists) with both hands to adjust it over the nose;

i/ Check that the barrier mask is correctly positioned. This should be done by checking the sealing and that there is no breathing discomfort. To verify sealing, cover the mask with a plastic film and when inhaling, the mask should flatten against the face;

WARNING Use of a plastic bag for verification purpose is definitely excluded.

j/ Once adjusted, no longer touch the face mask with the hands. Each time the barrier mask is touched, the user must wash the hands with soap and water or rub with a hydroalcoholic solution;

EXAMPLE **Examples of posters describing how to position the mask and check on sealing.**

Figure 10 — Example of poster describing how to put the mask in place and check on sealing (INRS: http://www.inrs.fr/media.html?refINRS=A%20758)

NOTE The barrier mask shall not contain inhalation valve(s) and/or exhalation valve(s).

Figure 10 — Example of poster describing how to put the mask in place and check on sealing (INRS: http://www.inrs.fr/media.html?refINRS=A%20759)

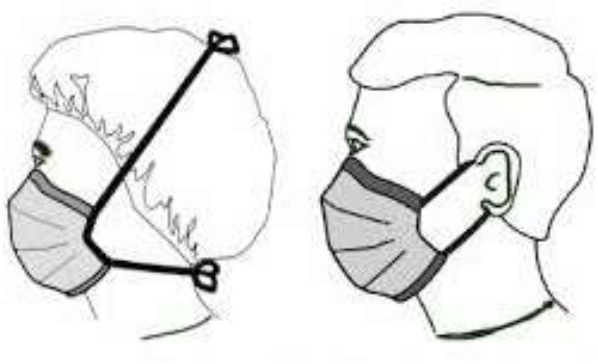


Figure 11 — Positioning of the head harness depending on models

9.3. Removing a barrier mask

In order not be contaminated when removing a barrier mask, it must be correctly removed and isolated, either to be thrown away, or to be washed. For this, the recommendations are:

a/ If wearing protective gloves, it is necessary to first remove these;

b/ Wash your hands with soap and water or rub with a hydroalcoholic solution;

c/ Remove the barrier mask by holding the back of the elastic strips of the head harness without touching the front part of the barrier mask;

d/ Place a barrier mask to be thrown away in a specific container as described in section 9.5;

e/ Place a barrier mask to be washed in a specific container (clean plastic bag);

f/ Wash your hands with soap and water or rub with a hydroalcoholic solution;

g/ Clean the outside of the specific container with a cleaning product.

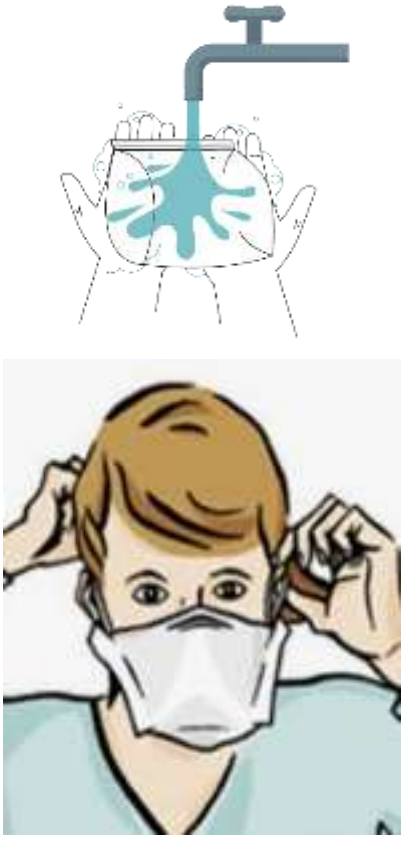


Figure 12 — Removal of the mask holding it as far as possible by the head harness

9.4. Washing and drying a barrier mask

Washing and drying of the barrier mask shall be in accordance with the manufacturer's specifications (instructions for use, washing instructions or training).

Any contact between a dirty barrier mask (to be washed) and clean items of clothing should be avoided. Those responsible for washing should protect themselves in order to handle dirty masks if they are not in a water-soluble bag.

Before any washing of barrier masks, it is recommended to clean your washing machine by doing a cold rinse with bleach or operating it empty at 60°C or 95°C without spinning.

It is not recommended to use specific products other than those normally used for washing without being certain beforehand that they are non-toxic in terms of inhaled residues, and that their use does not damage the materials. The full wash cycle (wetting, washing, rinsing) shall be at least 30 minutes with a wash temperature of 60°C.

