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& competition

Department:
Trade, Industry and Competition
REPUBLIC OF SOUTH AFRICA

Recommended Guidelines – updated

Fabric Face Masks
Manufactured by South Africa's
Clothing and Textile Manufacturing Industry for General Public Use

Friday, 24 April 2020

Table of Contents

1	OVERVIEW	3
2	SA'S LOCALISATION OBJECTIVES	4
3	BASIC PERFORMANCE REQUIREMENTS OF FABRIC/CLOTH FACE MASKS	5
4	FABRIC SELECTION FOR FABRIC MASKS	6
4.1	GUIDELINES FOR FABRIC SELECTION	6
4.1.1	<i>Inner Layer (next to face)</i>	6
4.1.2	<i>Middle Layer (optional filter layer)</i>	7
4.1.3	<i>Outer Layer (faces outwards)</i>	7
4.1.4	<i>General Remarks</i>	8
5	DESIGNS FOR FABRIC MASKS	8
6	INSTRUCTIONS FOR USING FABRIC MASKS	10
7	APPENDIX A: REFERENCE LIST OF LOCAL TEXTILE MANUFACTURERS	11
7.1	MANUFACTURERS OF NONWOVEN TEXTILES	11
7.2	MANUFACTURERS OF WOVEN TEXTILES	14

1 Overview

A ‘fabric/cloth’ face mask (non-medical mask) for the general public is only part of a broader solution to curb the spread of COVID-19¹ and it must always be used in combination with other hygienic methods of prevention². Such masks are not a replacement for other recommended precautionary measures. They should not provide a false sense of protection that lead to a lapse in the application of proper preventative measures like personal hand hygiene, respiratory hygiene and physical (social) distancing. Furthermore the design of fabric masks should be mindful of the thermo-physiological properties of fabrics which, if wrongly chosen, can lead to problems like skin irritation, the build-up of heat or moisture, or the incubation of bacteria etc, and may cause wearers to take off masks in situations when they should otherwise be wearing them. There has been much debate globally about the use of face masks for non-Health Care Professionals (non-HCP) during the Covid-19 pandemic. There is agreement in the recommendations that symptomatic individuals and those in healthcare settings should use face masks. But discrepancies and mixed messages exist in relation to the wearing of masks by the general public. By refining some of the lessons from various sources, it is possible to arrive at a set of interim guidelines for the use of masks by the general public in South Africa.

It is the intention of this document to distil these guidelines into a set of recommendations for the South African clothing and textile industry when making masks for use by the general public. These recommendations serve as suggested guidelines. They have been developed through engagements with publicly available research and recommendations from authorities like the World Health Organisation³ (WHO) as well as through insights provided by colleagues from the University of Stellenbosch⁴ (Dept of Chemistry and Polymer Science), University of Witwatersrand⁵ (School of Public Health, Industry Specialists⁶, the Southern African Clothing Textile and Workers Union⁷ (SACTWU), staff at the National Department of Health⁸ and the Department of Trade, Industry, and Competition⁹.

¹ <https://www.nicd.ac.za/diseases-a-z-index/covid-19/frequently-asked-questions/>

² <https://www.nicd.ac.za/diseases-a-z-index/covid-19/covid-19-prevention/>

³ <https://www.who.int/>

⁴ Ms. Adine Gericke, Department of Chemistry and Polymer Science, University of Stellenbosch: <http://academic.sun.ac.za/polymer/agcv.html>

⁵ Dr. Moreshnee Govender, <https://www.wits.ac.za/staff/academic-a-z-listing/g/moreshneegovenderwitsacza/> : the School of Public Health, University of the Witwatersrand

⁶ Sma Ngcamu-Tukulula, Mr. Rob Stewart and Mr. Kyle Ballard.

⁷ www.sactwu.org.za

⁸ <http://www.health.gov.za/>

⁹ <http://www.dti.gov.za/>

Fabric or ‘cloth masks’ do not fall in the same category as surgical or medical masks. Fabric/Cloth masks cannot prevent the risk of contracting the virus in aerosol form (as found in a contaminated atmosphere) since this requires the presence of very fine and highly specialised filters capable of trapping microscopic viral particles. **The shortage of medical grade masks globally and in South Africa means members of the public should not use these critical resources at the expense of frontline health workers.** In this context, and given that evidence indicates that the virus appears to largely exit through the mouth of an infected individual in droplet form (during talking, coughing or sneezing) it is believed that if the fabrics and filters used in the manufacture of cloth masks are chosen suitably and designed to fit users accordingly, these masks can play an important role in reducing the community transmission of the virus and offer some degree of protection for the user. They further appear to lower the risk of contracting the virus from contaminated surfaces by acting as a barrier to touching one’s face. The function of such public masks may be enhanced or impeded by the usability of the design and the combination of products, although it is also believed that any mask may be better than not wearing a mask.

