

A HOME MADE STERILISABLE MASK

The following shows how to make a mask, offering some protection against coronavirus. The filtration medium is HEPA 10 fabric, as used in vacuum cleaner bags specifically designed for use in such places as asthmatic households. Numatic NVM-1CH filters, and others of the same specification, will absorb 85% of particles 0.5 microns across. The majority of virus carrying particles are larger than this, giving a higher overall collection efficiency.

Several medical reports suggest an N95 mask offer 5x more protection than none at all. N95 collects 95% of particles 0.3 microns across, whereas this fabric is not quite so efficient. However the wearing of a mask also prevents the user from accidentally touching mouth and nose, and is a constant reminder to avoid contact with contaminated surfaces, and wash or sterilise hands regularly.

In the description, lengths are in millimetres. *Italic text shows near equivalents in inches and cm.*

Items needed



IMG 2583

Price examples:

Numatic Henry Cleaner Bags - 1 Box (Pack of 10)
£7.49

Duck Tape 232318 All Purpose Masking Tape, 50 mm x 50 m.
£4.32

Prices from Amazon.
Makes about 30 masks.

- HEPA 10 fabric
- A piece of wire 150mm long (*15 cm or 6 inches*) is needed to form the mask snugly around the nose. Thin PVC coated garden wire 1.2mm diameter is ideal. Alternatives shown are from electrical house wiring cable.
- Thin elastic bands, typically 1.5 x 100mm (*10cm or 4 inches*), or thin clothing elastic, can be used in place of ties.
- The tape is regular masking tape, minimum 25mm wide. 50 mm wide (*2 inches*) can be cut in half.
- A stapler, ideally a smaller one such as Rexel Bambi with size 25 staples.
- Scissors, rule, pen, hole punch. Pliers, not shown.



IMG 2584

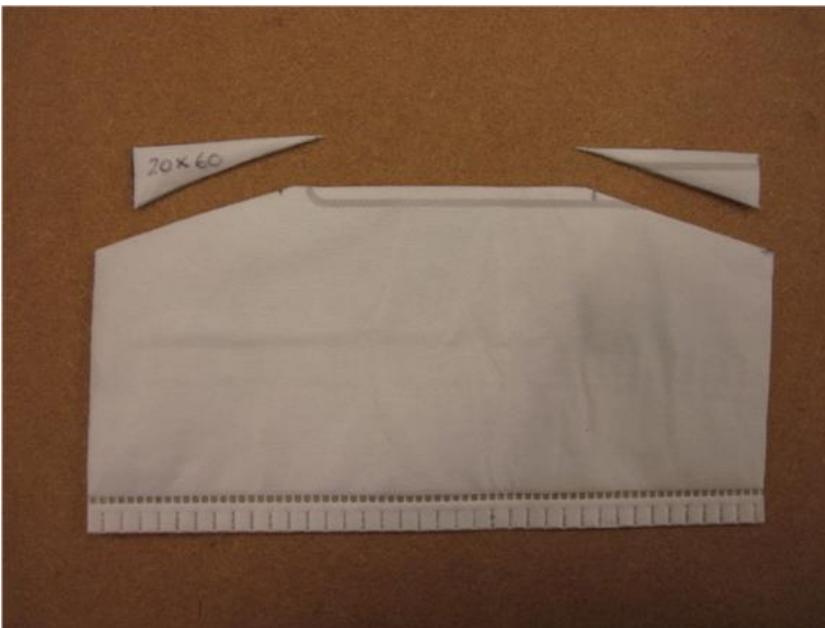
The area to cut is:

220 x 110 mm

(Equivalent to:

22 x 11 cm, or 8 ½ x 4 ¼ inches)

Mark out the area shown, with a seam along the long side. Cut out.

