# VIRALOC eco™

## Biopolymer Procedural Masks

### The green alternative

Most masks are made of plastics that take hundreds of years to decompose. VIRALOC eco™ masks have material that come from plant-based biopolymers that are fully compostable.

### Medical grade and certified

This product is tested to international standards, including ASTM F2100 for breathability, filtration, splash resistance, and flammability. Truly the gold standard for protection.

### Carbon offsets

Each VIRALOC eco™ mask produces 56% less $CO_2$ emissions than a synthetic mask over its life cycle. Our masks come with carbon credits that can be used to meet Paris Agreement commitments. All materials are made in North America.

## Contact us to order today

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info@padmmedical.com

LATEX GRAPHENE FREE HYPOALLERGENIC HYPOALLERGÉNIQUE

Made using responsibly sourced biomaterials. Manufactured by Precision ADM Inc., Unit A - 1595 Buffalo Place, Winnipeg, MB, Canada. R3T 1L9.
VIRALOC eco™ is a trademark of Precision ADM Inc.
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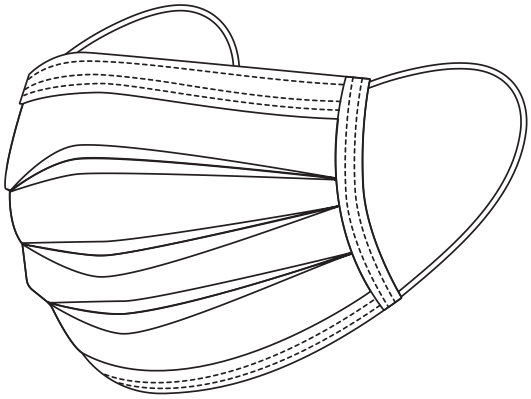
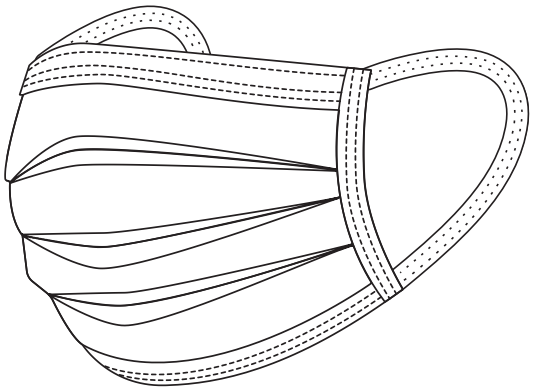
Innovation for Life™

## Available with regular earloops or soft earloop configurations



**Corded Elastic Ear-loop**



**Soft Elastic Laminate Ear-loop**

**Raw Materials:** up to 55% improvement in global warming potential compared to conventional mask

**Manufacturing:** up to 5% improvement in global warming potential compared to conventional mask

**Disposal:** up to 70% Improvement in global warming potential compared to conventional mask

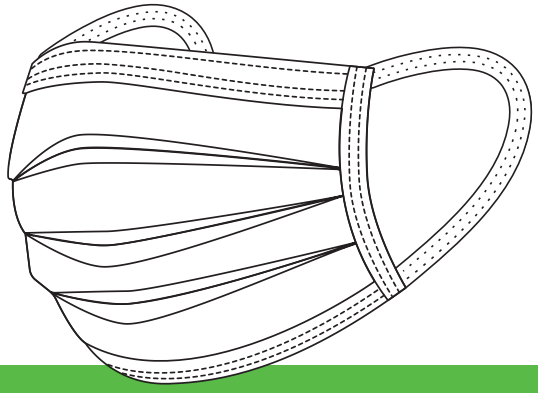
# Responsibly sourced **bio-based** polymer.

# **Secure North American** material supply chain.

We believe in making products that leave a **postive impact on our environment.** That's why every VIRALOC eco™ mask is made using biopolymers grown in Alberta, Ontario, Nebraska, and other North American fields right outside your backdoor. Over their life cycle, they will account for **56% less carbon emissions than traditional masks**, without compromising on safety.