2 SA’s Localisation Objectives

- ⇒ In line with the Republic of South Africa’s Industrial Policy Acton Plan¹⁰ (IPAP) and the Clothing, Textile, Footwear and Leather (CTFL) Master Plan’s policy objectives it is highly recommended that manufacturers source textiles made locally, by local manufacturers, when making fabric/cloth face masks.
- ⇒ All textile/fabric quality recommendations for making fabric face masks, found within this document, are qualities found in textiles that are locally made in the Republic of South Africa.
- ⇒ It is imperative that fabric/cloth face mask manufacturers ensure that efforts to manufacturer masks are done within the boarder context of supporting South Africa’s Clothing and Textile Industry, and our government’s efforts to ensure localisation of value-chains and boarder economic prosperity – in keeping with our country’s developmental objectives and Industrial Policy.
- ⇒ A list of local textile manufacturers is found in the Appendix A of this document.

¹⁰ http://www.dti.gov.za/industrial_development/industrial_development.jsp

3 Basic Performance Requirements of Fabric/Cloth Face Masks

- a) The performance of fabric/cloth face masks varies greatly with the shape and fit of the mask¹¹ as well as the fabric structural properties and number of layers.¹²
- b) The objective of a fabric face mask is to act as a physical barrier to extremely small droplets generally upwards of **5 microns in size** secreted during talking, sneezing or coughing (WHO 29/4/2020).
- c) The higher the performance of the mask with regard to barrier efficiency the better.
- d) Masks must be breathable.
 - i. Should the mask prevent one from breathing easily, this will present a serious danger to the health of the wearer - not only from becoming oxygen deprived but also because the mask will promote risky behavior like the need to touch the face and remove or adjust the mask during wear, increasing the risk of transmission of the virus.
- e) Masks must be designed to fit properly and be comfortable to wear.
 - i. Mask style and design features will contribute to user fit which should follow closely the contours of the face especially around the nose bridge and under the chin to reduce leakage out and into the mask.
- f) Mask style and design features will contribute to user fit which should follow closely the contours of the face especially around the nose bridge and under the chin to reduce leakage out and into the mask.
- g) Cleaning and disinfection of all the components should be easy to carry out at home.
- h) All components should be durable and should maintain their integrity during the full expected life span of the product or components.
- i) All masks should be accompanied by instructions clearly explaining how it should be worn and cared for what the limitations of a mask are and when the mask or its components must be replaced.

¹¹ Shakya, Kabindra M.; Noyes, Alyssa; Kallin, Randa; Peltier, Richard E. (May 1, 2017). ["Evaluating the efficacy of cloth facemasks in reducing particulate matter exposure"](#)(PDF). Journal of Exposure Science & Environmental Epidemiology.

¹² Chughtai, Abrar Ahmad; Seale, Holly; MacIntyre, Chandini Raina (June 19, 2013). ["Use of cloth masks in the practice of infection control – evidence and policy gaps"](#). International Journal of Infection Control.

4 Fabric Selection for Fabric Masks

- a) Tests have shown that at **least two layers** of fabric is are sufficient for balancing performance and comfort (as indicated above).
- b) An increase in the number of layers will improve the barrier efficiency, but have the opposite effect on breathability.
- c) **Using three layers, selecting a non-woven (or similar) fabric with strong filtering capability (barrier efficiency) as the middle layer (with the accompanying inner and outer layers providing comfort, structure, and some additional protection) is recommended.**
 - a) Ideally this middle layer (filter) should be inserted into the mask (or removed) via an ‘envelope’ style design to allow for improved cleaning and easy replacement filters when worn out.
 - b) It is recommended that the pocket into which it fits be at least 120 mm by 100 mm to ensure compatibility between multiple masks and filters in production domestically.
 - c) Clear markings or design options must be used to distinguish between the outside of the mask and the inside of the mask.

