Altor Safety
711 Executive Boulevard
Valley Cottage, NY 10989
USA

The following sample(s) was/were submitted and identified by/on behalf of the client as: Flat-fold disposable face masks

Sample Received Date: June 18, 2020

Testing Period June 18, 2020 – July 23, 2020

Test Method & Results : Please refer to next page(s).

Test(s) Requested :

Test(s) Requested
ASTM F2100-19 – Standard Specification for Performance of Materials Used in Medical Face Masks
1. ASTM F2299/F2299M-03 (Reapproved 2017) – Test Method for Determining the Initial Efficiency of Materials used in Medical Face Masks to Penetration by Particulates Using Latex Spheres
2. EN14683:2019 Annex C Method for determination of breathability (differential pressure)
3. ASTM F1862/F1862M-17 – Test Method for Resistance of Medical Face Masks to Penetration by Synthetic Blood (Horizontal Projection of Fixed Volume at a Known Velocity)
4. 16 CFR Part 1610 – Standard for the Flammability of Clothing Textiles
5. ASTM F2101-19 – Test Method for Evaluating the Bacterial Filtration Efficiency (BFE) of Medical Face Mask Materials, Using a Biological Aerosol of *Staphylococcus aureus*

Signed for and on behalf of SGS North America, Inc.

Daniel Miller
Air Labs Manager

Prepared By:

Christina Crimi
Business Manager - Chemistry

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As per ASTM F2100-19, Table 1 section 6.1

Medical Face Mask Material Requirements by Performance Level			
Test Parameter	**Level 1 Barrier**	**Level 2 Barrier**	**Level 3 Barrier**
Bacterial Filtration Efficiency (BFE)*	≥ 95%	≥ 98%	≥ 98%
Differential pressure	< 5.0 mmH_2O/cm^2	< 6.0 mmH_2O/cm^2	< 6.0 mmH_2O/cm^2
Sub-micron particulate filtration efficiency	≥ 95%	≥ 98%	≥ 98%
Resistance to penetration by synthetic blood	80 mmHg	120 mmHg	160 mmHg
Flame Spread	Class 1	Class 1	Class 1

Result Summary:

This table is a summary of results for all testing requested by the client. It is not to be used to state compliance and is only provided for ease of data consolidation. This report is not to be altered or reproduced unless in its entirety. The results are not valid unless accompanied by the data set(s) in the following Appendices.

Test Performed	Result Summary	Report	Appendix
Bacterial Filtration Efficiency (BFE)*	≥ 95%	Intertek Report No. 104369636CRT-012	1
Differential pressure	< 5.0 mmH_2O/cm^2	SGS IBR 22026C	2
Sub-micron particulate filtration efficiency	≥ 95%	SGS IBR 22026D	3
Resistance to penetration by synthetic blood	80 mmHg	SGS-IPS 01101-20	4
Flame Spread	Class 1	SGS-IPS 01101-20	4

*Testing is performed at an external laboratory.

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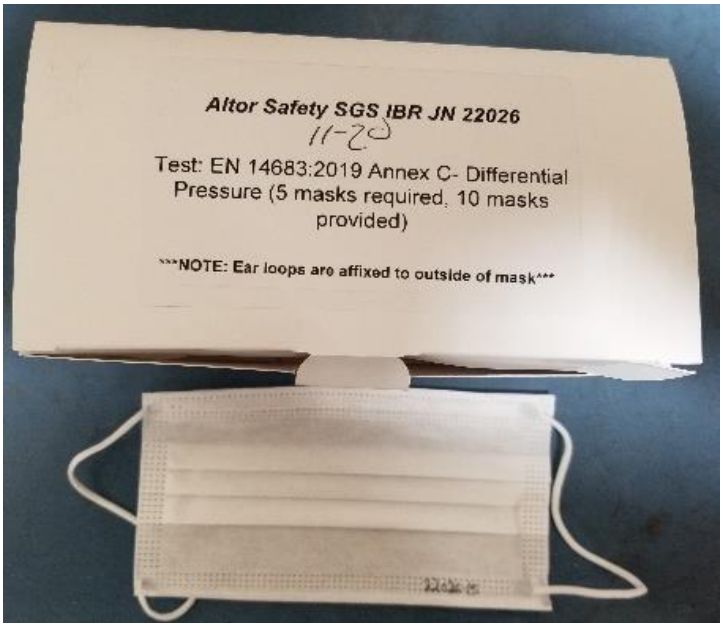