We think that's something to feel good about.

## Construction: Biopolymer Soft Elastic Laminate Ear-loop

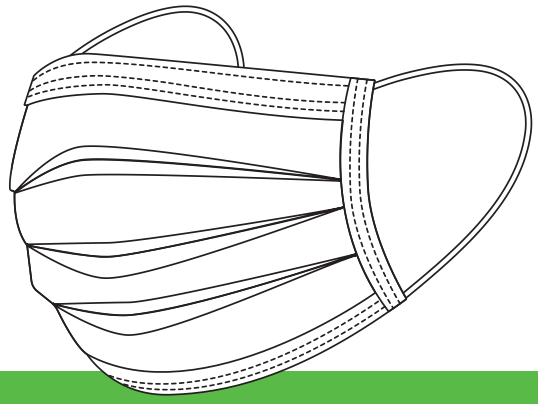


| | |
|---|---|
| Inner Layer | Compostable spunbond |
| Nose Wire | Removable aluminum wire |
| Filtration | Compostable melt blown |
| Ear Loops | Compostable bio-based elastic or tie back strap |
| Outer Layer(s) | Compostable spunbond |

**Biopolymer procedural masks**

| Product SKU | ASTM Level | Bacterial filtration efficiency (BFE%) | Particle filtration efficiency (PFE%) | Differential pressure (Δp mm H20/cm$^2$) | Splash resistance (mmHg) | Flame spread | Biocompatibility |
|---|---|---|---|---|---|---|---|
| | | ASTM F2101 | ASTM F2299 | EN 14683 Annex C | ASTM F1862 | 16 CFR Part 1610 | ISO 10993 |
| 1CA4A5W | 1 | ≥95% | ≥95% | <5.0 | 80 | Class 1 | Pass |
| 2CA4A5W | 2 | ≥98% | ≥98% | <6.0 | 120 | Class 1 | Pass |
| 3CA4A5W | 3 | ≥98% | ≥98% | <6.0 | 160 | Class 1 | Pass |
| 3CP4A5W (Pediatric size) | 3 | ≥98% | ≥98% | <6.0 | 160 | Class 1 | Pass |

## Construction: Biopolymer Corded Elastic Ear-loop



| | |
|---|---|
| Inner Layer | Compostable spunbond |
| Nose Wire | Removable aluminum wire |
| Filtration | Compostable melt blown |
| Ear Loops | Removable elastic cord |
| Outer Layer(s) | Compostable spunbond |

**Biopolymer procedural masks**

| Product SKU | ASTM Level | Bacterial filtration efficiency (BFE%) | Particle filtration efficiency (PFE%) | Differential pressure (Δp mm H20/cm$^2$) | Splash resistance (mmHg) | Flame spread | Biocompatibility |
|---|---|---|---|---|---|---|---|
| | | ASTM F2101 | ASTM F2299 | EN 14683 Annex C | ASTM F1862 | 16 CFR Part 1610 | ISO 10993 |
| 1CA1A0W | 1 | ≥95% | ≥95% | <5.0 | 80 | Class 1 | Pass |
| 2CA1A0W | 2 | ≥98% | ≥98% | <6.0 | 120 | Class 1 | Pass |
| 3CA1A0W | 3 | ≥98% | ≥98% | <6.0 | 160 | Class 1 | Pass |

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# Providing safety and protection for you and the environment

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VIRALOC eco™

# VIRALOC eco™ Report

## Procedural Mask Test Results

- Blood penetration
- Breathability
- Flammability
- Particulate filtration
- Bacterial filtration

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FABRIQUE AU CANADA

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# TEST REPORT

## Precision ADM Surgical Compostable Surgical Mask Prototype Breathability, Flammability, Particulate Filtration and Bacterial Filtration Test Summary

**Client** **Precision ADM**

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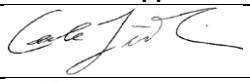
Test and Verification Engineer
Jolly Hipolito, B.Sc
Microbiologist