4.1 Guidelines for Fabric Selection

4.1.1 Inner Layer (next to face)

- a) The main purpose of this layer is to provide a smooth, soft, pleasant feel against the skin.
- b) The fabric should not irritate the skin in any way or allow the build-up of moisture or excessive heat in between the skin and the mask.
- c) Avoid water repellent fabric that inhibit the absorption of droplets. It must not wet easily or accumulate excessive moisture with breathing.
- d) The fabric should have very high air permeability and should not restrict normal breathing.
- e) Synthetic fibres are recommended for quick drying properties.
- f) If cotton, poly-cotton or viscose are used, care should be taken as these fabrics can be highly water absorbent and might become wet against the skin. They can also impact on heat generation, potential fibre/fluff shedding and drying time after washing.

- g) Options: Plain weaves (lightweight, low count), warp knit polyester ‘mesh’; lightweight single jersey, spunbond nonwovens (providing air permeability is high and fabric is washable)

4.1.2 Middle Layer (optional filter layer)

- a) **The primary function of this layer is to trap or stop particles 5 micron and larger.**
- b) It should have a **barrier efficiency of at least 75%.**
- c) Filter fabric should not restrict air permeability or impede on the air permeability of the completed mask.
- d) It is suggested that the filter fabric should not block > 25 % of airflow through the fabric.
- e) Filter fabric should not shed fibres or disintegrate with use in any way, causing potential of fibre inhalation or failure to filter.
- f) It should not add or create unnecessary heat load.
- g) Filter should be replaceable via a pouch between inner and outer layer of mask (envelope).
- h) It must be possible to disinfect filter daily or wash with hot water [Minimum filter size 100mm x 120mmm]
- i) Ideal product – non-woven or similarly performing fabric that meets the recommended requirements.

4.1.3 Outer Layer (faces outwards)

- a) This layer can be woven, warp- knitted or made from a suitable nonwoven fabric.
- b) Fabrics should not allow liquids to move through them.
- c) Hydrophobic or water repellent properties are recommended to prevent wetting from external sources and improve soil repellence.
- d) Fabrics should not restrict normal breathing.
- e) Care should be taken that this layer does not ruin the breathability of the mask
- f) Fabric choice should be suitable for the design of the mask - some designs may require a firmer fabric while others may require fabrics with more drape.
- g) A firm finish will prevent the mask from collapsing with breathing.
- h) Outer and inner layers can potentially be of the same fabric.

4.1.4 General Remarks

- a) Fabrics should not contain any toxic chemicals or excessive lint (especially the inner layer).
- b) The outward facing and inward facing of the mask must be clearly distinguished.
- c) **A new prototype can be easily tested for comfort by wearing it for at least 30 minutes.**
- d) Disinfection of all the components should be easy to carry out at home and components must not deteriorate with use/cleaning.
- e) Fabrics should be able to resist washing in hot water – not easily damaged.
- f) Components that are not removable should be resistant to at least 100 wash cycles.
- g) It must be ensured that proper airflow is achieved when all the layers are combined.
- h) One component with poor air permeability can cause a total failure in breathability
- i) **NOTE: If a filter layer is not used, the combination of the two layers must provide a 5 micron particle barrier efficiency of at least 75%.**

5 Designs for Fabric Masks

- a) Mask style and design features will contribute to user fit and should follow closely the contours of the face especially around the nose bridge and under the chin to reduce leakage out and into the mask.
- b) A wire insert, in middle of the mask that sits over the nose bridge area of mask, will allow the user to mould the shape of the mask around the nose bridge for a closer fit.
- c) Comfortable elastic bands/or cloth tie-straps of adequate size and shape for attachment either around the ears or the head should **facilitate comfortable fit.**
- d) Further adjustments to the dimension of this elastic/cloth tie-straps will enhance fit for more users permitting flexibility in the adjustment.
- e) The ties or elastics used to fit the mask to the face should not be designed to require that the wearer touches the front of the mask at all.
- f) Masks should be comfortable to wear. Fabrics selection should consider performance properties such as moisture management and thermal discomfort (guideline for fabric selection 4.1 above).
- g) Discomfort will undermine one's health by promoting the need to touch the face and remove or adjust the mask during wear.
- h) Bearing in mind that different fabric constructions and innovations allow for different properties and functions, there is merit in a mask designed from **at least two layers of**

suitable fabric or three layers of such fabric (two layers plus an extra third barrier/filtration layer in the centre).

