THAILAND TEXTILE INSTITUTE
สถาบันพัฒนาอุตสาหกรรมสิ่งทอ

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TEST REPORT

CLIENT:

REPORT NUMBER: G 4807/64
DATE OF RECEIPT: 10/08/21
DATE OF TEST: 19/08/21-30/08/21
ISSUE DATE: 30/08/21
PAGE: 1/2

SAMPLE NUMBER	SAMPLE NAMES (AS SPECIFIED BY THE CLIENT)
G 4807-1/64	FACE MASKS
SAMPLE DESCRIPTION	ONE SAMPLE OF MASK

	CLIENT'S REQUIREMENT	G 4807-1/64	CONCLUSION
BACTERIAL FILTRATION EFFICIENCY: TIS 2424: 2562			
BACTERIAL FILTRATION EFFICIENCY (%)	LEVEL 1: ≥ 95%		PASS
Staphylococcus aureus ATCC 6538			
- TEST SPECIMEN 1		99.9	
- TEST SPECIMEN 2		99.9	
- TEST SPECIMEN 3		99.9	
- TEST SPECIMEN 4		99.8	
- TEST SPECIMEN 5		99.8	

REMARK(S):
- CONTROL AVERAGE : 2575 CFU
- MEAN PARTICLE SIZE : 2.7 µm
- TESTING AREA : 50.2 cm^2
- FLOW RATE : 28.3 L/min
- TESTING SIDE : INSIDE OF SPECIMEN
- CONDITION TEST SPECIMEN : 21±5 °C, 85±5 %RH, MINIMUM 4 HOUR
- TEST APPARATUS : BACTERIAL FILTRATION EFFICIENCY TESTER

AUTHORIZED BY

K. Kanyarat

(MS. KANYARAT RANGSANGA)
(ASSISTANT MICROBIOLOGY LABORATORY MANAGER)

232371

"การปลอมรายงานผลการทดสอบ ไม่ว่าจะเป็นการปลอมทั้งฉบับหรือแต่ส่วนหนึ่งส่วนใด หรือใช้รายงานผลการทดสอบปลอม เป็นความผิดตามประมวลกฎหมายอาญา"

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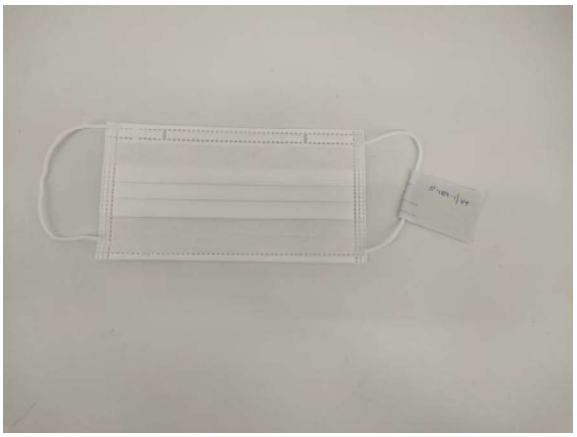

FIGURE 1: G 4807-1/64

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Particle Filtration Efficiency (PFE) And Differential Pressure (Delta P) Final Report

Report No. PFE20220622-081

Study Number 65-0179-M
Testing Date 22 June 2022
Expired Date 21 June 2023
Testing Facility RUEE, Research Unit of Applied Electric Field in Engineering
Test Procedure PFE Standard Test Method: ASTM F2299-03

Summary: This procedure was performed to evaluate the non-viable particle filtration efficiency of the test article and employed the basic particle filtration method described in ASTM F2299-03. Polystyrene Latex (PSL) were nebulized mono-dispersedly and passed through the test article. The test procedure measures filtration efficiency by comparing between the particle concentration count in the upstream and the downstream ones.

Filtered and dried air is passed through an atomizer to produce an aerosol containing suspended latex spheres. This aerosol is then passed through a charge neutralizer. The aerosol is then mixed and diluted with additional preconditioned air to produce a stable, neutralizer, and dried aerosol of latex spheres.

One-minute particle concentration count were performed, with and without the test article in the system. The filtration efficiency was calculated using the average number of particles penetrating the test article compared to the average of the control values.

