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No. : HC21100831

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Applicant(Code:01325900) : Savewo Limited
1/F
266-270 Texaco Road
Tsuen Wan NT HK

Description of Sample(s) : One submitted sample said to be 3DMASK Kids.
Country of Origin : Hong Kong

Sample(s) Received Condition(s): In plastic bag under
ambient temperature

Date Sample(s) Received : 2021-10-26

Date Tested : 2021-10-27 to 2021-11-06

Investigation Requested : Performance Test as per ASTM F2100-19
1. Bacterial Filtration Efficiency (BFE) %
– *Staphylococcus aureus* (ATCC 6538)
2. Particulate Filtration Efficiency (PFE) %
3. Differential Pressure
4. Synthetic Blood Penetration
5. Flammability to Class 1



LAU Yuk Kuen, Joey
Authorized Signatory





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Requirement:

Performance Test as per ASTM F2100-19	Level 1	Level 2	Level 3
Bacterial Filtration Efficiency (BFE) % – <i>Staphylococcus aureus</i> (ATCC 6538)	≥95%	≥98%	
Particulate Filtration Efficiency (PFE) %	≥95%	≥98%	
Differential Pressure (ΔP)	<5.0 mmH ₂ O/cm ²	<6.0 mmH ₂ O/cm ²	
Resistance to Penetration by Synthetic Blood	80 mmHg	120 mmHg	160 mmHg
Flame Speed (Flammability to Class 1)	Class 1 (The time of flame spread is 3.5 seconds or more)		

Summary:

Performance Test as per ASTM F2100-19	3DMASK Kids
	Level 3
Bacterial Filtration Efficiency(BFE) % – <i>Staphylococcus aureus</i> (ATCC 6538)	Pass
Particulate Filtration Efficiency (PFE) %	Pass
Differential Pressure (ΔP)	Pass
Resistance to Penetration by Synthetic Blood Penetration	Pass
Flame Speed (Flammability to Class 1)	Pass

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

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Test Result(s):

1. Bacterial Filtration Efficiency (BFE) %

Test method: ASTM F2100-19 9.1 & ASTM F2101-19

Summary: The BFE test is performed to determine the filtration efficiency of test articles by comparing the bacterial control counts upstream of the test article to the bacterial counts downstream. A suspension of *Staphylococcus aureus* was aerosolized using a nebulizer and delivered to the test article at a constant flow rate and fixed air pressure. The challenge delivery was maintained at $1.7 - 3.0 \times 10^3$ colony forming units (CFU) with a mean particle size (MPS) of $3.0 \pm 0.3\mu\text{m}$. The aerosols were drawn through a six-stage, viable particle, Andersen sampler for collection. This test method complies with ASTM F2101-19.

All test method acceptance criteria were met.

Specimen(s)	3DMASK Kids
1	99.9%
2	>99.9%
3	99.9%
4	>99.9%
5	>99.9%

- Notes :
- Challenge bacteria : *Staphylococcus aureus* (ATCC 6538)
 - Positive control average : 2674 CFU
 - Negative control average : <1 CFU
 - Mean particle size : $3.2\mu\text{m}$
 - Testing side : Outside of specimen
 - Testing area : 49 cm^2
 - Precondition : Minimum of 4 hours at $(21\pm 5)^\circ\text{C}$ and $(85\pm 5)\%$ relative humidity (RH)

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2. Particulate Filtration Efficiency (PFE) %

Test method: ASTM F2100-19 9.3 & ASTM F2299-17

Summary: This procedure was performed to evaluate the non-viable particle filtration efficiency (PFE) of the test article. Monodispersed polystyrene latex spheres (PSL) were nebulized (atomized), dried, and passed through the test article. The particles that passed through the test article were enumerated using a laser particle counter.

The upstream and downstream particle counts at each position were sampled and recorded. The filtration efficiency was calculated using the average number of particles penetrating the test article (downstream particle count) compared to the average of the upstream particle count.