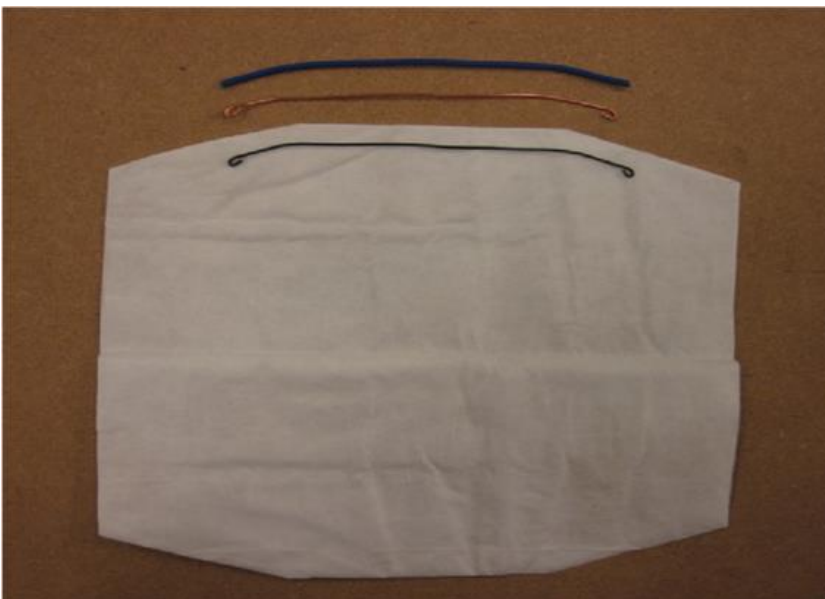


IMG 2585

Cut 2 corners approximately

20 x 60mm

(2 x 6 cm, or 1 x 2 ½ inches)



IMG 2586

Open out the fabric and position it with the seam underneath and with the seam fold to the bottom. Bend the ends of the wire into a tight loop so they so they cannot poke through the fabric.



IMG 2587

Cut a strip of tape 10-15mm wide and attach the wire 8-10mm down from the edge.

(Tape width 1 to 1.5 cm or ½ inch, attached 1 cm or ½ inch down from the top edge of the mask)



IMG 2588

Fold the fabric over the wire and stick down with 10-15mm wide tape. Tape the ends with 25mm wide tape, folding over. Trim off excess

(The width of the 25 mm tape is 2.5 cm or one inch.)



IMG 2589

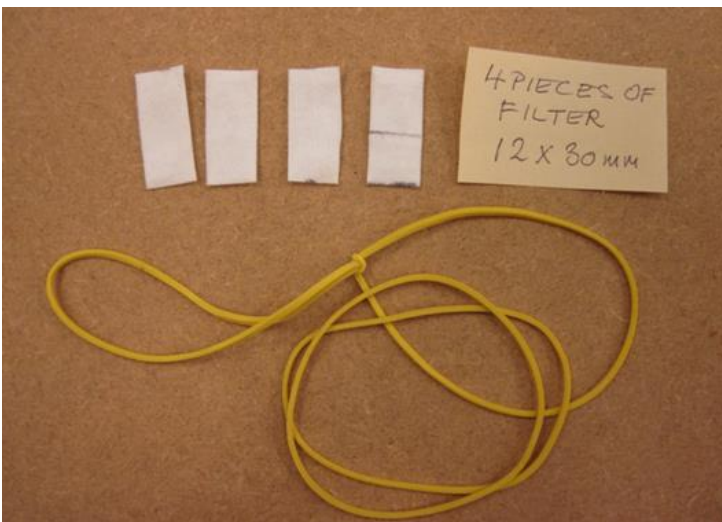
Form a pleat 12 mm wide at the end, with a slight angle as shown. This helps to form a 3 dimensional shape to the mask. Staple. Now make a smaller pleat each side of the central one and staple.

(The first pleat is ½ inch wide, or 1.2 cm.)



IMG 2590

Now pleat the other end.

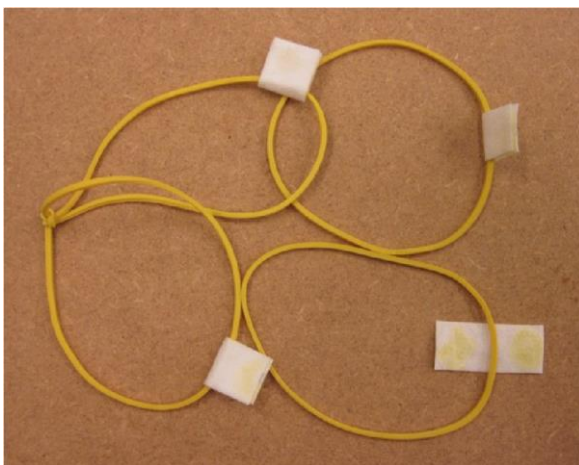


IMG 2591

There are two easy methods of attaching ties. The elastic band method is shown here.