**Ref. #** 21142-R01
**Revision:** C
**Revision Date:** Aug 12, 2021

**This document has been approved by:**

| | | | | |
|---|---|---|---|---|
| **Author** |  | Digitally Signed by Cale Timlick, B.Sc, EIT | **Review Date** | Aug 12, 2021 |
| **Director of Operations** | | Digitally Signed by Trevor Gascoyne, M.Sc, P.Eng | **Review Date** | Aug 12, 2021 |
| **Quality Manager** | | Digitally Signed by Meaghan Coates, B.Sc, EIT | **Review Date** | Aug 12, 2021 |

**Notes:**

This document contains the professional opinion of the Orthopaedic Innovation Centre (OIC) according to the matters set out herein, using its professional judgment and reasonable care based on the information available, the methodology, procedures, and techniques used, and OIC's assumptions and constraints in place at the time of preparation.

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# 1 TESTING SUMMARY

The testing described in this report for a set of Precision ADM compostable prototype surgical masks from lot 210705-11A-ECO show the below performance.

**Table 1.1: Precision ADM 3 layer surgical mask performance summary**

| | **210705-11A-ECO** | **ASTM F2100 Requirements** | | |
|---|---|---|---|---|
| **Test Method** | **Average Results** | Level 1 | Level 2 | Level 3 |
| Breathability<br>EN 14683 Annex C | 3.5 $mmH_2O/cm^2$<br>Pass any level | < 5.0 $mmH_2O/cm^2$ | < 6.0 $mmH_2O/cm^2$ | |
| Flammability<br>16 CFR Part 1610 | Class 1<br>Pass any level | Class 1 | | |
| Bacterial Filtration Efficiency<br>ASTM F2101 | 99.34%<br>Pass any level | ≥ 95% | ≥ 98% | ≥ 98% |
| Particulate Filtration Efficiency<br>ASTM F2299 | 99.34%<br>Pass any level | ≥ 95% | ≥ 98% | ≥ 98% |

The masks achieved Level 3 surgical mask rating for Breathability, Flammability, Bacterial Filtration Efficiency and Particulate Filtration Efficiency. The surgical masks also passed the ASTM F2100 requirements for the above 4 tests for level 1 or level 2 designations.

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# 2 BREATHABILITY (DIFFERENTIAL PRESSURE)

## 2.1 Test Results

**Table 2.1: Breathability test details**

| | | |
|---|---|---|
| **Date** | July 6, 2021 | |
| **Manufacturer** | PADM | |
| **Model** | Surgical Mask | |
| **Lot** | 210705-11A-ECO | |
| **Material** | 3 layer compostable meltblown | |
| **Testing Standard** | EN 14683:2019 Annex C | |
| **Required Conditioning** | Yes | 21 deg C<br>85% RH<br>4 hrs |
| **Oven Details** | PE049 - Memmert HPP260<br>S/N: W620.0155<br>Calibration Expiry: October 6, 2021 | |
| **Sample Test Duration** | ~1 min | |
| **Test Flow Rate** | 8 l/min | |
| **Jig Serial Number used** | 2.5cm diameter adapter plate | |
| **Test Pass/Fail** | < 5.0 mmH2O/cm2 for level 1<br>< 6.0 mmH2O/cm2 for level 2 or 3 | |

**Table 2.2: Breathability test results**

| Sample | Breathability ($mmH_2O/cm^2$) | Result | Lot Average |
|---|---|---|---|
| **1** | 3.5 | Pass | 3.5 |
| **2** | 3.5 | Pass | |
| **3** | 3.5 | Pass | |
| **4** | 3.4 | Pass | |
| **5** | 3.6 | Pass | |

The mask samples passed the breathability standards outlined in ASTM F2100 with an average lot value of 3.5 $mmH_2O/cm^2$ for level 1, 2 or 3 of surgical mask.

