DJS 354: 202X
ICS 65.020.20

DRAFT

Jamaican Standard

Specification

for

Bamboo protective face masks

BUREAU OF STANDARDS JAMAICA

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Jamaican Standards establish requirements in relation to commodities, processes and practices, but do not purport to include all the necessary provisions of a contract.

The attention of those using this specification is called to the necessity of complying with any relevant legislation.

Amendments

No.	Date of Issue	Remarks	Entered by and date

Contents Page

Foreword

The standard describes the testing and requirements for bamboo materials used in the construction of protective face masks and filters that are used in preventing the penetration of bacteria and viruses.

This standard is voluntary.

Committee Representation

The development of this standard for the Standards Council, established under the Standards Act, 1969 was carried out under the supervision of the Bamboo and Indigenous Materials Product Standards Technical Committee, which at the time comprised the following members:

Related Documents

ASTM F2100	Standard Specification for Performance of Materials Used in Medical Face Masks
JS 333	Jamaican Standard Specification for Bamboo charcoal for air purification

1 Scope

The standard describes the testing and requirements for bamboo materials used in the construction of protective face masks and filters that are used in preventing the penetration of bacteria and viruses.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

16 CFR Part 1610, *Standard for the Flammability of Clothing Textiles*

ANSI/ASQC Z1.4, *Sampling Procedures and Tables for Inspection by Attributes*

ASTM F2101, *Standard Test Method for Evaluating the Bacterial Filtration Efficiency (BFE) of Medical Face Mask Materials, Using a Biological Aerosol of* Staphylococcus aureus

ASTM F2299, *Standard Test Method for Determining the Initial Efficiency of Materials Used in Medical Face Masks to Penetration by Particulates Using Latex Spheres*

EN 14683:2019, *Medical face masks — Requirements and test methods*

ISO 2859-1, *Sampling procedures for inspection by attributes — Part 1: Sampling schemes indexed by acceptance quality limit (AQL) for lot-by-lot inspection*

3 Terms and definitions

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

3.1
bacterial filtration efficiency (BFE)
the effectiveness of face mask material in preventing the passage of aerosolized bacteria, expressed in the percentage of a known quantity that does not pass the face mask material at a given aerosol flow rate.

3.2
bamboo charcoal for air-purification
under the conditions of high temperature and limited oxygen (or isolated oxygen), the bamboo is heated through pyrolysis, so as to obtain the black solid.

3.3
body fluid
any liquid produced, secreted, or excreted by the human body.

3.4
body fluid simulant
a liquid which is used to act as a model for human body fluids.

3.5
differential pressure
the measured pressure drop across a face mask material.

3.6
face mask
an item of protective clothing designed to protect portions of the wearer's face, including the mucous membrane areas of the wearer's nose and mouth.

3.7
filter
a porous material layer for removing impurities from air passing through it.

3.8
fixed carbon
the remaining effective carbon after the charcoal is burned at high temperature.

3.9
flammability
those characteristics of a material that pertain to its relative ease of ignition and relative ability to sustain combustion.

3.10
formaldehyde adsorption rate
a certain mass of dried test sample is placed in adsorption instrument that is completely filled with adsorption gas. Adsorb for 24h at the constant temperature of 20°C. The Formaldehyde adsorption rate is the percentage of the weight-gain of the test sample to the original test sample's mass.

3.11
penetration
in a protective clothing material or item, the flow of a chemical on a non-molecular level through closures, porous materials, seams and pinholes, or other imperfections in protective clothing.

3.12
protective clothing
an item of clothing that is specifically designed and constructed for the intended purpose of isolating all or part of the body from a potential hazard; or, isolating the external environment from contamination by the wearer of the clothing.

3.13
sub-micron particulate filtration efficiency
the efficiency of the filter material in capturing aerosolized particles smaller than one micron, expressed as the percentage of a known number of particles that does not pass the medical face mask material at a given flow rate.