- i) Masks must be designed to fit properly, ideally covering at least 50% of the length of the nose and fit to 25mm under the chin.
 - a. A guideline for the adult size of pleated mask designs is 180mm for the width and 160mm for the length (maximum unpeated length).
- j) Additionally, manufacturers should indicate sizing of masks:
 - i. Adults: S/M/L/XL
 - ii. Children: S/M/L
- k) Children sizes can be considered by downsizing the adult sizes until further anthropometric data is available to guide a more informed decision.
- l) The suggested size for the removable filter is 120 x 100 mm.
- m) The dimension for a simple pleated masks design is illustrated below:



- j) It is useful to provide markings or features that help the wearer to distinguish between the inner layer and outer layer of the mask in order to prevent wearers from placing the wrong side against their faces.
- k) **Special needs may arise within some groups of society** (such as hearing-impaired individuals who rely on lip reading) whose needs should also be considered when making masks.
- l) Other users such as children and those wearing spectacles should also be considered.
- m) Fabric Face Masks for different seasons and climates must also be considered.
- n) When adjusting to climate and seasonal needs, the fabric used should follow recommended guidelines – adjustments must not compromise fabric functionality as described in the guidelines.

6 Instructions for Using Fabric Masks

- a) Clear instructions should be provided to consumers about the capabilities and limitations of masks.
- b) At the very least guidance should be given that when re-usable fabric masks are worn:
- c) They do not constitute medical PPE nor are they a replacement for normal precautionary hygienic measures such as handwashing, not touching one's face, coughing or sneezing into a tissue or elbow and keeping a proper social distance of 1,5m from other people.
- d) The wearer should ensure the masks have been appropriately washed and disinfected before use
- e) Clear instructions must be provided around the proper protocol for wearing masks, including at a minimum that wearers should avoid touching the mask during use and that when putting on or taking off the mask, one's hands must have been cleansed after practicing appropriate hand hygiene;
- f) That re-usable masks or the components used within the masks may need to be replaced if they are damaged or worn out, or if they have exceeded their lifespans or use; and
- g) **That children should be supervised at all times when using a cloth mask**, and they are not recommended for infants who may struggle to breathe with a mask or even choke if they put parts in their mouths.
- h) **A user-guide MUST be supplied with a mask on how to wear and how to care for it.**
- i) A fabric face masks should generally not to be used by Health workers, working in a health care environment.

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7 Appendix A: Reference List of Local Textile Manufacturers.

Reference list of local manufacturers of nonwoven and woven textiles and elastics for inputs for fabric face masks for the public¹³.

7.1 Manufacturers of Nonwoven Textiles

Company	Key contacts	Province	Category/ies	Product/s that your company can offer clothing manufacturers for making masks, and practical description of how your product/s assist in protection
Beier Envirotec	Posh Moodley: 083 708 5378 pmoodley@beier.co.za	KZN	Fabrics	Manufacturer of: needle punched nonwovens. Can be used as the outer layer of masks. Their nonwovens provide dust loading capacity, comfort and a level of filtration and mouldability.
Brits Nonwovens	Dicky Coetzee: 082 901 4117 dicky.coetzee@brits.co.za	KZN	Filters	Manufacturer of: Polypropylene/ polyester combination filters. Can be used as filter in the middle of two layers of fabric. Can produce 50m per month
Feltex Nonwovens	Robert Gooch: 082 905 9958 robertg@feltex.co.za John Mauer: 082 909 4402 Johnm@feltex.co.za	KZN	Fabrics	Manufacturer of: needle punched nonwovens. Could be used as inner or outer layer of masks. At the moment they do not supply products outside of the automotive industry, but they would be happy to work with mask manufacturers to try and meet the standards required for face masks.
Fibertex	Sefton Fripp: 082 903 6714 SEFR@fibertex.com Clive Hitchcock: 076 413 0899 cahi@fibertex.com	KZN	Filters	Manufacturer or: nonwovens and nanofiber treated products. Can be used as inner or middle (filter) fabrics and media. Functions include moulding support, particulate efficiency layers and barriers. Their adhetex product is made from PET/ PVDF fine fibres is a nano material most commonly used in High-Energy Particulate Arresting (HEPA) filters for masks, A/C units, automotive components and domestic filters i.e. vacuum cleaners. Their breathetex product is made from

¹³ This list is subject to available information and will be updated regularly. Please monitor the DTIC's website periodically for updates.