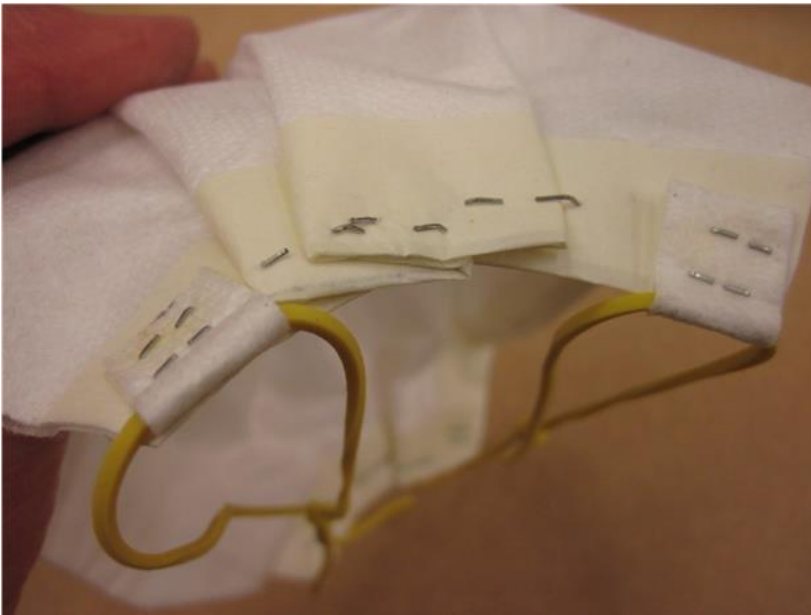
Cut 4 pieces of fabric 12 x 30mm. (1.2 cm x 3 cm, or ½ inch x 1 ¼ inch)

Select 4 rubber bands, typically 1.5mm x 100mm. The 100mm (= 10 cm, 4 inches) is the unstretched length laid out straight. Thicker bands are too tight as a loop, but 3mm wide bands can be cut so a single strand is used. However the ends are difficult to secure and need superglue to form an end loop.



IMG 2592

Loop 2 bands together to double the length. Fold the fabric over the band and secure with a dab of glue from a Pritt stick or contact adhesive. The fabric loop can then be stapled to the mask. Stapling the bands directly often fails as the sharp edges of the staple cut in to the rubber.



IMG 2593

The band is stapled to the outside of the mask, at each corner.



IMG 2595

The mask is ready to try. If the bands are too tight, remove staples one side and add an extra band, as shown in the 3 band tie next to the mask. Restaple.



IMG 2601

The elastic ties fit below and above the ears. The wire should be moulded to fit snugly around the nose, so you do not feel a draught around the eyes when exhaling.



IMG 2603

One Henry bag
makes three
masks.
Order as
Numatic
NVM-1CH



A possible cut-up

Above left: the alternative elastic tie. Use a hole punch to make a hole at each corner of the mask and tie the elastic with a simple knot. Allow extra length so the tension can be adjusted. The disadvantage is that fabric covered elastic will only stretch about twice its relaxed length and may be tight when fitting over the head, yet give insufficient pull when in position.

Above right: 30 masks from a £7.50 box of 10 bags. Each mask costs about 25p.

STERILISATION OF USED MASKS

WHO report (link below) states the virus is destroyed by a temperature of 56 Centigrade for 15 minutes. I have tested these masks, along with 3M 9332 valved masks, in an industrial fan oven, at 70 Centigrade for 20 minutes. There is no damage to any part of the mask, the rubber is unaffected and the tape remains bonded. A domestic fan oven set to 65 -70 C should achieve the same result.

Roger Hadland 26/03/2020

https://www.who.int/csr/sars/survival_2003_05_04/en/