Cambridge
materials testing limited

6991 Millcreek Drive, Unit 13
Mississauga, Ontario L5N 6B9
Tel: (905) 812-3856 Fax: (905) 812-3866
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Report For:	KJ Trade and Production Joint Stock Company 587 Arc En Ciel Orleans, Ontario K4A 3J1 Phone: 819-329-4950 Email: tloan.nguyen@importexportvncan.ca	**Laboratory #:** **Report Date:** **Received Date:**	845518-2-20 **FINAL** October 13, 2020 September 30, 2020
Attention:	Thanh Loan Nguyen		
Specimen:	#2: KJ Mask. Model: KJVINA.05. Lot: 200605		

TEST REPORT

One specimen, consisting of Medical Masks, was submitted to be tested for bacteria filtration efficiency, differential pressure, particle filtration efficiency, synthetic blood penetration and flame spread to determine acceptability with level barrier classification under ASTM F2100-19 requirements.

Medical Face Mask Material Requirements

Characteristic	**Level 1 Barrier**	**Level 2 Barrier**	**Level 3 Barrier**	**Summary Results**
Bacterial Filtration Efficiency, %	≥95	≥98	≥98	**Pass any Level**
Differential Pressure, mm H_2O/cm^2	<5.0	<6.0	<6.0	**Pass Level 2 & 3**
Sub-Micron Particulate Filtration Efficiency at 0.1 micron, %	≥95	≥98	≥98	**Pass any Level**
Synthetic Blood Penetration minimum pressure in mmHg for pass result	80	120	160	**Pass Level 3**
Flame Spread	Class 1	Class 1	Class 1	**Pass any Level**
OVERALL PERFORMANCE LEVEL	**Complete - Level 3**			

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Per Stuart Brown
Authorized By Stephen Brown

Per Anamaria Rojas Pineda.
Technician, Anamaria Rojas-Pineda

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DIFFERENTIAL PRESSURE

EN 14683:2019 edition Annex C
Each specimen was conditioned for 4 hours minimum at 21+/-5 C and 85+/-5 % R.H.

Requirements ASTM F2100-19:
Differential Pressure (mmH_2O/cm^2)
Level 1 Barrier: <5.0
Level 2 Barrier: <6.0
Level 3 Barrier: <6.0

RESULTS

Specimen ID	Area ID	Differential Pressure ($mmH2O/cm^2$)	Specimen Pass/Fail	FINAL RESULT
2-1	1	4.7	**PASS**	**PASS Level 2 & 3**
	2	5.1		
	3	5.5		
	4	4.0		
	5	5.5		
	AVERAGE	5.0		
2-2	1	6.1	**PASS**	
	2	5.6		
	3	4.7		
	4	5.6		
	5	5.0		
	AVERAGE	5.4		
2-3	1	4.1	**PASS**	
	2	4.6		
	3	4.0		
	4	4.6		
	5	4.8		
	AVERAGE	4.4		
2-4	1	4.6	**PASS**	
	2	4.4		
	3	4.6		
	4	4.9		
	5	4.4		
	AVERAGE	4.5		
2-5	1	5.2	**PASS**	
	2	4.5		
	3	5.4		
	4	4.6		
	5	5.0		
	AVERAGE	4.9		

Mask Surface Area: 25mm diameter (x5 test areas) (4.9 cm^2)
Air Flow Rate: 8 L/min
Mask Location Specimen taken from: 5 Areas from each specimen distributed all surface wide
Note: For a test plan of 5 specimens, no failure is allowed for an Acceptable Quality Limit of 4.0%.

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SYNTHETIC BLOOD PENETRATION
ASTM F1862/F1862M-17 at 160 mmHg pressure

RESULTS

Specimen #	Test Pressure (mmHg)	Total Number of Specimens	Number of Pass Specimens	**FINAL RESULT**
2	160	32	29	**Pass for Level 3**

Note: Acceptable Quality Limit of 4.0% is met for single sampling plan when 29 or more of the 32 tested specimens show pass results.