NOTE Use of a softener is not recommended.

Washing of barrier masks can be done with old sheets in the machine, to retain the mechanical aspect of the washing.

Complete drying of the barrier mask is recommended within under two hours after washing is finished. Barrier masks shall not be dried in the open air. In an industrial laundry, dryers and drying machines should be used. For domestic drying, a dryer should be used and the dryer filters should be cleaned (and hands washed afterwards). In all cases, the barrier masks must be completely dried (in other words all the core layers), or even over-dried.

NOTE It is not recommended to clean barrier masks with a microwave.

A visual inspection (with protective gloves or washed hands) shall be carried out before each wash cycle. If any damage to the barrier mask is detected (less well-fitting, deformation, wear, etc.) the barrier mask shall be thrown away.

9.5. Disposing of a barrier mask

The barrier masks must be disposed of in a bin fitted with a plastic bag (preferably with a lid and non-hand operation, see Figure 14). Double bagging is recommended to retain the contents of the first bag in the case of tearing of the outer bag during collection.

Figure 13 — Example of bin with lid and non-hand operation

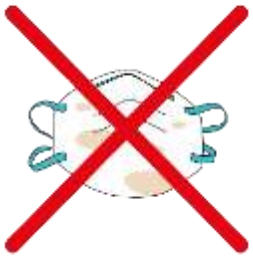
A water-soluble bag can be used - during the washing phase if the mask permits this - so as to limit contact between people and dirty masks.

Dirty barrier masks can be disposed of in bins for biological waste (Figure 15).

Figure 14 — Example of bin for biological waste

9.6. Period of use of the barrier mask

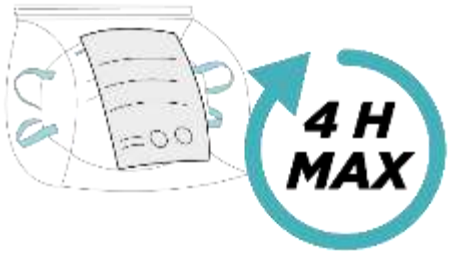
The barrier mask must be washed each time it is dirty, wet or poorly positioned on the face. It should not be put in a waiting position on the forehead or under the chin during and after use.



Do not reuse any dirty or wet barrier mask.

During a single 4-hour period, the mask may be used several times subject to the fact that it is removed each time according to the instructions, stored temporarily or hung up so that there is as little contact as possible, and put on again according to the instructions.

The wearing period shall be compliant with the instructions for use if they exist. In all cases, it shall be less than 4 hours over a single day (equivalent to half a day).



9.7. Reminder on essential protective measures even when wearing the barrier mask

Please refer to the local regulations for relevant health instructions.

In the French context, the health instructions are given on the French government's website: https://www.gouvernement.fr/info-coronavirus.

Figure 15 — COVID-19 protective measures

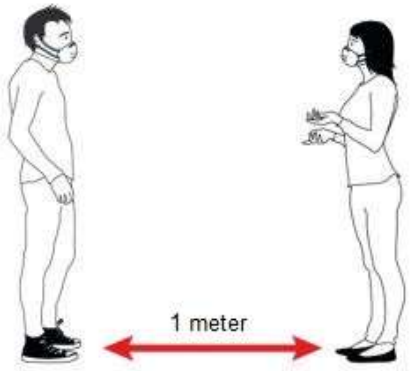


Figure 16 — Compliance with social distancing rules (at least one meter), even with a mask

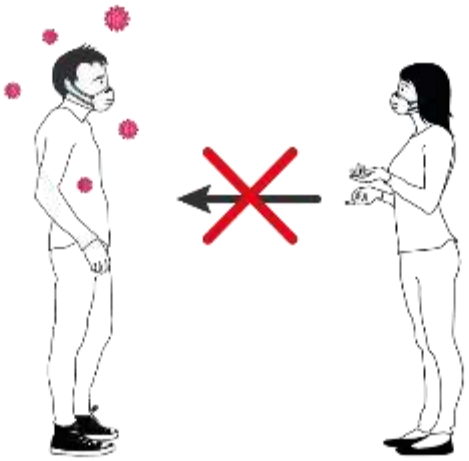
9.8. Use of a barrier mask: what must be definitely avoided!