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*** End of Report ***

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APPENDIX 1

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SGS IBR LABORATORIES
TEST REPORT

SCOPE OF WORK
Performance Testing of Medical Face Masks to ASTM F2100 *Standard Specification for Performance of Materials Used in Medical Face Masks,* 2019 Edition

REPORT NUMBER
104369636CRT-012

ISSUE DATE
July 23, 2020

PAGES
4

DOCUMENT CONTROL NUMBER
GFT-OP-10i (28-Nov-2018)
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3933 US Route 11
Cortland, New York 13045

Telephone: 1-607-753-6711
Facsimile: 1-607-756-9891
www.intertek.com

TEST REPORT

Issued July 23, 2020

Intertek Report No. 104369636CRT-012
Intertek Project No. G104369636

CLIENT
SGS IBR Laboratories
11599 Morrissey Rd
Grass Lake, MI 49240
USA

TEST STANDARD
ASTM F2100 *Standard Specification for Performance of Materials Used in Medical Face Masks,* 2019 Edition

AUTHORIZATION
Quote Number: Qu-01081174-1

SAMPLE IDENTIFIED BY THE CLIENT AS
Product Type: Face Mask
Reference Number: JN 22026

SAMPLE INFORMATION
Date(s) Samples Received: June 29, 2020
Condition of Samples: Production Run
Date(s) of Testing: July 21, 2020

TEST INFORMATION

ASTM F2101 *Bacterial Filtration Efficiency*	Test data attached
EN 14683:2019 Annex C *Differential Pressure*	Not tested under this project
ASTM F2299 *Sub-Micron Particulate Filtration*	Not tested under this project
ASTM F1862 *Resistance to Penetration by Synthetic Blood*	Not tested under this project
16 CFR 1610 *Flammability*	Not tested under this project

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TEST REPORT

Issued 23-July-2020

Intertek Report No. 104369636CRT-012
Intertek Project No. G104369636

SECTION 1
CONCLUSION

This test report represents the testing covered by proposal number Qu-01081174-1.

The observations and test results in this report are relevant only to the sample tested. Intertek makes no representations or warranties, express or implied, regarding units that were not tested including, but not limited to, units that may be part of the same lot.

If there are any questions regarding the results contained in this report, or any other services offered by Intertek, please do not hesitate to contact the undersigned.

Please note this Test Report does not represent authorization for the use of any Intertek certification marks.

Project Owner:	Benjamin Hanna	Project Reviewer:	Jason Allen
Title:	Project Engineer	Title:	Technical Advisor
Signature:		Signature:	
Date:	July 23, 2020	Date:	July 23, 2020

REPORT REVISIONS

Date / Project #	Project Handler/ Reviewer	Description of Change
		None

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SGS IBR Laboratories
Intertek Report No: 104369636CRT-012

TEST REPORT

SECTION 2

ASTM F2100-19 TEST DATA

BACTERIAL FILTRATION EFFICIENCY (BFE), ASTM F2101-19

Specimens conditioned for 4-hours at 20.4-22.1°C and 83-86%RH

Test Set-up Information	
Area of Test Specimen (cm^2)	48.3
Specimen Side Faceing Challenge	Inside of Mask
Flow Rate (LPM)	28.3
Averaged + Control Plate Count	2942
Mean Particle Size (µm)	2.88, 2.93