Area of test: 17.80 cm^2
Particle Size: 0.1 μm
Face Velocity: 10.6 cm/s
Environment: 25±3°C and 58±5% relative humidity (RH) for 4 hours
References: TSI Classifier Model 3082 S/N: 3082001807003,
TSI CPC Model 3788 S/N: 3788180801,

Average Filtration Efficiency: 96.60 %

Test Article Number	Upstream Counts (particles/cm^3)	Downstream Counts (particles/cm^3)	Filtration Efficiency (%)
1	4,490.00	154.00	96.57
2	4,480.00	150.00	96.65
3	4,330.00	144.00	96.67
4	4,470.00	149.00	96.67
5	4,570.00	163.00	96.43

Study Director Assoc. Prof. Dr.Panich Intra

22 - June -2022
Study Completion Date

Tested and Reported by: Research Unit of Applied Electric Field in Engineering (RUEE), 98 Moo 8, Papong, Doi-saket, Chiang Mai, 50220, Thailand
Document Designed by: Wisanapat Ratanachan, Research Unit of Applied Electric Field in Engineering (RUEE)

Particle Filtration Efficiency (PFE) And Differential Pressure (Delta P) Final Report

Report No. PFE20220622-081
Test Procedure Delta P Standard Test Method: EN 14683

Summary: This Delta P 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.

Area of Test: 4.9 cm^2
Delta P Flow Rate: 8 L/min
References: Dwyer Manometer Model 1211-30 S/N: S677041
Dwyer Manometer Model 1211-30 S/N: S231662
Dwyer Flow Controller Model GFC-111 S/N: G142241-1C

Test Article Number	Delta P (mmH_2O/cm^2)	Delta P (Pa/cm^2)
1	2.21	21.67
2	2.46	24.11
3	2.17	21.24
4	2.19	21.47
5	2.32	22.71

*** End of Report ***

Statement:

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3. The results shown in this report refer(s) only to the articles tested;
4. Without written approval of RUEE, this report can't be reproduced except in their entirely.

Reference Note:

- P/N : SXFM-E-3PLYW-50-G (SBR 22-025)
- Lot : 20220521-05
- Surgical Mask (Level 1)

Study Director Assoc. Prof. Dr.Panich Intra

22 - June -2022
Study Completion Date

Tested and Reported by: Research Unit of Applied Electric Field in Engineering (RUEE), 98 Moo 8, Papong, Doi-saket, Chiang Mai, 50220, Thailand
Document Designed by: Wisanapat Ratanachan, Research Unit of Applied Electric Field in Engineering (RUEE)

Nelson Labs
A Sotera Health company

Viral Filtration Efficiency (VFE) Final Report

Test Article:	Face Mask
Purchase Order:	POQA21080006
Study Number:	1454181-S01
Study Received Date:	27 Sep 2021
Test Started Date:	06 Oct 2021
Test Finished Date:	09 Oct 2021
Testing Facility:	Nelson Laboratories, LLC 6280 S. Redwood Rd. Salt Lake City, UT 84123 U.S.A.
Test Procedure(s):	Standard Test Protocol (STP) Number: STP0007 Rev 17
Deviation(s):	None

Summary: The VFE test is performed to determine the filtration efficiency of test articles by comparing the viral control counts upstream of the test article to the counts downstream. A suspension of bacteriophage ΦX174 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 1.1 - 3.3 x 10^3 plaque forming units (PFU) with a mean particle size (MPS) of 3.0 µm ± 0.3 µm. The aerosol droplets were drawn through a six-stage, viable particle, Andersen sampler for collection. The VFE test procedure was adapted from ASTM F2101.

All test method acceptance criteria were met. Testing was performed in compliance with US FDA good manufacturing practice (GMP) regulations 21 CFR Parts 210, 211 and 820.

Test Side:	Inside
Test Area:	~40 cm^2
VFE Flow Rate:	28.3 Liters per minute (L/min)
Conditioning Parameters:	85 ± 5% relative humidity (RH) and 21 ± 5°C for a minimum of 4 hours
Positive Control Average:	1.4 x 10^3 PFU
Negative Monitor Count:	<1 PFU
MPS:	2.8 µm

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James Luskin electronically approved — 20 Oct 2021 16:01 (+00:00)

Study Director James Luskin — Study Completion Date and Time

Results:

Test Article Number	Percent VFE (%)
1	99.9
2	>99.9[a]
3	99.7

[a] There were no detected plaques on any of the Andersen sampler plates for this test article.

The filtration efficiency percentages were calculated using the following equation:

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

C = Positive control average

T = Plate count total recovered downstream of the test article
Note: The plate count total is available upon request