The following list contains examples of uses of barrier masks that must be definitely avoided and is based on identified feedback from experience:

a/ The barrier mask must never be used for protection against chemicals.

b/ The barrier mask must not be frozen: the viral agent would simply be retained and at 4°C it would fully keep its infectious character.

c/ Social distancing rules (at least one meter) must be complied with, even if wearing a protective mask.



Annex A *(informative)*

List of recommended materials for making the barrier mask

A.1 General

The lists of materials and results come from the following sources:

— (1) The French Directorate General of Armaments (DGA). The table containing the list of materials in A2 summarizes the main characteristics of the multi-layer composites controlled in accordance with the DGA test protocols and the results of the verifications (updated 25 March 2020);

— (2) The French Society for Hospital Hygiene (SF2H) and the French Society for Sterilization Sciences (SF2S) (use of sterilization wraps based on meltblown nonwovens of the type SMS/SMMS). The table containing the list of materials in A2 summarizes the main characteristics of sterilization wraps based on meltblown nonwovens of the type SMS/SMMS (updated 21 March 2020).

AFNOR does not make any commitment on the performance of the materials cited by the different sources. It is recommended that the manufacturer consults the source concerning use of the materials and that supplies of materials are accompanied by certificates of origin.

Additional information on materials can be found in the following studies:

— Study and development of nonwoven fibrous structures dedicated to air filtration of fine particles, Julien Payen. http://www.theses.fr/2009VALE0037 (thesis);

— Antibacterial functionalization of nonwoven filter media, Gwladys Bénistant. http://www.theses.fr/2010VALE0051 (thesis)

A.2 List of materials

No.	Single layer or multi-layer composite					Conformity with requirements		Source
	Structure	Name	Composition	Basis weight (g/m²)	Comments	Air permeability, vacuum pressure (100 Pa) (breathability)	Splash protection (3 µm)	
1	Interlock knit			150		Nonconforming	OK	(1)
	Membrane	Nano membrane		30				
	Interlock knit			150				
2	Woven, plain weave		Cotton	150		OK	OK	(1)
	Nonwoven		Viscose	130				
	Woven, plain weave		Cotton	150				
3		Microfibre		100		Nonconforming	OK	(1)

No.	Single layer or multi-layer composite					Conformity with requirements		Source
	Structure	Name	Composition	Basis weight (g/m²)	Comments	Air permeability, vacuum pressure (100 Pa) (breathability)	Splash protection (3 µm)	
4		Polycotton	Cotton, polyester			Nonconforming	OK	(1)
	Nonwoven, wadding type		Polyester (textured)		Overall basis weight: 260 g/m²			
		Polycotton	Cotton, polyester					
5	Woven	Poplin "120 thread"	Cotton		"Duckbill" type barrier mask	Nonconforming	OK	(1)
	Woven	Poplin "120 thread"	Cotton					
6	Woven	Poplin "120 thread"	Cotton		"Flat-fold" barrier mask	OK	OK	(1)
	Woven	Poplin "120 thread"	Cotton					
7	Knit (flat-knit, weft insertion)		100% polyamide	25	2-layer laminate by chemical bonding	OK	Not suitable	(1)
	Nonwoven		100% polyester					
8	Knit (flat-knit, weft insertion)		100% polyamide	25	2-layer laminate by thermal bonding	OK	OK	(1)
	Nonwoven		100% polyester					
9	Woven			270		Nonconforming	OK	(1)
		Microfleece	100% polyester	125				
	Woven			200				
10	Nonwoven		Polypropylene	60		OK	OK	(1)
	Nonwoven		Polypropylene	60				

No.	Single layer or multi-layer composite					Conformity with requirements		Source
	Structure	Name	Composition	Basis weight (g/m²)	Comments	Barrier Filtration Efficiency (BFE)	Breathing resistance	
11	Nonwoven, SMS	Reliance SMS 200		43	Amcor® Single and double layer	×	Not tested	(2)
12	Nonwoven, SMS	Reliance SMS 300		50	Amcor® Single and double layer	×	Not tested	(2)
13	Nonwoven, SMS	Reliance SMS 400		60	Amcor® Single and double layer	×	Not tested	(2)
14	Nonwoven	H100			Halyard® Single and double layer	×	Not tested	(2)
15	Nonwoven	H200			Halyard® Single and double layer	×	Not tested	(2)