4 Requirements for bamboo charcoal filters

4.1 Appearance

Black, odourless, tasteless, amorphous solid.

4.2 Bamboo charcoal for air-purification is divided into 2 levels - level I product, and level II product.

4.3 The two levels of bamboo charcoal for air-purification shall comply with the requirements in Table 1.

Table Error! Missing test condition.**1 — Quality technical index requirements of bamboo charcoal filters**

Item		Unit	Index	
			Level I	Level II
Moisture Content	≤	%	9.00	11.00
Ash content	≤	%	4.00	6.00
Fixed carbon content	≥	%	85.00	75.00
Formaldehyde adsorption rate	≥	%	10.00	8.00
		mg/g	100.00	80.00
Benzene adsorption rate	≥	%	6.00	5.00
		mg/g	60.00	50.00
TVOC adsorption rate	≥	%	4.00	3.00
		mg/g	40.00	30.00

5 Inspection methods for bamboo charcoal filters

5.1 Determination of moisture content

5.1.1 Method summary

A certain mass of test sample is dried to constant weight at 105 ± 5 °C. The percentage of mass-reduction amount to the original test sample's mass is the moisture content.

5.1.2 Instruments

5.1.2.1 Electrothermal constant-temperature drying oven: with automatic temperature control device, and with blower or natural ventilation device.

5.1.2.2 Analytical balance: with sensitivity of 0.1 mg.

5.1.2.3 Dryer: with desiccant in it (non-deliquescent bulk-shape calcium chloride or silica gel).

5.1.2.4 Weighing bottle: 70 mm×35 mm.

5.1.3 Operating methods

5.1.3.1 Weigh 1 g to 5 g (accurate to 0.5 mg) of test sample. It is required that the particles shall be less than 1 mm (through 18-mesh).

5.1.3.2 Place the sample into the weighing bottle that has been pre-dried to constant weight. Ensure the thickness of the test sample in the bottom of the weighing bottle is well-distributed.

5.1.3.4 Place the sample in an electrothermal constant-temperature drying oven with the temperature adjusted to 105 ± 5°C. Dry for 3h ~ 4h. Remove from the oven and place in the dryer.

5.1.3.5 Weigh the sample after cooling to room temperature (about 30 min).

5.1.3.6 Perform inspection test. Each drying time is 30 min, until the reduction of test sample is less than 0.0050 g or when the mass is increased. In the latter case, it shall adopt the before-weight-gain mass as the calculation basis.

5.1.4 Result calculation

Moisture content determination results of bamboo charcoal for air-purification shall be calculated by formula (1):

where:

$w = m - m_1 \times 100\%$ (1)

$m - m_2$

w is the moisture content of the test sample, %;

m is the mass of before-dried test sample and weighing bottle, unit in gram (g);

m_1 is the mass of after-dried test sample and weighing bottle, unit in gram (g);

m_2 is the mass of weighing bottle, unit in gram (g).

5.1.5 Allowable errors

The errors of 2 parallel determination results of the moisture shall not exceed 0.2 %.

5.2 Determination of ash content

5.2.1 Method summary

At 500 - 710 °C, a test sample with a certain mass is burned to constant weight (weigh after cooling). The percentage of residue mass to the original test sample's mass is the ash content.

5.2.2 Instruments

5.2.2.1 High temperature electric furnace: with temperature control device which can maintain at 500 - 710 °C, accompanied by thermocouple and high-temperature meter.

5.2.2.2 Porcelain crucible with cover: 30 mL.

5.2.2.3 Analytical balance: sensitivity of 0.1 mg.

5.2.2.4 Dryer: with desiccant in it (non-deliquescent bulk-shape calcium chloride or silica gel)

5.2.3 Operating methods

5.2.3.1 Place the porcelain crucible that meets the specifications into the high temperature electric furnace. Burn to constant weight. Place the crucible in a dryer for cooling to room temperature (about 30 min).

