

# NARWHAL INC

## TEST REPORT

### SCOPE OF WORK

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

### REPORT NUMBER

104384376CRT-001

### ISSUE DATE

August 6, 2020

### PAGES

11

### DOCUMENT CONTROL NUMBER

GFT-OP-10i (28-Nov-2018)

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**TEST REPORT**

Issued August 6, 2020

Intertek Report No. 104384376CRT-001  
Intertek Project No. G104384376

**CLIENT**

Narwhal Inc  
2426 Peck Road  
Industry, CA 90601  
USA

**TEST STANDARD**

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

**AUTHORIZATION**

Quote Number: QU-01081575

**SAMPLE IDENTIFIED BY THE CLIENT AS**

Product Type: Disposable Face Mask

**SAMPLE INFORMATION**

Date(s) Samples Received: July 7, 2020  
Condition of Samples: Production Run  
Date(s) of Testing: July 14, 2020 through July 31, 2020

**TEST INFORMATION**

ASTM F2101 <i>Bacterial Filtration Efficiency</i>	Test data attached
EN 14683:2019 Annex C <i>Differential Pressure</i>	Test data attached
ASTM F2299 <i>Sub-Micron Particulate Filtration</i>	Test data attached
ASTM F1862 <i>Resistance to Penetration by Synthetic Blood</i>	Test data attached
16 CFR 1610 <i>Flammability</i>	Test data attached

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## TEST REPORT

Issued August 6, 2020

Intertek Report No. 104384376CRT-001  
Intertek Project No. G104384376


### SECTION 1 CONCLUSION

This test report represents the testing covered by proposal number QU-01081575.

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  
**Title:** Project Engineer  
**Signature:**   
**Date:** August 6, 2020

**Project Reviewer:** Jason Allen  
**Title:** Technical Advisor  
**Signature:**   
**Date:** August 6, 2020

### REPORT REVISIONS

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

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 <sup>2</sup> )	48.3
Specimen Side Facing Challenge	Inside of Mask
Flow Rate (LPM)	28.3
Averaged + Control Plate Count	3116
Mean Particle Size (µm)	2.83, 2.73

Medical Face Mask Barrier Testing					
Plate Count	Mask Specimen				
Stage	1	2	3	4	5
Stage 1	1	0	0	0	0
Stage 2	1	0	0	0	0
Stage 3	0	1	0	0	0
Stage 4	1	1	1	1	0
Stage 5	3	0	0	3	0
Stage 6	1	0	0	0	1
Plate Count Total	7	2	1	4	1
% BFE	99.78	>99.9	>99.9	99.87	>99.9

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	7/17/2020
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TEST REPORT

SECTION 3

ASTM F2100-19 TEST DATA

DIFFERENTIAL PRESSURE, EN 14683:2019 ANNEX C

Specimens conditioned for 4-hours at 20-22°C and 82-86%RH

Specimens tested at 20-22°C and 55-62% RH

Medical Face Mask Barrier Testing		
Specimen	$\Delta P$ (mm H <sub>2</sub> O/cm <sup>2</sup> )	Flow Rate (L/min)
1	1.7	8
2	2.0	8
3	2.0	8
4	1.8	8
5	1.4	8
Avg.	1.8	8

TEST EQUIPMENT INFORMATION

Description	Control Number	Calibration Date	Calibration Due
Conditioning Chamber	308-H252	2/26/2020	2/26/2021
Flow Meter	308-H384 & H385	4/8/2020	4/8/2021
Ambient Conditions Monitor	308-G183	4/28/2020	4/28/2021
Digital Manometer	308-H383	7/19/2019	7/19/2020

Date of Testing	7/14/2020
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## TEST REPORT

### SECTION 4

#### ASTM F2100-19 TEST DATA

#### PARTICULATE FILTRATION EFFICIENCY (PFE), ASTM F2299-17



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: 22369A

Performed for: Intertek  
Location: Cortland, NY  
Contact: Benjamin Hanna

Date: 29 July 2020

Description of Samples: Blue/White Flatfold Disposable Face Mask, G104384376

Test Area: 45.22 cm<sup>2</sup>  
Source: Intertek  
Date Samples Received: 14 July 2020

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



Filter ID	Differential Pressure (mmH <sub>2</sub> O)	Port	Particles / 2 ft <sup>3</sup>	Temp:	RH:	BP:
22369-1	11.7	Upstream	9077450	23.1 °C		
		Downstream	92931	49.4 %		
		Efficiency (%)	98.98		732 mmHg	
22369-2	11.7	Upstream	11342100	23.5 °C		
		Downstream	152265	49.3 %		
		Efficiency (%)	98.66		732 mmHg	
22369-3	11.4	Upstream	12091300	23.7 °C		
		Downstream	135589	49.5 %		
		Efficiency (%)	98.88		732 mmHg	
22369-4	11.9	Upstream	11927875	23.8 °C		
		Downstream	120091	47.6 %		
		Efficiency (%)	98.99		732 mmHg	
22369-5	11.7	Upstream	11506425	23.9 °C		
		Downstream	132362	46.8 %		
		Efficiency (%)	98.85		732 mmHg	

Notice: These data relate only to the samples tested. This report may be copied only in its entirety.  
Performed By: ES Data Location: EMS-37

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 inH <sub>2</sub> O	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	7/31/2020