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# 3 FLAMMABILITY

## 3.1 Test Results

**Table 3.1: Flammability test details**

| | | |
|---|---|---|
| **Date** | July 6, 2021 | |
| **Manufacturer** | PADM | |
| **Model** | Surgical Mask | |
| **Lot Number** | 210705-11A-ECO | |
| **Material** | 3 layer meltblown | |
| **Testing Standard** | 16 CFR Part 1610 - Flammability | |
| **Required Conditioning** | No | High conditioning temperatures changed material properties of compostable product. Samples kept in |
| **Oven Details** | PE047 – Quincey Env. Chamber<br>S/N: A4E-00600<br>Calibration Expiry: September 4, 2021 | |
| **Sample Test Duration** | 1 second ignition | |
| **Equipment Used** | M015 45 Degree Automatic Flammability Tester | |
| **Test Pass/Fail** | Class 1 flame spread<br>Average burn time ≥ 3.5s | |
| **Notes** | Flammability testing | |

**Table 3.2: Flammability test results**

| Sample | Time of Spread | Result |
|---|---|---|
| **1** | DNI | Pass |
| **2** | DNI | Pass |
| **3** | DNI | Pass |
| **4** | DNI | Pass |
| **5** | DNI | Pass |

The code “DNI” refers to did not ignite. The burn pattern on the surgical mask samples can be seen in Figure 3.1. This burn characteristic classifies the samples as Class 1 fabric. The samples passed the requirements in 16 CFR part 1610 for level 1, 2 or 3 surgical mask.

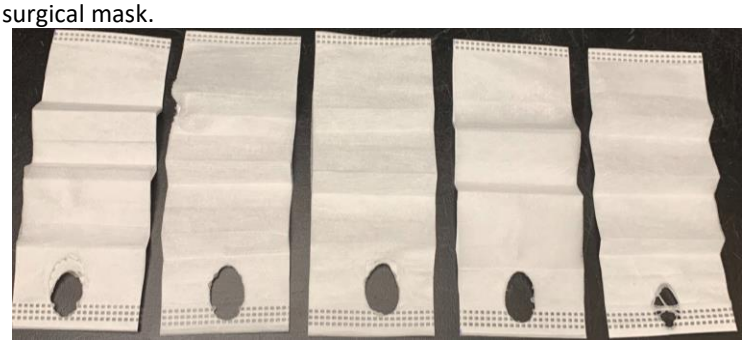

**Figure 3.1: Level 3 tested samples**

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# 4 BACTERIAL FILTRATION EFFICIENCY

## 4.1 Test Results

**Table 4.1: BFE testing details**

| | |
|---|---|
| **Date** | Aug 5, 2021 |
| **Manufacturer** | Precision ADM |
| **Lot Number** | 210705-11A-ECO |
| **Testing Standard** | ASTM F2101 |
| **Required Conditioning** | Yes<br>21°C ± 5°C, 85% ± 5% RH for 4.0 hrs |
| **Oven Details** | PE049 - Memmert HPP260<br>S/N: W620.0155<br>Calibration Expiry: October 6, 2021 |
| **Sample Test Duration** | 3 min |
| **Vacuum flow rate** | 28.3 L/min |
| **Nebulizer pressure** | 18 psi |
| **Syringe pump rate** | 0.05 mL/min |
| **Bacterial solution** | McFarland Solution 0.5 to crease $1.5x10^8$ CFU/mL diluted to $5x10^5$ CFU/mL with peptone water |
| **Testing Notes** | Bacterial solution made with 5% glycerol. |
| **Mean particle size** | 2.99 µm |
| **Positive control CFUs** | 2364 |
| **Test Pass/Fail** | > 95% BFE for level 1<br>> 98% BFE for level 2 or 3 |

**Table 4.2: BFE test results**

| Sample | %BFE | Result | Avg |
|---|---|---|---|
| **1** | 99.32 | Pass | 99.34 |
| **2** | 99.34 | Pass | |
| **3** | 99.07 | Pass | |
| **4** | 99.58 | Pass | |
| **5** | 99.37 | Pass | |

The masks from Precision ADM passed the ASTM requirement for Level 1, 2 or 3 surgical masks of > 98% Bacterial Filtration Efficiency.