				polyester and is one of the components in FFP1 & 2 masks where it is used to mould and shape the masks. It sits adjacent to the melt-blown and outer spunbond layer
Filtafelt	Anil Chandran: 076 170 0702 Anil@iffgroup.com	Gauteng	Fabrics & Filters	Manufacturer of: nonwovens that can be used as outer and inner layer of masks, and filters. Their 200 gram/m2 weight, 300 gram/m2 weight and 400 gram/m2 weight Polypropylene nonwoven may be used to manufacture masks.
Freudenberg Nonwovens	Fiona Shaw: 083 658 4095 Fiona.Shaw@freudenberg-pm.com	W. Cape	Fabrics & Filters	Manufacturer of: nonwovens that can be used as outer and inner layer of masks, and filters. They can produce a dense polyester nonwoven filter layer, as well as hydrophobic and hydrophilic nonwovens as necessary.
Inno Textiles	Oliver Wilhelm: 082 440 7021 oliver@innotextiles.co.za	KZN	Filters	Manufacturer of: nonwoven fabric for outer or inner layer of mask and middle filter. They produce needled and heat-set or calendered filter media manufactured from 100% polyester in weight ranges from 120g/m ² and up. Their products can be moulded, sewn or welded to make masks. Media could be used as the middle layer of a three layer mask, or if they produce a slightly heavier media at about 200g/m ² , this might be used for manufacturing a single layer mask. Can produce 5000m per day if required.
Romatex Home Textiles	Helmut Höck, +27 (82) 566 7522 , +27 (21) 933 9800, helmuth@romatex.co.za	KZN & Western Cape		Manufacturer of: nonwoven fabric that can be used as the filler (middle layer) or the outer layer in a multi-layered mask. They manufacture 100% polyester non-allergenic non-woven fabric.

<p>Spunchem</p>	<p>Gary Sweeney: 082 652 0463 garys@spunchem.co.za</p> <p>Thokozani Mbhamali thokozanim@spunchem.co.za</p> <p>Sandy Stewart: 074 999 7009 sandys@spunchem.co.za</p>	<p>KZN</p>	<p>Fabrics & Filters</p>	<p>Manufacturer of: nonwoven fabrics. Can be used as inner and outer layers, as well as middle filter.</p> <p>Spunbond can be produced to any gsm and can be used as a highly breathable outer and inner layer. Standard meltblown is produced to 25gsm to 50gsm and can be used as a middle layer filter. It has medium bacterial filtration properties and is breathable. They are in the process of developing electrostatic meltblown which can be used as a middle layer and forms a viable anti-viral filter.</p>
<p>Vitafoam</p>	<p>Aldrin John: 083 795 1085 aldrin.john@vitafoam.co.za</p> <p>Loren van Jaarsveld loren.vanjaarsveldt@vitafoam.co.za</p> <p>Johan Booysen johan.booyesen@vitafoam.co.za</p>	<p>Gauteng</p>	<p>Fabrics & Filters</p>	<p>Manufacturer of: nonwoven fabric and nonwoven filters.</p> <p>Can be used for inner or outer layer (highly breathable hydrophobic spunbond of any gsm), and middle filter (presently running tests of whether their flexible polyurethane foam 4mm low density can be used as a filter)</p>

7.2 Manufacturers of Woven Textiles

Company	Key contacts	Province	Category/ies	Product/s that your company can offer clothing manufacturers for making masks, and practical description of how your product/s assist in protection
Aunde Tap	Sean Kennedy: 083 615 0298 sean.kennedy@aunde.co.za	KZN	Fabrics	Manufacturer of: Woven and warpknit 100% polyester fabrics. Can be used as the outer layers for masks.
Da Gama Textiles	Kelvyn Breetzke: 083 297 1485 kbreetzke@cowie.co.za	E. Cape	Fabrics	<p>Manufacturer of: cotton and polycotton woven fabrics. Can be utilised as the inner and outer layer of the mask</p> <p>Specifically supply: (1) CC484 (P48): 100% cotton sheeting, tight weave and can withstand high temp wash; (2) PCS7: 50/50 poly/cott sheeting , tight weave and can withstand high temp wash; (3) FT3: 100% cotton winter sheeting Flannel , comfort and tight weave; and (4) CJ54 (J54): 100% cotton twill excellent for outside layers , strong and tightly woven, would be able to last many washes</p>
Deslee Mattex	Michael Borchers 082 441 7305 michaelb@desleemattex.co.za Larry Unterhalter 082 447 4091 larryu@desleemattex.co.za	W. Cape	Fabrics	<p>Manufacturer of: Woven fabrics of Polyester, Polypropylene, Viscose and cotton. Their fabric can be utilized as both the inner and outer layers of the mask.</p> <p>Fabrics have the following properties: hydrophobic; breathable; washable; and do not contain toxic chemicals. Utilize high density yarns and can customize the fabrics pick count to ensure a pore size of 5 micron or less as per the guidelines. Capable of applying an antimicrobial and antibacterial finish to the woven fabrics which would also assist in reducing infection..</p> <p>Able to produce 21 000 meters of woven fabric per day. .</p>
Finlam Textiles	Janice Roberts: 084 083 0404 jroberts@finlamtechnical.com	KZN	Fabrics	Manufacturer of: woven polyester fabrics, circular knitted polyester fabrics, specialised lamination (breathable hydrophilic membranes, PU membranes, PVC films etc, and coating, dyeing and finishing of woven fabrics. Can be used as outer and inner layers of mask