SGS IBR JN 22026					
Plate Count	Mask Specimen				
Stage	1	2	3	4	5
Stage 1	1	1	0	0	0
Stage 2	0	0	1	0	0
Stage 3	1	0	0	2	0
Stage 4	7	5	3	4	6
Stage 5	16	5	5	12	11
Stage 6	0	3	1	0	0
Plate Count Total	25	14	10	18	17
% BFE	99.15	99.52	99.66	99.39	99.42

TEST EQUIPMENT INFORMATION

Description	Control Number	Calibration Date	Calibration Due
Conditioning Chamber	308-H252	2/26/2020	2/26/2021
Timer	308-H358	1/13/2020	1/13/2021
Pipette	308-H294	2/26/2020	2/26/2021
Analytical Balance	308-S268	12/2/2019	12/2/2020

Date of Testing	7/21/2020

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APPENDIX 2

SGS IBR LABORATORIES

TEST REPORT

Test Method: EN14683:2019 Annex C Method for determination of breathability (differential pressure)

IBR JN: 22026C

Date: 06 July 2020

Performed for: Altor Safety
Location: Valley Cottage, NY
Contact: Jared Scott

Description of Samples: Flat-fold disposable face masks

Source: Seth MacGregor - Valley Cottage, NY
Date Samples Received: 18 June 2020

Fluid: Air
Flow Rate: 8 lpm
Effective Area: 4.9 cm^2

Filter ID	Measurement Area	Differential Pressure (mmH_2O)	Mean Differential Pressure (mmH_2O)	Mean Differential Pressure / Area (mmH_2O/cm^2)	
22026-11	1 2 3 4 5	13.0 16.3 15.2 14.3 17.5	15.3	**3.1**	Temp: 23.6 °C RH: 45.5 % BP: 736 mmHg
22026-12	1 2 3 4 5	15.9 13.3 14.9 13.7 14.4	14.4	**2.9**	Temp: 23.6 °C RH: 46.8 % BP: 736 mmHg
22026-13	1 2 3 4 5	14.4 16.3 18.5 16.9 15.2	16.3	**3.3**	Temp: 23.6 °C RH: 45.5 % BP: 736 mmHg
22026-14	1 2 3 4 5	15.9 16.8 16.9 15.5 14.5	15.9	**3.2**	Temp: 23.5 °C RH: 45.4 % BP: 736 mmHg
22026-15	1 2 3 4 5	14.6 13.8 14.2 12.5 13.1	13.6	**2.8**	Temp: 23.6 °C RH: 45.5 % BP: 736 mmHg

Notice: These data relate only to the samples tested. This report may be copied only in its entirety.
Performed By: DN Data Location: DN262

Description	IBR ID	Manufacturer	Model No.	Serial No.	Range of Use	Cal Due
Flow Meter	AF-112	Alicat Scientific	M20SLPM-D/5M	99928	0.1-20 SLPM	8/30/2020
Differential Pressure	MAN-52	Dwyer	DHII-007	DC: A38AA	0.1-10.0 inH2O	1/31/2021
Temp / Humidity	RH-206	Vaisala	HMT330	L5220038	12-75%RH/16-27C	1/9/2021
Barometric Pressure	MAN-51	Testo	511	39111389/505	300-1200 hPa	8/29/2020

Reviewed By: _____
Daniel R. Miller, Air Labs Manager

Revision	Editorial / Technical	Description	Approved By	Release Date
		Initial Release	DRM	7/7/2020

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APPENDIX 3

SGS IBR LABORATORIES

TEST REPORT

Test Method: ASTM F2299/F2299M-03 (reapproved 2017) Determining the Initial Efficiency of Materials Used in Medical Face Masks to Penetration by Particulates Using Latex Spheres

Testing parameters per ASTM F2100-19 Standard Specification for Performance of Materials Used in Medical Face Masks

IBR JN: 22026D

Date: 06 July 2020

Performed for: Altor Safety
Location: Valley Cottage, NY
Contact: Jared Scott

Description of Samples: Flat-fold disposable face masks
Test Area: 45.22 cm^2
Source: Seth MacGregor - Valley Cottage, NY
Date Samples Received: 18 June 2020