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# 5 PARTICULATE FILTRATION EFFICIENCY

## 5.1 Test Results

**Table 5.1: PFE testing details**

| | | |
|---|---|---|
| **Date** | July 26, 2021 | |
| **Manufacturer** | PADM | |
| **Lot Number** | 210710-11A-ECO | |
| **Testing Standard** | ASTM F2299 | |
| **Required Conditioning** | Yes | 21°C, 40% RH for 3 hrs |
| **Oven Details** | Memmert HPP 260<br>W620.0155<br>Calibration Expiry: October 6, 2021 | |
| **Test Face Velocity** | 5.0 cm/s | |
| **Sample Test Duration** | 10 min | |
| **Sampling Volume** | 141500cm$^3$ up and down stream | |
| **Test Flow Rate** | 28.3 | l/min |
| **Testing Notes** | Testing at 1.0 Bar<br>1:100 dilution upstream<br>1:10 dilution downstream<br>11 cm diameter sample area | |
| **Test Pass/Fail** | > 98% PFE | |

**Table 5.2: Sampling Schedule**

| Phase | Time (s) |
|---|---|
| Purge | 30 |
| Stabilization | 10 |
| Upstream Sample | 60 |
| Purge | 30 |
| Stabilization | 10 |
| Downstream Sample | 60 |
| **Total Loops** | **5** |

A stability check was conducted prior to PFE testing to ensure that the system was able to maintain particle counts. Six alternating readings were taken with a sampling volume of 28300 cm$^3$ each.

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**Table 5.3: Stability Check**

| Reading | Particle Count | Deviation from Avg |
|---|---|---|
| 1 | 2,194,100 | 78,383 |
| 2 | 2,128,500 | 12,783 |
| 3 | 2,121,600 | 5,883 |
| 4 | 2,067,000 | -48,717 |
| 5 | 2,054,700 | -61,017 |
| 6 | 2,128,400 | 12,683 |
| Avg | 2,115,717 | |
| Concentration (#/m3) | 7.48E+07 | |

**Table 5.4: Sample 1 Particle Size Distribution**

| size (µm) | Particle count |
|---|---|
| 0.1 | 14,218,800 |
| 0.15 | 5,678,900 |
| 0.2 | 1,957,700 |
| 0.25 | 4,846,000 |
| 0.3 | 3,212,100 |
| 0.5 | 450,300 |
| 0.7 | 121,800 |
| 1 | 95,000 |

**Table 5.5: PFE test results**

| Sample | % PFE | Result | Avg | avg upstream count (0.1µm) | total upstream count (0.1µm) | control concentration (part./m³) | avg downstream (0.1µm) |
|---|---|---|---|---|---|---|---|
| **Mask 1** | 99.28 | Pass | 99.34 | 2,843,760 | 14,218,800 | 1.00E+08 | 20,352 |
| **Mask 2** | 99.30 | Pass | | 3,022,200 | 15,111,000 | 1.07E+08 | 21,226 |
| **Mask 3** | 99.35 | Pass | | 3,075,000 | 15,375,000 | 1.09E+08 | 20,052 |
| **Mask 4** | 99.39 | Pass | | 2,984,000 | 14,920,000 | 1.05E+08 | 18,068 |
| **Mask 5** | 99.36 | Pass | | 3,162,560 | 15,812,800 | 1.12E+08 | 20,304 |

Precision ADM 3 layer masks passed the ASTM F2100 requirement for level 1, 2 or 3 surgical masks of > 98% particulate filtration. Testing concentrations were slightly higher than the standard recommended $10^7$ to $10^8$ particles per $m^3$. The Particle Size Distribution for Sample mask 1 can be found in Table 5.4. The concentration during the stability check was found to be 74,800,000 particles/$m^3$ which is within the standard requirement.