Gelvenor Textiles	<p>Thomas Adlam: 082 774 0758 tadlam@gelvenor.co.za</p> <p>Steve Fitzjohn: 066 264 4581 sfitzjohn@gelvenor.co.za</p>	KZN	Fabrics	<p>Manufacturer of: Woven polyester fabric. Can be used for outer and inner layers of masks.</p> <p>Produce hydrophobic finish, breathable to FFP rated mask standards – with option to do anti-bacterial/ microbial finish. The fabric is durable and has been tested to keep its functionality for up to 40 washes under specific conditions equivalent to a basic disposable face mask</p>
Imraan Textiles	<p>Imraan Bux : 083 325 3243 ibux@itmkn.co.za</p> <p>Andrew Broughton: 083 3006535 bwerdna@tiscali.co.za</p>	KZN	Fabrics	<p>Manufacturer of: woven polyester as well as poly-viscose fabrics. Can be used as inner and outer layer of masks.</p> <p>Customisable colours; minimised linting; can be easily washed without changing fabric properties.</p> <p>Materials and capacity for large volume production.</p>
Korteks Textiles	<p>Zayd Tayob: 082 900 5786 zayd@zaydtex.com</p> <p>Khabir Tayob khabir@zaydtex.com</p>	Gauteng	Fabrics	<p>Manufacturer of: 100% polyester woven and warpknit fabrics. Can be used for outer and inner layer of a mask. The warpknit could be used as a filter</p> <p>They have equipment to treat the fabric so that it is water resistant. The warp knitted fabric is a high density net like fabric which could be used as a filter fabric and can be washed and reused easily. It has no stretch.</p>
Nu-Mym Textiles	<p>Farhaad Vally 081 352 2225 Numymtex@telkomsa.net</p>	KZN	Fabrics	<p>Manufacturer of: 1. We can polyester, poly-cotton, cotton and poly-viscose fabrics. Can be used for inner or outer layers of mask.</p> <p>They produce 100% polyester, 65/35 poly-viscose, 100% cotton and 65/ 35 poly-cotton. They can add a blood guard, antibacterial agent and a water repellent finish</p>
Suntex	<p>Eddy Sun 082 333 3888 esun@suntex.co.za</p>	E. Cape	Fabrics	<p>Manufacturer of: woven fabrics. Can be used for outer layer and inner layer</p> <p>Outer layer can be +- 200 gsm woven fabrics in 100% texturized polyester yarns with water repellent finish. Inner layer can be +- 70 gsm 100% texturized or non texturized polyester yarns</p>
Svenmill	<p>Brent Greenblatt: 083 995 8600 the_mill@svenmill.co.za</p>	W. Cape	Fabrics	<p>Manufacturer of: woven fabrics</p> <p>Can be used for inner and outer layers. Can supply 280cm wide fabrics, a mixture of polycotton (50:50) or 100% cotton. Fabric can be treated with anti-</p>

				bacterial nanotechnology silver proven to kill 99.99% of bacteria. Awaiting anti-viral results currently in lab testing.
Umzinto Textiles	Muhammad Paruk: 0827862623 mparuk45@outlook.com	KZN	Fabrics	Manufacturer of: woven fabrics Capable of weaving fabrics. Can do specialized finishes such as anti-microbial and anti-bacterial breathable finishes to various textiles up to a max width of 220cm .
Winelands Textiles	Peter Gaal: 082 441 2938 pgaal@winetex.co.za Juanita Wilkinson (Hextex office) jwilkinson@winetex.co.za Karen Bouwer (WC, EC) kbouwer@winetex.co.za Arif Cassim (GAUT) acassim@winetex.co.za Andrew Guy (KZN) McNair.Guy@telkomsa.net	W. Cape	Fabrics	Manufacturer of: woven fabrics. Can be used for inner or outer layer. Can supply range of polyester viscose, poly-cotton and cottons. Able to finish products with fluid resistant finishes