Indoor Environmental Standards Organization

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PHEAF – ANSI/IESO Standard 4310 (draft)

- ## Portable High Efficiency Air Filtration (PHEAF) Device Field Testing Standard

- …minimum in-field testing requirements for portable high efficiency air filtration devices. These devices include vertical and horizontal PHEAF devices, movable vacuums, hand held vacuums, and other filtered suction devices used for cleaning surfaces for the purposes of removing dust, dirt, mold, asbestos, lead, soot and other undesired particulate and environmental contaminants.

- The deterioration and potential damage to a PHEAF device and its components over the lifetime of the equipment justify the need for in-field validation of a PHEAF device's effectiveness. This standard describes the procedures for testing and validation of PHEAF device performance using a laser particle counter.

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- **Table 1: Device Classification by Percent Reduction**
- **of Incoming versus Discharge Particle Counts by Particle Size**

Classification	Class 5	Class 4	Class 3	Class 2	Class 1	Class 0
MERV *	17	NA	16	15	14	13
Particle size	MINIMUM	MEASURED	PERCENT	FILTER	EFFICIENCY	
(in microns)						
0.3	99.97	99	95	85	75	75
0.5	99.97	99	95	90	80	75
0.7	99.97	99	95	90	85	75
1.0	99.97	99	95	90	90	80
2.0	99.97	99	95	90	90	85
3.0	99.97	99	95	90	90	90
5.0	99.97	99	99	90	90	90
10.0	99.97	99	99	90	90	90

- *This table is based on ratings derived from ASHRAE 52.2 -2007 MERV for air filters.

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- **Table 2: Background Minimal Particle Concentrations in Testing Area**

Particle size (in microns)	Minimum Particle Concentration (particles/m3)*
0.3	10,000
0.5	2,000
0.7	1,000
1.0	500
2.0	100
5.0	10
10.0	1

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- ## 7.4.2 Set Mode
- The particle counter should be placed in the differential counting mode and not the cumulative counting mode. The sampling period should be no less than 60 seconds or 0.002831 m3 sample volume (0.1 cubic foot).

- ## 7.5 Background Airborne Particle Data Sampling
- The test results for each particle size range should be recorded (and) the three results are then averaged for each particle size range…

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- **7.6 PHEAF Device Exhaust Sampling**

- the PHEAF device should be turned on and operated at normal flow conditions for at least one minute.

- The sampling head of the particle counter shall be placed in parallel with the discharge air direction... (and) placed approximately 3-6 inches from the discharge port of 1,000 – 2,000 cfm air filtering devices... The three results are then averaged for each particle size range and recorded in the column titled "Average (Tave)".

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- The placement of the particle counter for lower exhaust flow devices such air vacuum cleaners should be such that the sample probe of the particle counter is fully encompassed by the exhaust air flow.

- If a plastic bag is used to enclose and collect the exhaust air flow from a vacuum cleaner it is recommended that a small diameter cardboard tube be used to direct the exhaust air flow from out of the bag. The particle sampler can then sample air from the discharge of this tube.

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- **7.7 Calculation and Interpretation of Results**

- The average background particle data and the average unit test result data for each particulate size range shall be recorded… The percent particle count reduction (percent efficiency) for each particle size range shall be calculated

$$1 - \frac{\text{Discharge particle concentration}}{\text{Incoming particle concentration}} \times 100 = \text{\% reduction in particle size concentration}$$

7.7 Calculation and Interpretation of Results

The average background particle data and the average unit test result data for each particulate size range shall be recorded… The percent particle count reduction (percent efficiency) for each particle size range shall be calculated

The percent efficiency for each particle size range for the unit is then compared to the percent removal efficiencies in Table 1.

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Table 1:

	Class 5	Class 4	Class 3	Class 2	Class 1	Class 0
MERV *	17	NA	16	15	14	13
0.3	99.97	99	95	85	75	75
0.5	99.97	99	95	90	80	75
0.7	99.97	99	95	90	85	75
1.0	99.97	99	95	90	90	80
2.0	99.97	99	95	90	90	85
3.0	99.97	99	95	90	90	90
5.0	99.97	99	99	90	90	90
10.0	99.97	99	99	90	90	90

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- A data point that falls between two classes should be rounded down to the lower class. For example, a unit that is 93% efficient at 0.7 micron should be rounded down to 90% efficient. This would give the unit a Class 2 rating at that size range.

- **7.8 Determining Efficiency Class**

- The lowest class recorded for all the size ranges measured will be the designated efficiency class for the unit.

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