5.2.3.2 Weigh the crucible (accurate to 0.1 mg).

5.2.3.3 Weigh 1 g (accurate to 0.1 mg) of dried test sample that has been crushed and has been passed through the 0.25 mm-sieve (60 meshes). Place it in a porcelain crucible that has had a constant weight. Place the crucible with sample into the high temperature electric furnace in which the temperature does not exceed 300 °C.

5.2.3.4 Open the crucible cover. Slowly raise the temperature to 500 °C. Keep for 30 min. Continue to raise the temperature. Burn for 3 h – 4 h under the condition of 500 - 710 °C. Take the crucible out. Place it on a porcelain plate. Cover with the crucible cover. Cool it in the air for about 5 min. Place it into the dryer. Cool it to the room temperature and weigh it.

5.2.3.5 Then perform checking burning. Each firing time is 30 min, until the reduction of test sample is less than 0.0010 g or when the mass is increased. In the latter case, it shall adopt the before-weight-gain mass as the calculation basis.

5.2.4 Result calculation

Moisture content determination results of bamboo charcoal filters shall be calculated by formula (2):

$$A = \frac{m_2 - m_1}{m} \times 100\% \quad (2)$$

where:

A is the ash content of test samples, %;

m_2 is the mass of the ash and crucible, in unit of gram (g);

m_1 is the mass of the crucible, in unit of gram (g);

m is the mass of the test sample, in unit of gram (g);

5.2.5 Allowable errors

The errors of 2 parallel determination results of ash content shall not exceed 0.3%.

5.3 Determination of volatile matter content

5.3.1 Method summary

At the temperature of 500 – 710 °C, test sample with certain mass is heated for 7 min with isolation from the air. The percentage of lost mass to the original test sample's mass is the volatile matter content. If obvious sparks are generated in the experiment, the experiment shall be redone.

5.3.2 Instruments

5.3.2.1 Porcelain crucible: Height: 40 mm; diameter of upper mouth: 30 mm; bottom outer diameter: 18 mm; cover outer diameter: 35 mm; groove outer diameter: 29 mm; external groove depth: 4 mm.

5.3.2.2 High temperature electric furnace: Provided with temperature control device that can maintain at the temperature of 500 – 710 °C.

5.3.2.3 Crucible holder: Made of nichrome wire. Crucible's size does not exceed the limit of constant temperature region in the high temperature furnace. Ensure the bottom of the crucible on the crucible is 10mm - 15mm from the bottom of the furnace.

5.3.2.4 Analytical balance: with sensitivity of 0.1 mg.

5.3.2.5 Stopwatch or time clock.

5.3.2.6 Dryer: with desiccant in it (non-deliquescent bulk-shape calcium chloride or silica gel)

5.3.3 Operating methods

5.3.3.1 Weigh 1 g (accurate to 0.1 mg) of test sample that has been crushed and passed through

5.3.3.2 0.25 mm (60-mesh) sieve. Place in the porcelain crucible that has been burned to constant weight at 500 - 710 °C. Cover the crucible. Gently shake to make the test sample spread out. Place it on the crucible shelf. Then, quickly place it into the high temperature electric furnace that has been pre-heated to 850 °C. The crucible shall be located above or below the measurement point of the thermocouple. Continue to heat it for 7 min. The temperature of furnace drops at the beginning, but shall be restored to 500 - 710°C within 3 min. If there are obvious sparks, the method shall be repeated.

5.3.3.3 Finally, remove the crucible from the furnace and place it on the porcelain plate. Cool it in the air for 5 min. Place it in a dryer, cool it to room temperature and weigh it.