The procedure employed the basic particle filtration method described in ASTM F2299-17. All test method acceptance criteria were met.

Specimen(s)	3DMASK Kids			
	Upstream particle count	Downstream particle count	Resistances to Ventilation (Pa)	PFE %
1	86750	0	28	>99.9
2	88340	0	30	>99.9
3	88970	20	30	>99.9
4	88290	0	29	>99.9
5	87810	30	28	>99.9

Notes : - Flow rate : 28.3 Litre/min
 - Challenge particles : 0.1 µm PSL
 - Testing area : 50 cm²
 - Testing side : Outside of specimen
 - Testing condition : 18 - 24 °C, 25 -55 % Relative humidity

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3. Differential Pressure

Test method: ASTM F2100-19 9.2 & EN 14683:2019 + AC:2019, Annex C

Summary: The Differential Pressure test is performed to determine the breathability of test articles by measuring the differential air pressure on either side of the test article using a manometer, at a constant flow rate. This test complies with EN14683:2019 + AC:2019, Annex C and ASTM F2100-19.

All test method acceptance criteria were met.

Sample : 3DMASK Kids

Specimen(s)	Test area (in Pa/cm ²)					Average	
	1	2	3	4	5	Pa/cm ²	mmH ₂ O/cm ²
1	42.8	46.5	50.8	50.6	52.2	48.6	5.0
2	48.4	46.6	51.0	49.2	50.8	49.2	5.0
3	47.8	44.9	53.4	50.6	49.0	49.1	5.0
4	42.4	48.2	53.0	50.5	50.5	48.9	5.0
5	52.8	43.9	55.7	55.3	54.8	52.5	5.4

Notes : - 1 mmH₂O/cm² = 9.8 Pa/cm²
 - Flow rate: 8 Litre/min
 - Precondition : Minimum of 4 hours at (21±5) °C and (85±5) % relative humidity (RH)

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4. Synthetic Blood Penetration

Test method: ASTM F2100-19 9.4 & ASTM F1862-17

Summary: This procedure was performed to evaluate surgical facemasks and other types of protective clothing materials designed to protect against fluid penetration. The purpose of this procedure is to simulate an arterial spray and evaluate the effectiveness of the test article in protecting the user from possible exposure to blood and other body fluids. The distance from the target area surface to the tip of the cannula is 30.5cm. A test volume of 2 mL of synthetic blood was employed using the targeting plate method.

This test method was designed to comply with ASTM F1862-17.

Test Pressure: 160mmHg

Specimen Number	3DMASK Kids
1-2, 4-13, 15-20, 22-32	None Seen
3, 14, 21	Seen
<p>Requirement: An acceptable quality limit of 4.0% is met for a normal single sampling plan when ≥ 29 of 32 test specimens show passing result (none seen)</p>	

Notes : - Test Side: Outside
 - Precondition : Minimum of 4 hours at (21 ± 5) °C and (85 ± 5) % relative humidity (RH)
 - Testing condition: 18 - 24 °C, 25 -55 % Relative humidity

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5. Flammability

Test method: ASTM F2100-19 9.5, 16 CFR 1610

Summary: This procedure was performed to evaluate the flammability of plain surface clothing textiles by measuring the ease of ignition and the speed of flame spread. The parameter of time is used to separate materials into different classes, thereby assisting in a judgment of fabric suitability for clothing and protective clothing material. The test procedure was performed in accordance with the test method outlined in 16 CFR Part 1610(a) Step 1 – testing in the original state. Step 2 – Refurbishing and testing after refurbishing, was not performed. All test method acceptance criteria were met.

Specimen(s)	3DMASK Kids	Class
	Time of spread of flame (Original state)	
1	Ignite but extinguished	1
2	Ignite but extinguished	
3	Ignite but extinguished	
4	Ignite but extinguished	
5	Ignite but extinguished	

Notes : - Test Side: Outside
- Orientation: Cross

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Photo(s):



******* End of Test Report *******

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