

# AQ-SPEC

## Air Quality Sensor Performance Evaluation Center

### Evaluation Summary

#### Sensor Description

Manufacturer/Model:  
Strop de aer

Pollutants:  
**PM<sub>2.5</sub> mass concentration**

Time Resolution:  
1-min

Type: Optical



- The accuracy of the Strop de aer sensors was ~40% in the range of 10 to 300  $\mu\text{g}/\text{m}^3$ . Overall, the Strop de aer sensors underestimated PM<sub>2.5</sub> measurements compared to the T640x in the lab.
- The Strop de aer sensors exhibited high precision for all conc., T/RH combinations for PM<sub>2.5</sub>.
- The Strop de aer sensors showed low to moderate variability for PM<sub>2.5</sub> in the lab.
- Data recovery was ~74% to 83% in the field evaluation and ~86% to 88% in the laboratory evaluations.
- Strop de aer sensors showed strong correlations for PM<sub>2.5</sub> and very weak correlations for PM<sub>10</sub> with GRIMM and T640 from the field; and very strong correlations with the T640x in the laboratory studies ( $R^2 > 0.99$  for PM<sub>2.5</sub>).
- The same Strop de aer units were tested both in the field (1<sup>st</sup> stage of testing) and in the laboratory (2<sup>nd</sup> stage of testing) against reference PM instruments.

### Field Evaluation Highlights

- Deployment period 06/02/2022 - 08/02/2022: the Strop de aer sensors showed strong correlations for PM<sub>2.5</sub> and very weak correlations for PM<sub>10</sub> as compared to GRIMM and T640
- Data recovery from the units was ~74% to 83% for all PM fractions.

#### Additional Information

##### Field evaluation report:

<http://www.aqmd.gov/aq-spec/evaluations/field>

##### Lab evaluation report:

<http://www.aqmd.gov/aq-spec/evaluations/laboratory>

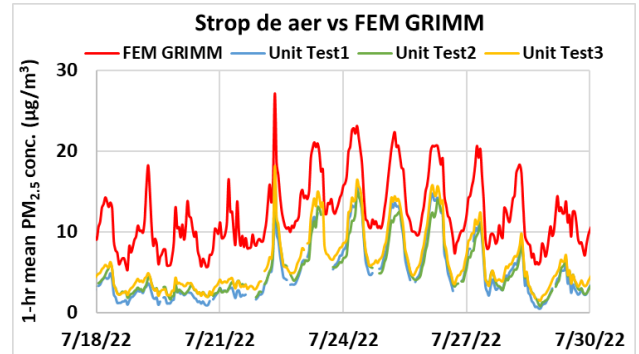
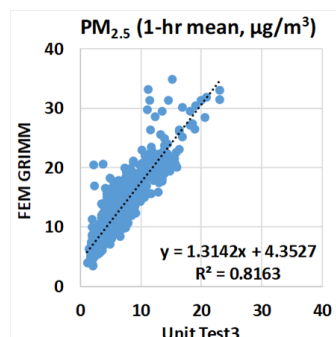
##### AQ-SPEC website:

<http://www.aqmd.gov/aq-spec>

1-hr mean, all ref. inst.

PM<sub>2.5</sub>:  $0.77 < R^2 < 0.83$

PM<sub>10</sub>:  $0.14 < R^2 < 0.29$



Coefficient of Determination ( $R^2$ ) quantifies how the two sensors followed the PM<sub>1.0</sub>, PM<sub>2.5</sub>, or PM<sub>10</sub> concentration change by the reference instruments.

An  $R^2$  approaching the value of 1 reflects a near perfect agreement, whereas a value of 0 indicates a complete lack of correlation.

