Athens State University Chemistry Lab

Fume Hood Exhaust Fan Testing

SEA verified proper functionality and recommended solutions for proper usage and safety of Fume Hoods with Exhaust Fan Testing.

About the Facility:

Athens State University required testing for the laboratory fume hood performance in order to verify they were working properly. The laboratory fume hoods in question were located at Waters Hall, Rooms N301 and N302. There was a total of six Hamilton brand Thermo scientific SafeAire II fume hoods. All hoods featured a combination sash configuration with a restricted height opening of 18". The sashes all have four panes of movable glass that could be operated horizontally for loading/unloading the hoods with equipment and chemicals. Nearby lab/classroom furniture did not impede the airflow in any measurable way.

Scope of Work

SEA tested the fume hoods to ensure they were functioning properly/safely. SEA engineers used a TSI Velocicalc air velocity meter, model 9565 series to test air velocities, pressures, and for the face velocity tests. For testing air flows from diffusers and return grills, the testing agent used the Shortridge instruments Series 8400 flow hood. A standard smoke pen was used for the air flow visualization testing.

Before testing the Hood Monitors, "background zero testing" ensured that no other conditions in the room would affect the results of the testing. All six fume hoods were tested with each sash open to its maximum operating height of 18" to simulate actual working conditions. The fume hood baffles were set to the lower position in hoods that had functional baffle controls. The labs were otherwise unoccupied other than the testing agent. Three hoods were completely emptied prior to testing and there were no additional heat loads present. All testing took place during regular hours with the HVAC system running as it would during normal operating hours.

The Hood Monitor used on all but one of the Fume Hoods was the EverWatch Model 8610 Face Velocity Monitor. All of the Hood Monitors were tested against calibrated Velocicalc air velocity meters with the sash completely closed.

Point of Contact

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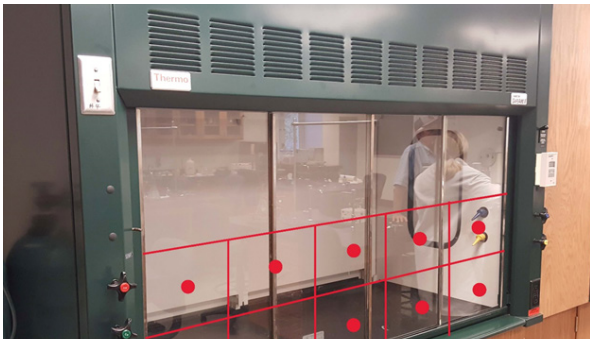
SEA also performed a smoke observation test to illustrate how fumes move inside the hood. Under ideal conditions, the smoke flows smoothly, drawn from the point of release toward the slots in the rear baffle. There were no problematic airflow patterns observed when the hoods were tested with the sash raised vertically; however, when the test was administered with the horizontal sash opened from the center, it created conditions known as reverse and lazy flow.

Fume Hood Conclusions

- Acceptable face velocity per OSHA Laboratory Standard 29 CFR 1910.1450 between 60-100 lfm
- Current operations would not have passed the EPA standard that requires no less than 80 fpm
- Operating as designed per the mechanical design drawings and were performing as designed
- Monitor low limit should be set to 60 lfm and checked every 3 months to ensure properly working
- Noted needed correction to a BAS communication issue
- Exhaust fan in room N301 needed to have a drive reinstalled that modulates the fan speed based off differential pressure in the room versus adjacent corridor - replacing differential pressure
- Diagnosed issue with outside airflow
- Diagnosed need for increased overall flow to room for quantity of air exhausted in space with recommended solution to resize classroom's VAV box



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