

INTERNATIONAL CODE COUNCIL – 2003/2004 Code Development Cycle

Proposed Change to the 2003 International Mechanical Code

M55-03/04

510.1

Proponent: Lou DiBerardinis, Mike Austin, Manuel Gomez (AIHA staff), American Industrial Hygiene Association-Laboratory Health and Safety Committee, representing American Industrial Hygiene Association

Revise as follows:

510.1 General. This section shall govern the design and construction of duct systems for hazardous exhaust and shall determine where such systems are required. Hazardous exhaust systems are systems designed to capture and control hazardous emissions generated from product handling or processes, and convey those emissions to the outdoors. Hazardous emissions include flammable vapors, gases, fumes, mists or dusts, and volatile or airborne materials posing a health hazard, such as toxic or corrosive materials. For the purpose of this section, the health-hazard rating of materials shall be as specified in NFPA 704.

Exception: This section shall not apply to laboratory ventilation systems in research laboratories that comply with all of the following:

1. The laboratories involve only laboratory scale use of substances as defined in 29 CFR 1910.1450.
2. A laboratory ventilation system is provided to control health hazard emissions in accordance with 29 CFR 1910.1450. Such exhaust system shall not recirculate to other areas and the entire system from the laboratory to the exhaust terminal shall operate under negative pressure.
3. The laboratory ventilation system required by Item 2 is designed, constructed and operated in accordance with Chapter 6 of NFPA 45 and ANSI/AIHA Z9.5 and complies with Sections 501.2 and 510.3 of this code.

Reason: This proposed change is necessary to provide safety conditions in research laboratories. The nature of research is such that laboratory scale quantities of a wide variety of chemicals are used which vary over time. According to the definition in 29 CFR 1910.1450 - Occupational Exposure to Hazardous Chemicals in Laboratories (OSHA Lab Standard), "laboratory scale" means work with substances in which the containers used for reactions, transfers, and other handling of substances are designed to be easily and safely manipulated by one person. Requirements for fire suppression and prohibition on manifolding of these laboratory ventilation systems will decrease rather than increase overall safety relative to designs based upon NFPA/AIHA Z9.5.

Scope - As noted above, the scope of the requested exception is consistent intent of the OSHA Lab Standard, a federal standard which was enacted to control health hazards in laboratories, while recognizing the unique nature of this work environment. Use of the "lab scale" definition serves to recognize that both academic and industrial research laboratories may have one or more "pilot scale" operations which involve large quantities of hazardous materials, operations which would be excluded from the scope of the exception. However, the far more common application is use of a wide variety of chemicals in very small quantities, and often for very short periods of time on a very infrequent basis.

Manifolding - A review of ANSI/AIHA Z9.5 shows that it is not necessary, nor is safety improved by limiting manifolding of laboratory exhaust systems based on concerns about flammability, toxic materials control, or incompatible material reactions within duct work where only very dilute concentrations of these materials will be present. ANSI Z9.5 also requires a "hazard evaluation" to assure that no unusual conditions exist that require special attention, such as filtration or a dedicated exhaust fan connected to the process. In addition, manifolding has the following benefits:

If laboratory hood exhaust is mixed with general room exhaust there is immediate dilution. When dealing with a multi-story building, the contaminated air from each floor can be combined in rated chases, or on the roof of the building using a header duct, thereby increasing the dilution factor even further. Finally, if the exhaust fan propels contaminated air off the

building's roof at a rate of 3000-4000 feet per minute the resulting plume is diluted even further. Once the building's exhaust reaches atmosphere, its chemical content is diluted to a point generally below measurable levels reducing exposure to maintenance personnel working on the roof. In addition, by eliminating multiple dedicated fume hood exhaust fans the overall time that maintenance personnel must spend on the roof of the building is reduced. Having redundant exhaust fans, as required by ANSI Z9.5 to support the manifolded exhaust system eliminates the problem of system failure and provides an opportunity to inspect and maintain the system components without shutting the system down.

Fire Suppression - The ANSI Z9.5 commentary indicates that addition of fire suppression within laboratory hood exhaust ducts increases potential chemical exposures to workers. During a fire emergency when the sprinkler is activated, the exhaust is turned off just when it is needed most. In addition, an uncontrolled flow of water from sprinklers in chemical hood duct work could push the contents of the hood out of the hood and create a very dangerous situation, especially if the hood contained water-reactive chemicals. This proposed change would eliminate unnecessary modifications to properly functioning laboratory exhaust ventilation systems. Laboratory ventilation systems safety features are well described in NFPA 45 Chapter 6, "Laboratory Ventilation Systems and Hood Requirements," and ANSI/AIHA Z9.5 "Standard For Laboratory Ventilation". These standards are specific to laboratory ventilation issues and are put forth by organizations that have extensive experience with laboratory ventilation system issues as they relate to issues of proper construction and durability. These standards contain more detailed design information concerning laboratory ventilation systems than section 510 and are appropriate references on this topic. The significant differences and the appropriateness of content in NFPA 45, Chapter 6 and ANSI/AIHA Z9.5 relative to section 510 necessitate the request for an exception rather than simple inclusions of NFPA 45 and ANSI/AIHA A9.5 as additional references. See attached review of IMC sections vs. these alternate standards. The IMC contains numerous references to other codes/standards where more specific information is available on particular topics. Laboratory ventilation is a topic where additional references are both appropriate and necessary.

By requesting this exemption for laboratory scale operations, yet not modifying any of the other content of IMC 510, the application of hazardous exhaust systems requirements for other operations is preserved, while exempted laboratories would be covered in an equivalent and superior fashion by these other standards that have been developed specifically for such laboratory environments. Control of exposure to health hazard materials (including NFPA 704 Health Hazard Rating 4 materials), are addressed by the OSHA Lab Standard.

More detail and supporting documentation for this proposed language change to Section 510.1 are provided in the following attached documents:

- 1) AIHA Position Paper: hazardous Exhaust Systems Are Unnecessary in Research Laboratories That Involve "Laboratory Scale" Use of Chemicals - *provides feedback that overall safety risk associated with laboratory ventilation systems is increased, not decreased through the designation of laboratory exhaust systems as hazardous exhaust systems per IMC Section 510.*
- 2) Summary Comparison of IMC Section 510 Hazardous Exhaust Requirements With Standard Laboratory Exhaust – *presents information on equivalency or superiority of design protection based on NFPA 45 and ANSI/AIHA Z9.5 vs. IMC 510.*
- 3) Experimental and Empirical Studies Documenting that 25% of LAL Will Not be Exceeded in Laboratories with Laboratory Scale Use of Chemicals.
- 4) Soon to be published Revision of ANSI/AIHA Z9.5 "Standard for Laboratory Ventilation"
- 5) AIHA Request for Letter of Interpretation Regarding Hazardous Exhaust Requirements In Laboratories (L. Cayman to G. Press, November 2002)

Analysis: The proponent had not submitted the standards for staff review prior to the printing of the monograph.

Cost Impact: None

Public Hearing: Committee: AS AM D
Assembly: ASF DF