# Laboratory Evaluation Highlights

## Accuracy (PM<sub>2.5</sub>)

$$A (\%) = 100 - \frac{|\bar{X} - \bar{R}|}{\bar{R}} * 100$$

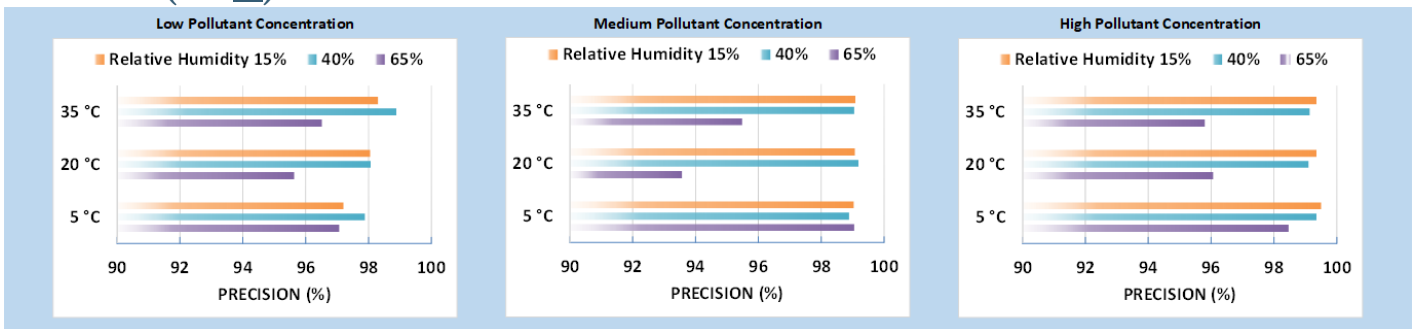
Steady State #	Sensor Mean (µg/m <sup>3</sup> )	FEM T640x (µg/m <sup>3</sup> )	Accuracy (%)
1	3.7	9.3	39.6
2	5.7	14.3	39.6
3	21.9	52.6	41.6
4	59.9	154.1	38.9
5	131.6	327.1	40.2

Accuracy was evaluated by a concentration ramping experiment at 20°C and 40% RH. The sensor's readings at each ramping steady state are compared to the reference instrument.

A negative % means sensor's overestimation by more than two fold. The higher the positive value (close to 100%), the higher the sensor's accuracy.



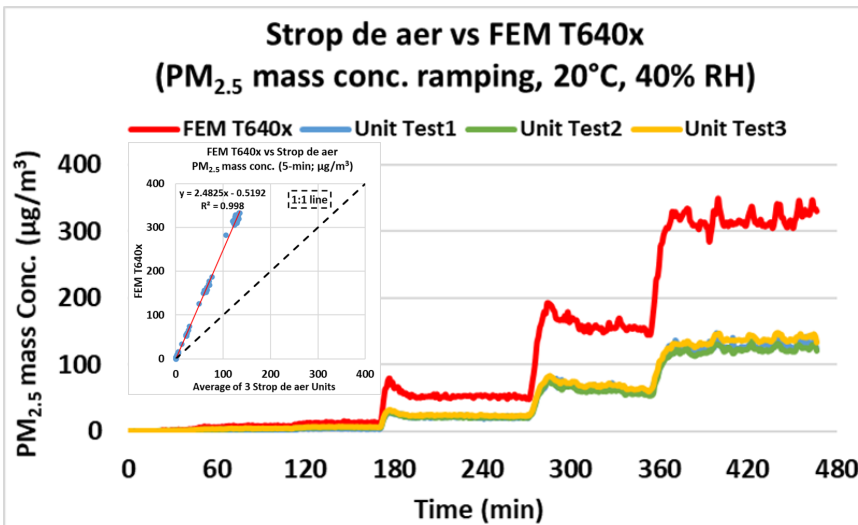
## Precision (PM<sub>2.5</sub>)



100% represents high precision.

Sensor's ability to generate precise measurements of PM<sub>2.5</sub> concentration at low, medium, and high pollutant levels were evaluated under 9 combinations of T and RH, including extreme weather conditions like cold and dry (5 °C and 15% RH) cold and humid (5 °C and 65% RH), hot and humid (35 °C and 65% RH), or hot and dry (35 °C and 15% RH).

## Coefficient of Determination



The Strop de aer sensors showed very strong correlations with the corresponding FEM PM<sub>2.5</sub> data ( $R^2 > 0.99$ ) at 20°C and 40% RH.

## Climate Susceptibility

From the laboratory studies, temperature and relative humidity had minimal effect on the Strop de aer sensors' precision. Spiked concentrations were observed at the RH change points, especially at the 65% RH change point.

## Observed Interferents

N/A



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