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

TEST REPORT

SECTION 5

ASTM F2100-19 TEST DATA

RESISTANCE TO PENETRATION BY SYNTHETIC BLOOD, ASTM F1862-17

Specimens conditioned for 4-hours at 21-22°C and 83-86%RH

Specimens tested at 21-23°C and 55-62% RH

Medical Face Mask Barrier Testing				
Specimen	Pressure	Test Volume (mL)	Visible Penetration of Blood or Wetness	Pass/Fail
1	160 mmHg	2	None	Pass
2	160 mmHg	2	None	Pass
3	160 mmHg	2	None	Pass
4	160 mmHg	2	None	Pass
5	160 mmHg	2	None	Pass
6	160 mmHg	2	None	Pass
7	160 mmHg	2	None	Pass
8	160 mmHg	2	None	Pass
9	160 mmHg	2	None	Pass
10	160 mmHg	2	None	Pass
11	160 mmHg	2	None	Pass
12	160 mmHg	2	None	Pass
13	160 mmHg	2	None	Pass
14	160 mmHg	2	None	Pass
15	160 mmHg	2	None	Pass
16	160 mmHg	2	None	Pass
17	160 mmHg	2	None	Pass
18	160 mmHg	2	None	Pass
19	160 mmHg	2	None	Pass
20	160 mmHg	2	None	Pass
21	160 mmHg	2	None	Pass
22	160 mmHg	2	None	Pass
23	160 mmHg	2	None	Pass
24	160 mmHg	2	None	Pass
25	160 mmHg	2	None	Pass
26	160 mmHg	2	None	Pass
27	160 mmHg	2	None	Pass
28	160 mmHg	2	None	Pass
29	160 mmHg	2	None	Pass
30	160 mmHg	2	None	Pass
31	160 mmHg	2	None	Pass
32	160 mmHg	2	None	Pass

TEST REPORT

TEST EQUIPMENT INFORMATION

Description	Control Number	Calibration Date	Calibration Due
Conditioning Chamber	308-H252	2/26/2020	2/26/2021
Automated Dispenser	308-H386	VBU	VBU
Ambient Conditions Monitor	308-G183	4/28/2020	4/28/2021
Timer for Dispenser Verification	308-T1515	9/5/2019	9/5/2019

Date of Testing	7/14/2020
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## TEST REPORT

### SECTION 6

#### 16 CFR 1610 TEST DATA



Test Report No. : USA00035177  
Report Date : July 29, 2020

#### TEST REPORT

**Client:** Intertek  
3933 US Route 11,  
Cortland, NY 13045

**Attention:** Benjamin Hanna

**E-Mail:** benjamin.hanna@intertek.com

#### Sample Description as Declared :

Sample Description : Face Mask  
Color : Blue  
Style # : G104384376  
Fabric/Garment Weight : Not Provided  
Fiber Content : Not Provided  
No. of Samples: 14  
End Use : Face Mask  
Care Instructions : Not Provided  
Sample Received Date : July 23, 2020  
Final Confirmation Received Date: July 23, 2020  
Report Completion Date : July 29, 2020



**For and on behalf of**  
**Intertek Products Group North America:**

Jessica Feiss  
Account Manager

Digitally signed by Jessica Feiss  
Account Manager  
Date: 2020.07.29 17:16:33 -0500

#### Intertek North America

545 E Algonquin Road, Suite F  
Arlington Heights, Illinois 60005  
Telephone: 847-871-1020 Fax: 847-439-6156



## TEST REPORT



Test Report No. : USA00035177  
Report Date : July 29, 2020

### TEST RESULTS:

#### 16 CFR 1610 (2008) - Flammability of Clothing Textiles

Sample Description: Face Mask, G104384376, Blue Color

Surface type: Plain – Single Layer		
Tested side: Face		
Original State		
<b>Preliminary Test</b>		
Length	Burn Characteristics	Time (s)
Up	DNI	-
Down	DNI	-
Width	Burn Characteristics	Time (s)
Up	DNI	-
Down	DNI	-

Surface type: Plain - Composite		
Tested side: Face		
Original State		
<b>Preliminary Test</b>		
Length	Burn Characteristics	Time (s)
Up	DNI	-
Down	DNI	-
Width	Burn Characteristics	Time (s)
Up	DNI	-
Down	DNI	-

<b>Final Test</b>		
Original State		
Test Direction: Length Up – Single Layer		
Test Side: Face		
Specimen	Burn Characteristics	Time (s)
1	DNI	-
2	DNI	-
3	DNI	-
4	DNI	-
5	DNI	-
Average:	-	-

**Classification:** X Class 1, Normal Flammability

Sample is a one-time use item. Flammability testing performed only in original state.

**Intertek North America**  
545 E Algonquin Road, Suite F  
Arlington Heights, Illinois 60005  
Telephone: 847-871-1020 Fax: 847-439-6156



## TEST REPORT



Test Report No. : USA00035177

Report Date : July 29, 2020

### Explanation of Flammability Results:

For plain surface fabric

DNI	Did not ignite
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**Remark: The samples referred to in this report were not tested in accordance with Intertek's full Mask Protocol. Testing was conducted on specific items only, at our client's request.**

The test results stated in this report relate only to the item(s) tested. This test report may not be reproduced except in full, without written approval of Intertek.

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*If you need assistance in interpreting these results or if you have any questions,  
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