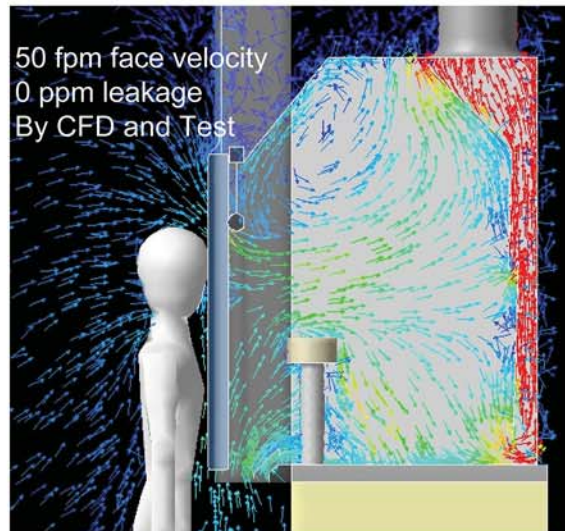


CHEMICAL FUME HOOD STANDARDS

An Historical Review



CHEMICAL FUME HOOD STANDARDS: HISTORY

Chemical fume hoods provide an extraordinary function. The ability to safely, conveniently and, at close proximity, work with materials that, otherwise, may be harmful or fatal. Without laboratory fume hoods many of today's discoveries and conveniences may not exist.

Fume hoods must function properly to deliver the protection promised. At minimum, every fume hood must be tested annually. The steps required to ensure safe operation are not difficult, should not be ignored, and are critical to good chemical hygiene.

Our firm was recently asked to validate the performance of twenty two freshly installed chemical fume hoods. In reviewing the provided specification it became clear that the information was dated and incorrect. This lack of understanding chemical fume hood standards, performance and requirements is common.

Codes, standards and regulations are no longer prescriptive - they are performance based. The goal is safety, not a prescribed measure. For example, current standards do not state that a fume hood must meet a specific measured flow rate (100fpm) - rather the hood must provide a safe working environment for personnel. The owner is responsible for safety.

Following is a brief history of chemical fume hood standards. This is not an exhaustive study, simply a snapshot of relevant documents. For more information we recommend reading current versions of the referenced documents. You may also call our office for help:

1970 The Scientific Apparatus Manufacturers Association (SAMA)

SAMA no longer exists. Standards published by SAMA, which include LF7-1975 and LF10-1981, classified chemical hoods as follows:

- Grade A – for use with extreme toxicity – face velocities 125 – 150 fpm
- Grade B – for most operations – face velocity of 100 fpm
- Grade C – for low hazard – face velocities of 75 – 80 fpm

SAMA standards are more than 25 years old and relied almost exclusively on face velocity as the performance benchmark. If your testing vendor recommends this grading system or these standards they are in the wrong business – run. SAMA is only interesting as a historical reference.

1980 The Scientific Equipment Manufacturers Association (SEFA)

Fume hood standards published by SEFA include SEFA 1.2 – 1996 and SEFA 1 – 2006.

Standards published by SEFA are available online at www.sefalabs.com and provide helpful information. However, it is important to remember that SEFA is a commercial manufacturers' association. Promoting the interests, views and products of member firms is the organization's reason for existence. It is difficult to endorse the fox's expert care of the hens. SEFA Standards are good, but should be viewed with a cautious eye - better standards without this conflict exist.

1990 OSHA: CFR 1910.1450 Occupational Exposure to Hazardous Chemicals in Laboratories

CFR 1910.1450 is commonly known as "The Lab Standard" and became law on May 1, 1990. As of January 1, 1991, all laboratories in the United States are required to have a Chemical Hygiene Plan. Owners of chemical fume hoods are responsible for proper function and safety of their hoods (performance based).