Material construction type	Not provided/unknown
Supplier	KJ VINA TRADE AND PRODUCTION JSC
Lot number	200605
Date of receipt	September 30, 2020
Date of test	October 2, 2020
Fluid velocity (cm/s)	635
Volume of impact fluid (ml)	2
Angle of pneumatic valve to horizontal	2°
Description target area mask	Blue ripple area
Distance from tip cannula to mask (in)	12
Technique to enhance visual detection	Cotton swab used to lightly daub on the surface
Conditioning parameters	21±5°C, 85±5% R.H for minimum of 4 hours

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FLAME SPREAD
The specimen, consisting of 5 masks, was tested in accordance to 16 CFR 1610 (1-1-16 Edition).

	Specimen #	RESULT	CONCLUSION
Specimen #2	2-1	IBE	**Classified as Class 1 PASS for ANY LEVEL**
	2-2	IBE	
	2-3	IBE	
	2-4	IBE	
	2-5	IBE	

IBE: Ignited but extinguished

Test: Flame Resistance 45˚ angle test. One-Second Flame Impingement.
Type of fabric: Without a raised fiber surface
Surface tested: Face
Type of test: Original State
Direction tested: Length
Testing Conditioning: Specimens conditioned at 105°C for 30 min, then placed in desiccator
Requirements: The flame spread time for textile products without a raised fibre surface must be greater than 3.5 seconds.

Note: For a test plan of 5 specimens, no failure is allowed for an Acceptable Quality Limit of 4.0%.

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Particle Filtration Efficiency

Particles: Monodispersed polystyrene latex spheres (PSL)
Particles Counter: TSI scanning mobility particle sizer spectrometer 3082 and CPC
Tested as per ASTM F2299, non-neutralized aerosol challenge measured over 3 minutes (test specimen / control counts before and after test specimen and averaged)

Test Side: Inside
Area Tested: 21.7 cm2
Particle Size: 0.1 µm
Laboratory Conditions: 23°C, 54% relative humidity (RH)

Requirements ASTM F2100-19:
Particle filtration efficiency at 0.1 micron (%)
Level 1 Barrier: ≥95
Level 2 Barrier: ≥98
Level 3 Barrier: ≥98

RESULTS

Specimen #	Average Control Counts	Specimen Counts	Filtration Efficiency (%)	Specimen (Pass/Fail)	FINAL RESULT
2-1	80,572	868	99	Pass	**Pass any Level**
2-2	78,407	1,553	98	Pass	
2-3	85,768	1,923	98	Pass	
2-4	81,062	564	99	Pass	
2-5	80,069	512	99	Pass	

Note: The PFE equipment was outsourced and located at University of Toronto, 223 College Street, Toronto, ON M5T 1R4.

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Bacterial Filtration Efficiency

A Bacterial Filtration Efficiency (BFE) test was completed according to the procedure in ASTM F2101-19 to determine the filtration efficiency of test articles by comparing the bacterial control counts upstream of the test article to the bacterial counts recovered downstream. A suspension of S. aureus was aerosolized using a nebulizer and delivered to the test article at a constant rate with a target delivery rate of 1.7 $x10^3$ – 3.0$x10^3$ colony forming units (CFU) per test article with a mean particle size of 3.0 ± 0.3 µm. The aerosolized suspension was drawn through the test article which was clamped in a six stage Andersen air sampler, at a constant flow rate of 28.3 liters per minute (LPM), for collection on bacteriological agar plates.

Challenge Microbe: *Staphylococcus aureus* ATCC 6538
Test Side: User side facing challenge
Area Tested: ~38.5 cm^2
Flow Rate: 28.3 LPM
Test Article Conditioning: 85 ± 5% RH at 25.0 ± 0.5°C for a minimum of 4 hours
Challenge Level: 2.347 x 10^3 CFU
Mean Particle Size: 3.17µm

Requirements ASTM F2100-19:
Bacterial filtration efficiency (%)
Level 1 Barrier: ≥95
Level 2 Barrier: ≥98
Level 3 Barrier: ≥98

RESULTS

Specimen #	Total CFU Recovered	Percent BFE (%)	Specimen (Pass/Fail)	FINAL RESULT
1-1	0	>99.9	Pass	**Pass any Level**
1-2	0	>99.9	Pass	
1-3	0	>99.9	Pass	

The filtration efficiency percentages were calculated using the following equation:

$$\% BFE = \frac{C - T}{C} \ x \ 100$$

C = Challenge Level
T = Total CFU recovered downstream of test article

Note: Testing performed by GAP EnviroMicrobial Services Ltd., 1020 Hargrieve Road, Unit 14, London, Ontario, Canada, N6E 1P5