5.3.4 Result calculation

Calculate the volatile matter content determination results of bamboo charcoal filters by formula (3):

$$V = \frac{m_1 - m_2}{m_1} \times 100\ \% \quad (3)$$

where:

V is the volatile matter content of test sample, %;

m_1 is the mass of test sample, in unit of gram (g);

m_2 is the mass of test sample after heating, in unit of gram (g);

5.3.5 Allowable errors

The errors of 2 parallel determination results of volatile matters shall not exceed 0.5 %.

5.4 Determination of the content of fixed carbon

5.4.1 Method summary

Calculate the fixed carbon content by the mass of dried bamboo charcoal minus its ash content and volatile matter content.

5.4.2 Instruments

5.4.2.1 The ash content test instrument, same as 5.2.2.

5.4.2.2 The volatile matter content test instrument, same as 5.3.2.

5.4.3 Operating methods

5.4.3.1 Crush the analysis test sample until all can be passed through the 0.25 mm-sieve (60 meshes). Dry to constant weight at the temperature of 102 °C -105°C. The mass of the test sample shall not be less than 30 g, for the use of testing the ash content and volatile matters.

5.4.3.2 The operating method of determination of ash content is shown in 5.2.3.

5.4.3.3 The operating method of determination of volatile matter content is shown in 5.3.3.

5.4.4 Result calculation

Calculate the fixed carbon content determination results of bamboo charcoal for air-purification by formula (4):

where:

$C = 100 - (A + V)$ (4)

C is the fixed carbon content, %;

A is the ash content of test samples (See calculation method in 4.2.4), %;

V is the volatile matter content of test samples (See calculation method in 4.3.4), %.

5.4.5 Allowable errors

The errors of 2 parallel determination results of the fixed carbon shall not exceed 0.5 %.

5.5 Determination of formaldehyde adsorption rate

5.5.1 Method summary

The dried test sample with certain mass is placed in the adsorption instrument that is completely filled of formaldehyde gas. Adsorb for 24 h at the constant temperature of 20 °C. The percentage of weight-gain of the test sample to the original test sample's mass is the bamboo charcoal's adsorption for formaldehyde.

5.5.2 Reagents

Formaldehyde, analytically pure.

5.5.3 Instruments

5.5.3.1 Special determinator for gas adsorption of bamboo charcoal (as shown in Figure 1).

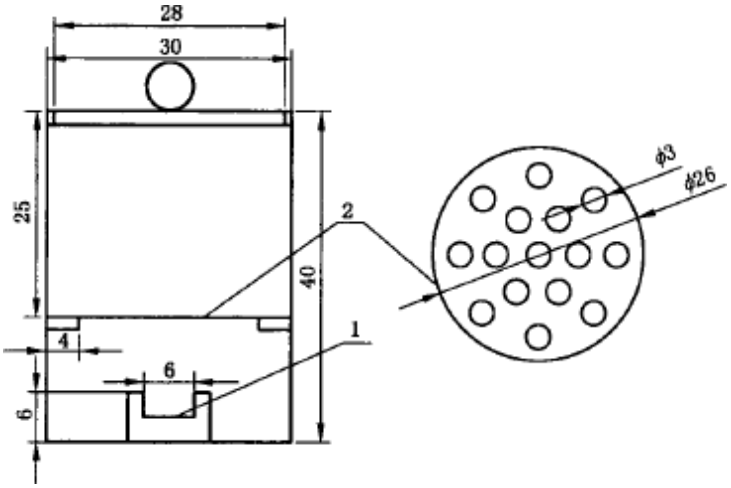

Figure Error! Missing test condition.**1 — Special determinator for gas adsorption of bamboo charcoal**

Unit: mm

1 —The specified position in the adsorption instrument;

2 — Grating.

5.5.3.2 Electrothermal constant-temperature drying oven: with automatic temperature control device, and with blower or natural ventilation device.