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# 6 CHANGES TO DOCUMENT

| Rev. To | Rev. From | Sec/Paragraph Changed | Change(s) Made | Date Implemented | Approval |
|---|---|---|---|---|---|
| A | N/A | N/A | Initial Release. | 2021-08-12 | CT |
| | | | | | |
| | | | | | |
| | | | | | |

Report: 21-PPE-00543 Sample Name: LOT#2107708-11-E
Company: Precision ADM Inc

# BLOOD PENETRATION RESISTANCE

**Test Summary** A volume of synthetic blood was disbursed at the mask to simulate the impact (splatter) of blood or other body fluid onto the specimen. Any evidence of synthetic blood penetration on the inner facing of the mask (side contacting the wearer's face) constitutes a failure. Samples are evaluated at one or more velocities of 450, 500, and 635 cm/s, corresponding to the velocity of blood exiting a small arterial puncture at human blood pressures of 80, 120, and 160 mmHg. The distance from the target area to the tip of the cannula is 30.5 cm, with the impact of the spurt normal to the target area. Test results are reported at each tested velocity or corresponding pressure, and the medical face mask is rated at the highest corresponding blood pressure for which the mask demonstrates an acceptable quality limit of 4.0. The test was conducted in accordance with Test Method ASTM F1862.

SCC Accredited LAB™

**Date Tested** 14-Jul-2021
**Test Side and Area** Outside, Centre
**Conditioning Parameters** 85 ± 5% relative humidity and 21 ± 5°C for a minimum of 4h
**Laboratory Conditions** 55.6 % Relative Humidity; 25.4 °C
**Acceptance Criteria** The output of synthetic blood before and after 16 articles must be within 2% of the theoretical output
29 of 32 tests must show a passing result
ASTM Level 1: Pass at 80 mmHg
ASTM Level 2: Pass at 120 mmHg
ASTM Level 3: Pass at 160 mmHg

| Article No. | 80 mmHg | 120 mmHg | 160 mmHg | Article No. | 80 mmHg | 120 mmHg | 160 mmHg |
|---|---|---|---|---|---|---|---|
| 1 | n/a | n/a | Pass | 17 | n/a | n/a | Pass |
| 2 | n/a | n/a | Pass | 18 | n/a | n/a | Pass |
| 3 | n/a | n/a | Pass | 19 | n/a | n/a | Pass |
| 4 | n/a | n/a | Pass | 20 | n/a | n/a | Pass |
| 5 | n/a | n/a | Pass | 21 | n/a | n/a | Pass |
| 6 | n/a | n/a | Pass | 22 | n/a | n/a | Pass |
| 7 | n/a | n/a | Pass | 23 | n/a | n/a | Pass |
| 8 | n/a | n/a | Pass | 24 | n/a | n/a | Pass |
| 9 | n/a | n/a | Pass | 25 | n/a | n/a | Pass |
| 10 | n/a | n/a | Pass | 26 | n/a | n/a | Pass |
| 11 | n/a | n/a | Pass | 27 | n/a | n/a | Pass |
| 12 | n/a | n/a | Pass | 28 | n/a | n/a | Pass |
| 13 | n/a | n/a | Pass | 29 | n/a | n/a | Pass |
| 14 | n/a | n/a | Pass | 30 | n/a | n/a | Pass |
| 15 | n/a | n/a | Pass | 31 | n/a | n/a | Pass |
| 16 | n/a | n/a | Pass | 32 | n/a | n/a | Pass |

**Passes at 80 mmHg** n/a
**Passes at 120 mmHg** n/a
**Passes at 160 mmHg** 32/32

**The samples tested meet the acceptance criteria for ASTM F2100 performance LEVEL 3.**

**Reviewed by:**

Rob Taylor
2021.07.14
15:39:49
-04'00'

**Authorized by:**

Ruwan
Wijesundera
2021.07.14
15:49:38 -04'00'

Test results only apply to the samples submitted for analysis. Samples are randomly selected for each test from the submitted batch. It is the responsibility of the distributor to ensure the tested batch is compliant to the required sampling methodology as per ANSI/ASQ Z1.4. Additional test information is available upon request. Kinectrics is accredited to ISO 17025 by the Standards Council of Canada for ASTM F2100