(OSHA: CFR 1910.1450 Continued)

Hoods (chemical, biological, glove boxes, etc.) must be routinely evaluated to determine if they are functioning properly. At minimum, evaluations should include individual performance surveys (tracer gas testing, documentation of qualitative measures, continuous monitoring devices, etc.) and, if required, a plan for corrective action. A qualified individual must be designated to oversee the evaluations, report the results and correct any performance shortcomings.

2000 FORWARD

ANSI/AIHA Z9.5 – American National Standard for Laboratory Ventilation

The American Industrial Hygiene Association (AIHA) first published this standard in 1992. This was a good first effort; however, it was a mix of normative and informative information that was not always clear.

The 1992 version helped specify hood selection based upon the ANSI/ASHRAE 110 method, required alarm systems for new and re-modeled fume hoods and recognized the importance of proper supply air distribution as critical to proper hood function.

The 2003 revision is an important revision and should be included in the library of any organization serious about quality laboratory ventilation. It was one of the first published documents to recognize that chemical hoods do not exist in a vacuum and that testing conducted by the manufacturer may not match results in your lab. In fact, empirical studies cited reveal hood failure rates in of **25 to 37%** for hoods with correct specified face velocities. Critical concepts of the 2003 revision include:

- Chemical fume hoods are mechanical devices and a component of the mechanical system servicing the laboratory and many factors impact performance.
- All new and remodeled chemical hoods shall be tested on site As Installed / As Used
- All new hoods shall be commissioned – guidance provided.

ANSI/ASHRAE 110 – 1985/1995

The ANSI/ASHRAE 110 – 1995 Method of Testing Performance of Laboratory Fume Hoods is a test methodology, not a performance specification. Prior to the publication of ANSI Z9.5 – 2003 this test was employed as a test / design protocol. The Z9.5 - 2003 revision mandated the ASHRAE method procedure for all new and remodeled hoods. If your testing agency is not equipped to perform this test your firm should seek a qualified testing vendor.

This test protocol:

- h Outlines qualitative and quantitative means of testing
- h Provides specific face velocity measurement method
- h Provides measurement of dynamic challenges such as sash movement effect, VAV response testing, room pressurization etc.
- h First published in 1985, updated in 1995.

Pre-Purchase Performance Test (PPT) – US Environmental Protection Agency (USEPA)

Published by the USEPA on April 26, 2006, the Procedure for Certifying Laboratory Fume Hoods to Meet EPA Standards is a test methodology, not a performance specification. As a pre-purchase protocol it is a selection tool. Prior to purchasing any fume hood a review of the EPA test results is prudent. Your hood vendor should provide test results upon request.

LTMW 1109 - Testing Procedure

Updated annually, this test method includes the current procedures of the standards noted herein with the exception of the ASHRAE 110 tracer gas test component. This test method is recommended as the “less rigorous” test in subsequent evaluations after establishing a baseline with the ASHRAE 110 method. At minimum, this test should be conducted annually for each hood as outlined in ANSI Z9.5.

FUTURE

NEBB Procedural Standard for Fume Hood Performance Testing – 2009 1st Edition

This is a new program and the included documentation is a refreshing approach to an often misunderstood topic – chemical fume hood testing. Clearly outlined are all of the test procedures, reporting requirements and, in the appendix, a very clear specification. This specification is an excellent communication tool and should be included in the project documents for any fume hood installation.

“NEBB’s new Fume Hood Testing Program is based upon the current testing requirements of the ASHRAE 110 Standard and the performance criteria of ANSI Z9.5—some of the most respected standards in the Fume Hood industry.” (NEBB Procedural Standard, 2009).”

This review is not intended to be an exhaustive study of all codes and standards, simply a synopsis of relevant requirements. A review of state and local codes and standards are required to fully understand the requirements for your facility. This document was developed for informational purposes only and hopefully it will prove to be helpful. It is important to understand that the standards outline MINIMUM requirements only. Additional measures may be required. It is the responsibility of the owner to ensure and document that each fume hood is safe to use.