Fluid: Air
Flow Rate: 28.3 lpm
Face Velocity: 10.4 cm/s
Challenge: 0.1µm (±15% CV) Latex Microspheres (Neutralized)

Filter ID	Differential Pressure (mmH_2O)	Port	Particles / 2 ft3		
22026-1	6.6	Upstream	6242875	Temp:	21.3 °C
		Downstream	274922	RH:	49.9 %
		Efficiency (%)	**95.60**	BP:	735 mmHg
22026-2	6.9	Upstream	7394750	Temp:	21.4 °C
		Downstream	270156	RH:	49.6 %
		Efficiency (%)	**96.35**	BP:	735 mmHg
22026-3	6.4	Upstream	6869425	Temp:	21.2 °C
		Downstream	286204	RH:	49.7 %
		Efficiency (%)	**95.83**	BP:	735 mmHg
22026-4	7.1	Upstream	6813800	Temp:	21.2 °C
		Downstream	296737	RH:	49.4 %
		Efficiency (%)	**95.65**	BP:	735 mmHg
22026-5	7.1	Upstream	6896900	Temp:	21.4 °C
		Downstream	265120	RH:	49.0 %
		Efficiency (%)	**96.16**	BP:	735 mmHg

Notice: These data relate only to the samples tested. This report may be copied only in its entirety.
Performed By: DN Data Location: DN262

Manufacturer	Model Number	Serial Number	IBR ID	Range of Use	Cal Due
Alicat Scientific	M-50SLPM-D/5M	99929	AF-113	5-45 SLPM	9/3/2020
Dwyer	DHII-007	Date Code: A31X	MAN-31	0.1-10.0 inH2O	2/17/2021
Vaisala	HMT330	L5220038	RH-206	12-75%RH/16-27C	1/9/2021
Vaisala	PTU300	R3240750	RH-209	500-1100 hPa	8/9/2020
PMS	Lasair III 110	116514	N/A	0.1-5.0 µm	12/17/2020
PMS	Lasair III 110	102709	N/A	0.1-5.0 µm	9/1/2020

Reviewed By: _____
Daniel R. Miller, Air Labs Manager

Revision	Editorial / Technical	Description	Approved By	Release Date
		Initial release	DRM	7/7/2020

SGS IBR Laboratories 11599 Morrissey Rd Grass Lake MI 49240 USA
Voice: +1 517 522 8453

page 1 of 1

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APPENDIX 4

SGS IPS TESTING

Test Report
July 17, 2020
Page 1 of 6
SGS-IPS 01101-20

Report to: Jared Scott
Altor Safety
711 Executive Boulevard
Valley Cottage, NY 10989

Sample Identification: **Project JN 22026 (One Face Mask Sample)**

Date Received: July 1, 2020

Test(s) Requested: Flammability, Resistance to Blood Penetration - ASTM F 1862

PO Number: SGS IBR (JN 22026)

Analysis of One Face Mask Sample

SGS IPS Testing performed the testing listed above on one face mask sample provided by Altor Safety. The results are summarized in Tables 1 and 2 on the following pages.

If you have any questions, please contact us.

Authorized by Mai Pa V. Ulys
MaiPa Xiong
Laboratory Manager

Signed
Andrew Smits
Senior Lab Technician
Physical Testing
920-749-3040

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Report to Altor Safety
SGS-IPS 01101-20

Project No. JN 22026

July 17, 2020
Page 2 of 6

Table 1. Physical Properties

	JN 22026 Face Masks
Flammability	
	AT-1659
Orientation	Nose to chin
Test Side	Outside
Burn Time (sec)	
1	IBE
2	IBE
3	IBE
4	IBE
5	IBE
Average	IBE
Classifications	Class 1

IBE indicates the specimen Ignited But Extinguished.
DNI indicates the specimen Did Not Ignite.
Average calculated based on combusted samples only.