No.	Single layer or multi-layer composite					Conformity with requirements		Source
	Structure	Name	Composition	Basis weight (g/m²)	Comments	Barrier Filtration Efficiency (BFE)	Breathing resistance	
16	Nonwoven	H300			Halyard® Single and double layer	×	Not tested	(2)
17	Nonwoven	H400			Halyard® Single and double layer	×	Not tested	(2)
18	Nonwoven	H500			Halyard® Single and double layer	×	Not tested	(2)
19	Nonwoven, SMS	Sterichamps S4			Sterimed® Paul HARTMANN Double layer **Single use** **Washing impossible**	×	Not tested	(2)

Complementary information can be found at the AFNOR website www.afnor.org

A.3 Head harness list

No.	Head harness				Conformity with requirements		Source
	Structure	Composition	Basis weight (g/m²)	Comments	Tensile strength	5 wash cycles	

For reference only.

Complementary information can be found at the AFNOR website www.afnor.org

A.4 Recommendations for artisanal (or DIY) making

Recommendations	
— Use tightly constructed fabrics; — Assemble in two or three layers (same fabrics or different fabrics); — Use fabrics allowing air to pass through when breathing; — Use fabrics that are sufficiently soft and supple to apply around the face to ensure sealing; — Use fabrics that are not too warm; — Use smooth, non-irritating fabrics;	— Do not use light and loosely constructed fabrics; — Do not make a mask with a single thickness of fabric; — Do not use staples when designing or assembling the barrier mask; — Do not use fabrics blocking the passage of air when breathing; — Do not use fabrics that are too stiff that would not be appropriate for sealing; — Do not use warm fabrics that would make masks difficult to wear; — Do not use irritating fabrics that would make masks difficult to wear; — Do not make vertical seams, along the nose, mouth and chin;

Annex B *(informative)*

List of French laboratories able to conduct tests on barrier masks

The following list contains laboratories able to conduct the tests as described in section 6 of this document. (The laboratories cited do not all have ISO 17025 accreditation.)

		Tests that can be conducted				
Laboratory name	**Contact**	**Penetration of the single layer or multi-layer composite (§ 5.1.7.)**			**Breathing resistance (§ 5.1.10.)**	
		Method 1 EN 13274-7 §6 Sodium chloride test method	**Method 2** EN 13274-7 §7 Paraffin oil test method	**Method 3** DGA procedure	**Method 2** Dynamic sinusoidal flow test	**Method 3** Constant flow test
APAVE EUROPE	Ms Marjorie SAINT GENIS marjorie.saintgenis@apave.com	×	×		×	×
HONEYWELL	Ms Ewa MESSAOUDI ewa.messaoudi@honeywell.com				× (temporary support)	
IRSN	Mr Victor MOCHO victor.mocho@irsn.fr	×				
LNE	Mr François GAIE-LEVREL francois.gaie-levrel@lne.fr	×	×	×		
MATISEC	Mr Benoit BOUTILLIER b.boutillier@matisec.fr				×	

Bibliography

NF EN 132:1999, *Respiratory protective devices – Definitions of terms and pictograms*

NF EN 149:2001+A1:2009, *Respiratory protective devices – Filtering half masks to protect against chemicals – Requirements, testing, marking*.

NF EN 13274-7, *Respiratory protective devices - Methods of test - Part 7: Determination of particle filter penetration.*

NF EN 14683 + AC:2019, *Medical face masks — Requirements and test methods.*

NF ISO 4915:2015, *Textiles - Stitch types - Classification and terminology.*

NF XP ISO/TS 16976-2:2015, *Respiratory protective devices – Human factors – Part 2: Anthropometrics.*

French Government, *Information on Coronavirus* https://www.gouvernement.fr/info-coronavirus

IFTH, *Simplified protective masks.*

INRS, *Respiratory protective masks and biological risks: FAQs*, 03/03/2020, http://www.inrs.fr/risques/biologiques/faq-masque-protection-respiratoire.html

World Health Organization (WHO), *Coronavirus disease (2019-nCov): Advice for the public – When and how to use masks.* https://www.who.int/fr/emergencies/diseases/novel-coronavirus-2019/advice-for-public/when-and-how-to-use-masks

French Society for Hospital Hygiene (SF2H) and French Society for Sterilization Sciences (SF2S), *Notice by the French Society for Sterilization Sciences and the French Society for Hospital Hygiene concerning alternative materials used for the making of protective masks*, 21/03/2020, https://www.sf2s-sterilisation.fr/wp-content/uploads/2020/03/Avis-conjoint-SF2S-SF2H_Confection-Masques_23.03.2020_10h03.pdf