

Bacterial Filtration Efficiency (BFE) Final Report

Test Article: Disposable Protective Mask
Study Number: 1315015-S01
Study Received Date: 29 Jun 2020
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: STP0004 Rev 18
Deviation(s): None

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 and EN 14683:2019, Annex B.

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
BFE Test Area: $\sim 40 \text{ cm}^2$
BFE Flow Rate: 28.3 Liters per minute (L/min)
Conditioning Parameters: $85 \pm 5\%$ relative humidity (RH) and $21 \pm 5^\circ\text{C}$ for a minimum of 4 hours
Test Article Dimensions: $\sim 174 \text{ mm} \times \sim 173 \text{ mm}$
Positive Control Average: 2.9×10^3 CFU
Negative Monitor Count: < 1 CFU
MPS: $2.9 \mu\text{m}$



Sean Shepherd electronically approved for
Study Director

James Luskin

06 Aug 2020 17:13 (+00:00)
Study Completion Date and Time

Results:

Test Article Number	Percent BFE (%)
1	99.7
2	99.8
3	99.5
4	99.7
5	99.8

The filtration efficiency percentages were calculated using the following equation:

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

C = Positive control average

T = Plate count total recovered downstream of the test article

Note: The plate count total is available upon request

Differential Pressure (Delta P) Final Report

Test Article: Disposable Protective Mask
 Study Number: 1315014-S01
 Study Received Date: 29 Jun 2020
 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: STP0004 Rev 18
 Deviation(s): None

Summary: The 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. The Delta P test complies with EN 14683:2019, Annex C and ASTM F2100-19.

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
 Delta P Flow Rate: 8 Liters per minute (L/min)
 Conditioning Parameters: 85 ± 5% relative humidity (RH) and 21 ± 5°C for a minimum of 4 hours
 Test Article Dimensions: ~173 mm x ~173 mm

Results:

Test Article Number	Delta P (mm H ₂ O/cm ²)	Delta P (Pa/cm ²)
1	4.3	42.3
2	4.6	44.7
3	4.1	40.6
4	4.5	44.0
5	4.4	42.8



David Brown electronically approved for
Study Director

James Luskin

14 Jul 2020 22:54 (+00:00)
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