5.5.3.3 Climate box: 1 m^3.

5.5.3.4 Weighing bottle: 60 mm × 30 mm.

5.5.3.5 Analytical balance: with sensitivity of 0.1 mg.

5.5.3.6 Dryer: with desiccant (Not-deliquescent bulk-shape calcium chloride or silica gel) in it.

5.5.4 Operating methods

5.5.4.1 Weigh 1 g (accurate to 0.1 mg) of test sample that has been crushed and gone through

5.5.4.2 0.25 mm (60-mesh) sieve. Place the sample in the weighing bottle that has been constant-weighted in advance. The thickness of the test sample in the bottom of the weighing bottle shall be well-distributed.

5.5.4.3 Then place the weighing bottle filled with formaldehyde to the specified location in the bottom of adsorption instrument. The volatile capacity of formaldehyde shall be larger than the adsorption capacity of the test sample. Meanwhile, place the weighing bottle filled with test sample to the grating of adsorption instrument. Adsorb for 24 h in the climate box at the constant temperature of 20 °C. Wait to be tested. Blank test is conducted simultaneously.

5.5.5 Result calculation

5.5.5.1 The formaldehyde adsorption rate can be expressed by %, and calculated by formula (5):

$$X = \frac{m_2 - m_1 - m_3}{} \times 100\% \quad \text{.....} \quad (5)$$

where:

X is the formaldehyde adsorption rate of bamboo charcoal, %;

m_1 is the mass of test samples before adsorption and weighing bottle, in unit of gram (g);

m_2 is the mass of test samples after the adsorption of 24h and weighing bottle, in unit of gram (g);

m_3 is the weight-gain of blank test, in unit of gram (g);

m is the mass of sample, in unit of gram (g).

5.5.5.2 Formaldehyde adsorption rate can be expressed by mg/g, calculated by formula (6):

$$B = X \times 10 \quad (6)$$

where:

B is the Formaldehyde adsorption rate of bamboo charcoal, in unit of milligram per gram (mg/g);

X is the Formaldehyde adsorption rate of bamboo charcoal, %.

5.5.6 Allowable errors

The errors of 2 parallel determination results of the formaldehyde adsorption rate shall not exceed 0.5 %.

5.6 Determination of benzene absorption rate

5.6.1 Method summary

Dried test sample with certain mass is placed in adsorption instrument that is completely filled with benzene. Adsorb for 24 h at the constant temperature of 20 °C. The percentage of weight-gain of the test sample to the original test sample's mass is the adsorption rate.

5.6.2 Reagents

Benzene, analytically pure.

5.6.3 Instruments

5.6.3.1 Special determinator for gas adsorption of bamboo charcoal (as shown in Figure 1).

5.6.3.2 Electrothermal constant-temperature drying oven: with automatic temperature control device, and with blower or natural ventilation device.

5.6.3.3 Climate box: 1 m^3.

5.6.3.4 Weighing bottle: 60 mm × 30 mm.

5.6.3.5 Analytical balance: with sensitivity of 0.1 mg.

5.6.3.6 Dryer: with desiccant (Not-deliquescent bulk-shape calcium chloride or silica gel) in it.

5.6.4 Operating methods

Weigh 1 g (accurate to 0.1 mg) of dried test sample that has been crushed and passed through 0.25 mm-sieve (60-mesh). Place the sample in the weighing bottle that has been constant-weighted in advance. The thickness of the test sample in the bottom of the weighing bottle shall be well-distributed.

Then place the weighing bottle filled with benzene to the specified location in the bottom of special determinator for gas adsorption of bamboo charcoal. The volatile capacity of the benzene shall be larger than adsorption capacity of the test sample. Meanwhile, place the weighing bottle filled with test sample to the grating of adsorption instrument. Adsorb for 24 h in the climate box at the constant temperature of 20 °C. Wait to be tested. Blank test is conducted simultaneously.