SGS IPS TESTING

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Report to Altor Safety
SGS-IPS 01101-20

Project No. JN 22026

July 17, 2020
Page 3 of 6

Table 2. Resistance to Blood Penetration - ASTM F 1862

	JN 22026 Face Masks (160mmHg)	JN 22026 Face Masks (120mmHg)	JN 22026 Face Masks (80mmHg)
		AT-1659	
Resistance to Blood Penetration (Pass/Fail)			
1	Fail	Pass	Pass
2	Fail	Pass	Pass
3	Fail	Pass	Pass
4	Fail	Pass	Pass
5	NA	Fail	Pass
6	NA	Pass	Pass
7	NA	Pass	Pass
8	NA	Pass	Fail
9	NA	Pass	Pass
10	NA	Pass	Pass
11	NA	Pass	Pass
12	NA	Fail	Pass
13	NA	Fail	Fail
14	NA	Pass	Pass
15	NA	Fail	Pass
16	NA	NA	Pass
17	NA	NA	Pass
18	NA	NA	Pass
19	NA	NA	Pass
20	NA	NA	Pass
21	NA	NA	Pass
22	NA	NA	Pass
23	NA	NA	Pass
24	NA	NA	Pass
25	NA	NA	Pass
26	NA	NA	Pass
27	NA	NA	Pass
28	NA	NA	Pass
29	NA	NA	Pass
30	NA	NA	Pass
31	NA	NA	Pass
32	NA	NA	Pass
Resistance to Blood Penetration Summary	0 Pass/4 Fail	11 Pass/4 Fail	30 Pass/2 Fail
Test Parameters			
Test Pressure (mmHg)	160	120	80
Lot Number	47201	47201	47201

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Report to Altor Safety
SGS-IPS 01101-20

Project No. JN 22026

July 17, 2020

Method(s) and Notes:
All valid results are included in the statistical analyses.
Revisions of SGS-IPS methods when used are current at the time of testing.
Samples tested and conditioned in TAPPI standard conditions unless requested otherwise by customer.
Samples were not preconditioned.

16 CFR Ch. II Part 1610 (1-1-18 Edition) - Standard for the Flammability of Clothing Textiles
Testing conducted as a Plain Surface Textile Fabric.
Samples were not refurbished.
Preliminary tests to determine most rapidly burning direction were not conducted.
Samples were cooled in a desiccator after oven drying for a minimum of 15 minutes.
If samples could not be dried in an oven, samples were placed in a desiccator for a minimum of 1 hour.

ASTM F 1862/F 1862M-17 Standard Test Method for Resistance of Medical Face Masks to Penetration by Synthetic Blood (Horizontal Projection of Fixed Volume at a Known Velocity)
A 2 mL check was performed at the beginning, middle and end of each sample.
Synthetic blood is purchased from Johnson, Moen & Co. Surface Tension is not independently verified after receipt and unused synthetic blood is stored in original plastic bottles.
As requested, the sample was initially tested using the highest pressure of 160mmHg. At 160mmHg, the sample failed to meet the Acceptable Quality Limit (AQL) specified in ASTM F 1862. Testing then proceeded to 120mmHg and failed to meet the AQL. Testing then proceeded to 80mmHg which met the AQL.

Analyzed by: EJW, EB, RG
Quality review by: TFH
Date(s) of testing: July 7-17, 2020

Room Conditions

	Relative Humidity (%)	Temperature (°F)
Conditioning Environment	50.9	73.6
Maximum during testing	51.8	73.9
Minimum during testing	50.9	73.6

Note: See the method(s) cited above for available estimates of measurement uncertainty. Unless otherwise noted, sampling was performed by customer.

SGS IPS TESTING

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Parameters and Instruments Appendix

Resistance to Blood Penetration - ASTM F 1862

Chamber Humidity (%RH)	Chamber Temperature (°F)
81.97	70.22

SGS IPS TESTING

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