



LMS Technologies, Inc.

Formaldehyde Removal Study of Dust Free Carbon Air Cleaner

Tested For:
Dust Free

Report # T022618A
Date: February 26, 2018

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1 Scope

A Dust Free Carbon air cleaner was provided by Dust Free for formaldehyde removal testing.

2 Test Methods

2.1 Formaldehyde Removal

- The air cleaner was placed into a horizontal test duct with recirculation through a 1000 ft³ test chamber.
- The airflow rate was adjusted to 800 CFM.
- The recirculating formaldehyde gas concentration was monitored for a stable baseline reading.
- Formaldehyde gas was injected into the test chamber until the monitored concentration in the recirculating test system was 75 PPB. A ventilation port allowed for adjusting the gas concentration lower to reach the 75 PPB target.
- The air cleaner was powered on and the formaldehyde gas concentration was monitored for 60 minutes.

3 Equipment

- Pump / Blower —Twin City Fan 5 HP Motor
- Flow Meter —ASTM Orifice
- Restriction – MKS 226A Differential Pressure Transducers
- Gas Analyzer – Aerodyne QC-TILDAS Formaldehyde Monitor



Figure 1. Formaldehyde system setup

4 Test Results

Figure 2 shows the formaldehyde measurements and fitted exponential functions for the Dust Free Carbon along with the natural chamber decay.

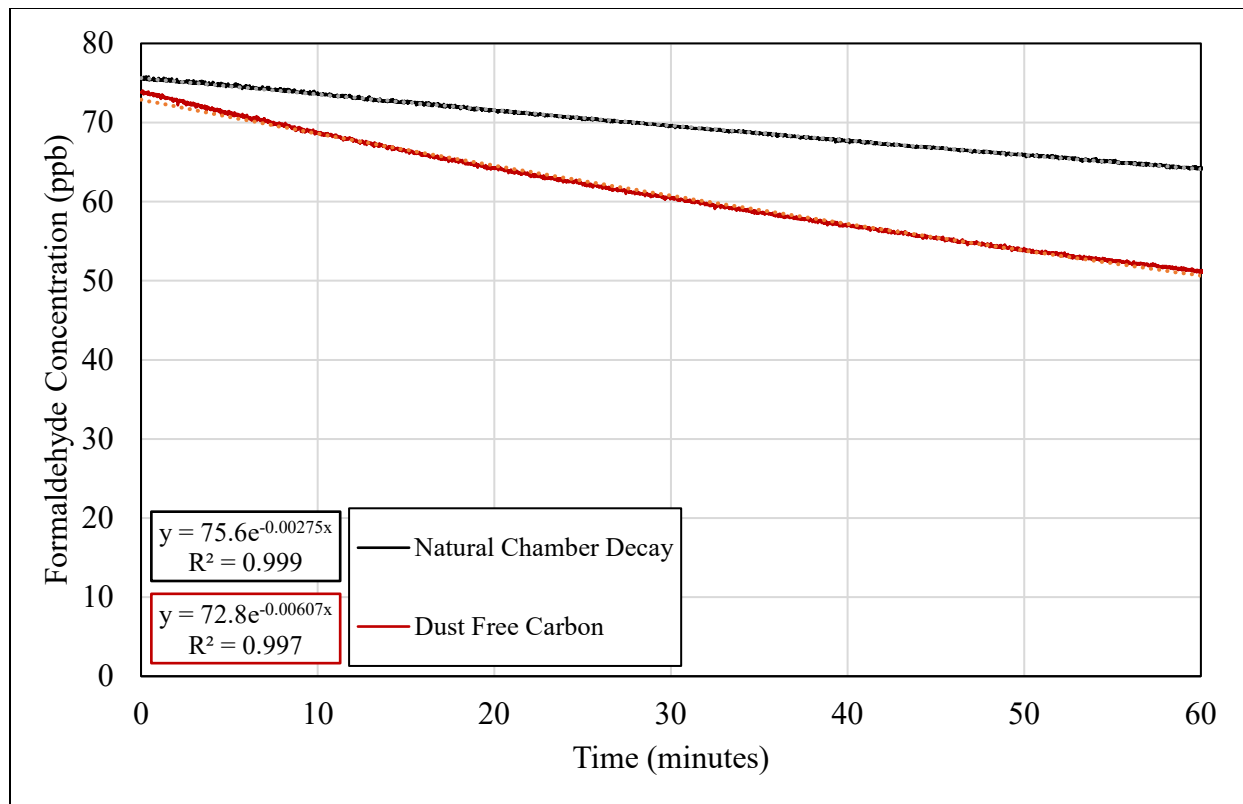


Figure 2. Formaldehyde decay graphs for Dust Free Carbon and Natural Decay tests

From Figure 2, the decay rates were found to be:

$$k_{\text{empty}} = 0.00275 \text{ (min}^{-1}\text{)}$$

$$k_{\text{Dust Free Carbon}} = 0.00607 \text{ (min}^{-1}\text{)}$$

The following, Equation 1, was used to determine the device clean air delivery rate (CADR) with a total test system volume (V) of 1156.5 ft³:

$$CADR = V(k_{\text{filter}} - k_{\text{empty}}) \quad (\text{Equation 1})$$

Dust Free Carbon:

$$CADR = 1156.5 \text{ ft}^3 (0.00607 \text{ min}^{-1} - 0.00275 \text{ min}^{-1}) = 3.84 \text{ cfm}$$

The CADR values as well as the coefficients of determination for each exponential regression are tabulated in Table 1.

Table 1. CADR values, R² values, and k-values for formaldehyde tests

	Natural Decay	Dust Free Carbon
k-value	0.00275	0.00607
R ²	0.999	0.997
CADR value (cfm)		3.84

5 Conclusion

Formaldehyde CADR testing of the Dust Free carbon device resulted in a CADR value of 3.84 cfm.