5.6.5 Result calculation

5.6.5.1 The benzene adsorption rate can be expressed by %, and calculated by formula (7):

where:

$$X = \frac{m_2 - m_1 1 - m_3}{m} \times 100\%$$

X is the benzene adsorption rate of bamboo charcoal, %;

m_1 is the mass of test samples before adsorption and weighing bottle, in unit of gram (g);

m_2 is the mass of test samples after the adsorption of 24h and weighing bottle, in unit of gram (g);

m_3 is the weight-gain of blank test, in unit of gram (g);

m is the mass of test samples, in unit of gram (g).

5.6.5.2 Benzene adsorption rate can be expressed by mg/g, calculated by formula (8):

B = X x 10 (8)

where:

B is the benzene adsorption rate for bamboo charcoal, in unit of milligram per gram (mg/g);

X is the benzene adsorption rate of bamboo charcoal, %.

5.6.6 Allowable errors

The errors of 2 parallel determination results of the benzene adsorption rate shall not exceed 0.4 %.

5.7 Determination of TVOC adsorption rate

5.7.1 Method summary

Dried test sample with certain mass is placed in adsorption instrument that is completely filled with total volatile organic gas. Absorb for 24 h at the constant temperature of 20 °C. The percentage of weight-gain of the test sample to the original test sample's mass is the adsorption rate.

5.7.2 Reagent and its preparation

5.7.2.1 Ammonia water: analytically pure.

5.7.2.2 Benzene: analytically pure.

5.7.2.3 Methylbenzene: analytically pure.

5.7.2.4 Xylene: analytically pure.

5.7.2.5 Ethylbenzene: analytically pure.

5.7.2.6 Ethyl acetate: analytically pure.

5.7.2.7 Styrene: analytically pure.

5.7.2.8 Test solution preparation of total volatile organic compounds: mix ammonia water, benzene, toluene, ethylbenzene, xylene, ethyl acetate, and styrene by volume ratio.

5.7.3 Instruments

5.7.3.1 Special determinator for gas adsorption of bamboo charcoal (as shown in Figure 1).

5.7.3.2 Electrothermal constant-temperature drying oven: with automatic temperature control device, and with blower or natural ventilation device.

5.7.3.3 Climate box: 1 m^3 .

5.7.3.4 Weighing bottle: 60 mm × 30 mm.

5.7.3.5 Analytical balance: with sensitivity of 0.1mg.

5.7.3.6 Dryer: with desiccant (Non-deliquescent bulk-shape calcium chloride or silica gel)

5.7.4 Operating method

5.7.4.1 Weigh 1 g (accurate to 0.1 mg) of dried test sample that has been crushed and passed through a 0.25mm- sieve (60-mesh).

5.7.4.2 Place the sample in the weighing bottle that has been constant-weighted in advance. The thickness of the test sample in the bottom of the weighing bottle shall be well-distributed.

5.7.4.3 Place the weighing bottle filled with volatile organic test solution to the specified location in the bottom of special determinator for gas adsorption of bamboo charcoal. Volatile capacity for organic gas shall be larger than the adsorption capacity of the test sample. Meanwhile, place the weighing bottle filled with test sample to the grating of special determinator for gas adsorption of bamboo charcoal.

5.7.4.4 Adsorb for 24 h in the climate box at the constant temperature of 20 °C. Wait to be tested. Blank test is conducted simultaneously.

5.7.5 Result calculation

5.7.5.1 The TVOC adsorption rate can be expressed by %, and calculated by formula (9):

$$X = \frac{m_2 - m_1 1 - m_3}{m} \times 100\%$$

where:

X is the TVOC adsorption rate of the bamboo charcoal, %;

m_1 is the mass of test samples before adsorption and weighing bottle, in unit of gram (g);

m_2 is the mass of test samples after the adsorption of 24 h and weighing bottle, in unit of gram (g);

m_3 is the weight-gain of blank test, in unit of gram (g);

m is the mass of test samples, in unit of gram (g).

