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METHOD FOR DETERMINING THE INITIAL EFFICIENCY OF MATERIALS USED IN MEDICAL FACE MASKS TO PENETRATION BY PARTICULATES USING LATEX SPHERES (UN-NEUTRALIZED PARTICLES)

Premier Guard USA LLC

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INTRODUCTION

This report presents the results of testing of Particle Filtration Efficiency of Un-Neutralized Particles using ASTM F2299 as a guide. Howard Sherman of Premier Guard USA LLC submitted the samples to our laboratory for testing on August 7, 2020. Testing and data analysis were completed on August 10, 2020.

Masks were previously tested to ASTM F2299 in Element Report ESP034081P.1R0.

OBJECTIVE

The scope of work was limited to testing per the methods of ASTM F2299/F2299M at a particle size of 0.1 micron as specified in ASTM F2100. Deviation from ASTM method by NOT Neutralizing particles, per customer request.

SAMPLE IDENTIFICATION

Submitted by	Premier Guard USA LLC
Sample Description	Disposable Face Masks
Samples Received	August 7, 2020
Quantity Tested	QTY 5 Samples

Table 1. Sample Identification

TEST DATA

Samples	Particle Diameter	Particle Diameter Standard Deviation	Face Velocity	Pressure Drop	Un-Neutralized Efficiency
Sample 1	0.1 micron	0.005 – 0.015 micron	11.3 cm/s	12.4 mmH2O	98.3%
Sample 2	0.1 micron	0.005 – 0.015 micron	11.3 cm/s	12.5 mmH2O	98.5%
Sample 3	0.1 micron	0.005 – 0.015 micron	11.3 cm/s	12.1 mmH2O	98.4%
Sample 4	0.1 micron	0.005 – 0.015 micron	11.3 cm/s	10.6 mmH2O	98.7%
Sample 5	0.1 micron	0.005 – 0.015 micron	11.3 cm/s	11.1 mmH2O	98.6%

Table 2. Summary of Results

PHOTOGRAPHS

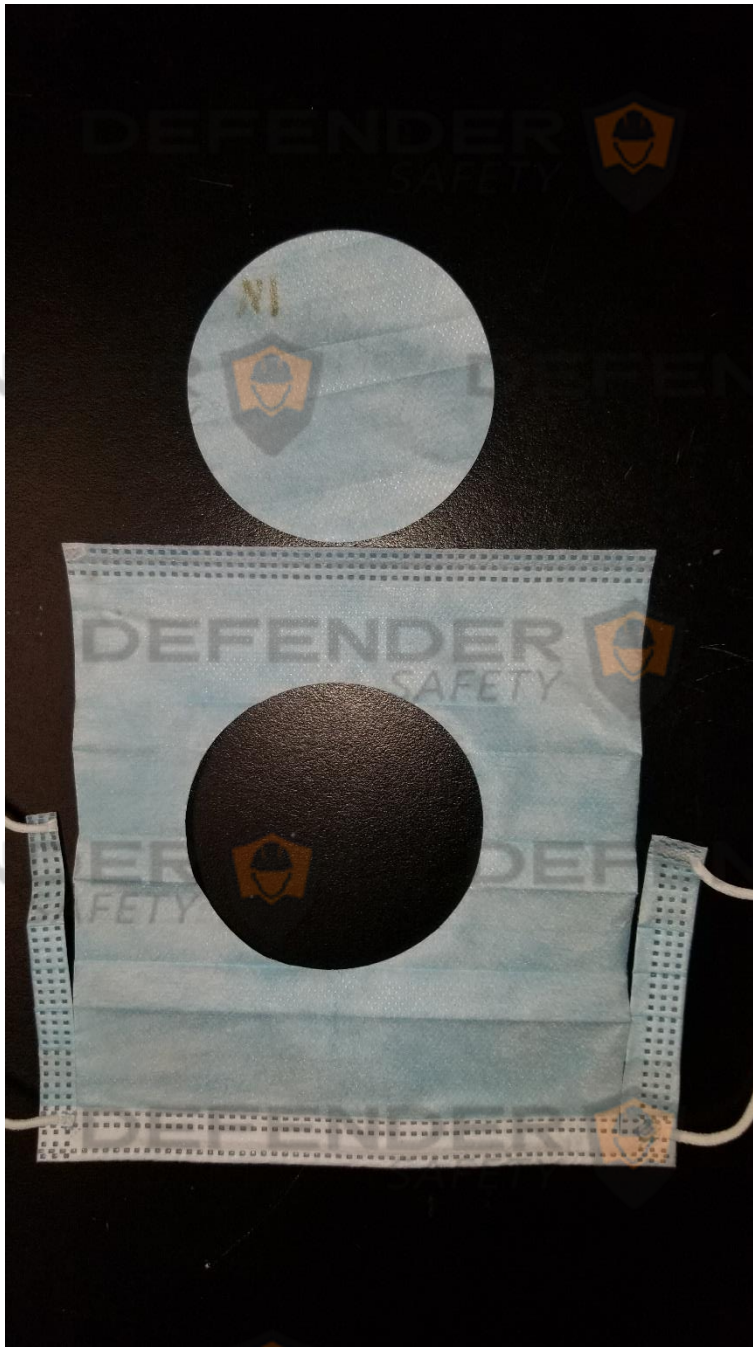


Figure 1. Sample Test Specimen

TEST METHOD

This test method measures the initial particle filtration efficiency of materials used in medical facemasks using monodispersed aerosols and light scattering particle counting. The filtration efficiency is measured by comparing the particle count in the feed stream (upstream) to that in the filtrate (downstream). Filtered and dried air is passed through an atomizer to produce an aerosol containing suspended latex spheres. This aerosol is then mixed and diluted with additional preconditioned air to produce an aerosol of latex spheres to be used in the efficiency test.

Per ASTM F2299, the particles are to be passed through a charge neutralizer. This testing was completed without passing the particles through a charge neutralizer at customer's direction.

TEST EQUIPMENT

Description	Asset ID#	Calibration Date	Calibration Due Date
Manometer	PT-161-117	05-NOV-2019	05-NOV-2020
Manometer	PT-165-038	08-APR-2020	08-APR-2021
Mass Flow Meter	PT-166-078	21-JAN-2020	21-JAN-2021
Temp/RH	PT-162-154	09-MAR-2020	09-MAR-2021
Particle Counter (Advanced Test Equipment)	19206	10-MAR-2020	10-MAR-2021
Temp/Humidity	MM190-024	2-JUN-2020	2-JUN-2021

Table 3. Test Equipment

Aerosol Generator

Aerosol was generated using a TSI 3076 Atomizer and TSI 3062 Dryer.

Particle Counter

PMS-LASAIR-III-110 Laser Diode-Based Particle Counter. NIST Traceable.

Challenge Particles

Sigma Aldrich Latex Beads, polystyrene – 0.1 micron mean particle size, MFC00131491, Certificate of Analysis on 26-NOV-2019. 10% Solid Content, particle diameter 0.10-0.12 micron with a standard deviation of 0.005-0.015 micron. NIST Traceable.

TEST CONDITIONS

Test Conditions	Parameters
Temperature of testing	72F
Relative Humidity of testing	40%
Temperature of Ambient	70F
Relative Humidity of Ambient	50% RH
Exposed Specimen Area	41.6 square centimeters

Table 4. Test Conditions