5.7.5.2 TVOC adsorption rate can be expressed by mg/g, calculated by formula (10):

B = X ×10 (10)

where:

B is the TVOC adsorption rate of bamboo charcoal, in unit of milligram per gram (mg/g);

X is the TVOC adsorption rate of the bamboo charcoal, %.

5.7.6 Allowable errors

The errors of 2 parallel determination results of the TVOC adsorption rate shall not exceed 0.3 %.

6 Labelling, packaging, transportation and storage of bamboo charcoal filters

6.1 Labelling

6.1.1 Product packaging shall contain a labeling including product name, number of this standard, batch number, net weight, product level, factory name, factory address, and date of production.

6.1.2 The products of bamboo charcoal filters used for export shall be marked in accordance with the export requirements.

6.1.3 In addition to the requirements above, labels shall conform to the requirements of JS 1 Part 1 and JS 1 Part 20.

6.2 Packaging

The interior layer of the package of bamboo charcoal filter for air-purification shall have an artight seal and be moisture proof. Appropriate external package can be added. Other forms of packaging may be used in accordance with user needs and negotiation between the user needs and supplier.

6.3 Transportation

During transportation, bamboo charcoal shall be protected from exposure rain, snow, and frost etc. Special attention shall be paid to loading and unloading. If the charcoal is in soft package, the hook to haul method shall not be used.

6.4 Storage

Bamboo charcoal filters for air-purification shall be stored in a cool, ventilated and dried warehouse. The bamboo charcoal shall be kept away from fire source and protected from exposing to the sun and rain. The warehouse shall not have any toxic and harmful gas. New fired bamboo charcoal shall be packaged, stacked and shipped after spreading-out for 3 days.

7 Requirements for bamboo protective face masks

7.1 The properties of the bamboo protective face mask material shall conform to the specifications requirements in Table 2, as tested in accordance with Clause 9.

7.2 Materials used in the construction of bamboo protective face masks shall meet the requirements for Class 1, normal flammability specified in 16 CFR Part 1610.

NOTE The material used in bamboo protective face masks should be hypoallegernic.

8 Sampling of bamboo protective face masks

8.1 Testing shall be performed on materials taken from manufactured bamboo protective face masks.

Table Error! Missing test condition.**2 — Bamboo Protective Face Mask Material Requirements by Performance Level**

Characteristic	Level 1 Barrier	Level 2 Barrier	Level 3 Barrier
Bacterial filtration efficiency, %	≥ 95	≥ 98	≥ 98
Differential pressure, mm H_2O/cm^2	< 5.0	< 6.0	< 6.0
Sub-micron particulate filtration efficiency at 0.1 micron, %	≥ 95	≥ 98	≥ 98

8.2 An acceptable quality limit of 4 % shall be used for all required testing to establish conformance of bamboo protective face masks to a specific performance class.

8.3 Examples of acceptable sampling plans are found in ANSI/ASQC Z1.4 and ISO 2859-1.

9 Test Methods

9.1 Bacterial Filtration Efficiency

Determine the bacterial filtration efficiency as directed in ASTM F2101.

9.2 Differential Pressure

Determine breathing resistance or differential pressure as directed in EN 14683:2019, Annex C.

9.3 Sub-Micron Particulate Filtration

Determine particulate filtration efficiency as directed in ASTM F2299.

Annex A
(informative)
Guidance for the use of Bamboo protective face masks and Bamboo charcoal filters

An N95 respirator is a respiratory protective device with a close facial fit and efficient filtration of airborne particles. As is the case with surgical masks, they are tested for fluid resistance, particulate and bacterial filtration efficiencies, flammability and biocompatibility.

The bamboo face mask is designed in a similar way as the N95, but with a receptacle for inserting the bamboo charcoal filter. The face mask itself is washable and the charcoal filter is replaceable

Bamboo charcoal has been used in various ways due to its extraordinary properties. What makes this charcoal so amazing is the carbonization process which creates a product with an enormous surface area to mass ratio which has high ability to attract and hold (adsorption) a wide range of materials, chemicals, minerals, radiowaves, humidity, odours and harmful substances. The absorption property of this material has been utilized in various applications such as household products (water filtration, humidity and odour adsorbent, air freshener, fruits and vegetables saver etc.) and health and beauty products (soap, powder, foot patch etc.). The adsorption properties of bamboo charcoal can be improved and become a perfect absorbent when this material is further activated either thermally or chemically.

The other masks such, as the N95, rely on the small pore size of the material used. The bamboo textile also has very small pore size but also utilizes the anti-microbial properties of bamboo textile. In addition to this, the charcoal filter that is inserted has adsorption properties as described above.

There are markets for protective masks. Presently, entrepreneurs are not concentrating on dust masks although the bamboo masks also protect against smoke and saw dust.

Within the protective masks market there are markets for reusable face masks.

On the basis of end-use industry, the global protective face mask market is segmented into:

1. Chemical & Petrochemical
2. Oil & Gas
3. Health Care & Pharmaceutical
4. Mining & Construction
5. Agriculture

The bamboo mask is usable in all these industries.

As face masks are becoming more of a necessity for people around the world — and not just physicians and health-care professionals fighting the coronavirus — the purposes they serve are as varied as the individuals who wear them. Part of the increasing demand for masks stems from the fact that surgical masks and N95 respirators are not meant to be shared or reused. The bamboo masks perform as efficiently as the N95 respirator but can be reused by washing the fabric and replacing the charcoal filter.

The widely referenced N95 respirators and surgical masks are examples of personal protective equipment used to protect wearers from airborne particles and from liquid contaminating the face. The criteria for various medical face masks include material performance testing for bacterial filtration efficiency, differential, pressure resistance to synthetic blood, flammability and submicron particulate filtration efficiency. These criteria are also applicable to masks made from bamboo textiles.

Standards Council

The Standards Council is the controlling body of the Bureau of Standards Jamaica and is responsible for the policy and general administration of the Bureau.

The Council is appointed by the Minister in the manner provided for in the Standards Act, 1969. Using its powers in the Standards Act, the Council appoints committees for specified purposes.

The Standards Act, 1969 sets out the duties of the Council and the steps to be followed for the formulation of a standard.

Preparation of standards documents

The following is an outline of the procedure which must be followed in the preparation of documents:

1. The preparation of standards documents is undertaken upon the Standard Council's authorisation. This may arise out of representation from national organisations or existing Bureau of Standards' Committees of Bureau staff. If the project is approved it is referred to the appropriate sectional committee or if none exists a new committee is formed, or the project is allotted to the Bureau's staff.

2. If necessary, when the final draft of a standard is ready, the Council authorises an approach to the Minister in order to obtain the formal concurrence of any other Minister who may be responsible for any area which the standard may affect.

3. The draft document is made available to the general public for comments. All interested parties, by means of a notice in the Press, are invited to comment. In addition, copies are forwarded to those known, interested in the subject.

4. The Committee considers all the comments received and recommends a final document to the Standards Council

5. The Standards Council recommends the document to the Minister for publication.

6. The Minister approves the recommendation of the Standards Council.

7. The declaration of the standard is gazetted and copies placed on sale.

8. On the recommendation of the Standards Council the Minister may declare a standard compulsory.

9. Amendments to and revisions of standards normally require the same procedure as is applied to the preparation of the original standard.

Overseas standards documents

The Bureau of Standards Jamaica maintains a reference library which includes the standards of many overseas standards organisations. These standards can be inspected upon request.

The Bureau can supply on demand copies of standards produced by some national standards bodies and is the agency for the sale of standards produced by the International Organization for Standardization (ISO) members.

Application to use the reference library and to purchase Jamaican and other standards documents should be addressed to:

Bureau of Standards Jamaica
6 Winchester Road,
P.O. Box 113,
Kingston 10,
Jamaica, W. I.