

Public Comment 4:

Kenneth Kretchman, representing the American Industrial Hygiene Association Laboratory Health and Safety Committee, requests Approval as Modified by this Public Comment.

Modify proposal 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 purposes 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.~~

For the purposes of the provisions of Section 510, a laboratory shall be defined as a facility where the use of chemicals is related to testing, analysis, teaching, research, or developmental activities. Chemicals are used or synthesized on a non-production basis, rather than a manufacturing process.

Modify current text as follows:

510.2 Where required. A hazardous exhaust system shall be required wherever operations involving the handling or processing of hazardous materials, in the absence of such exhaust systems and under normal operating conditions, have the potential to create one of the following conditions:

1. A flammable vapor, gas, fume, mist or dust is present in concentrations exceeding 25 percent of the lower flammability limit of the substance for the expected room temperature.
2. A vapor, gas, fume, mist or dust with a health-hazard rating of 4 is present in any concentration.
3. A vapor, gas, fume, mist or dust with a health-hazard rating of 1,2, or 3 is present in concentrations exceeding 1 percent of the median lethal concentration of the substance for acute inhalation toxicity.

Exception: Laboratories, as defined in section 510.1, except where the concentrations listed in Item 1 are exceeded or a vapor, gas, fume, mist or dust with a health-hazard rating of 1,2, 3, or 4 is present in concentrations exceeding 1 percent of the median lethal concentration of the substance for acute inhalation toxicity

510.4 Independent system. Hazardous exhaust systems shall be independent of other types of exhaust systems. Incompatible materials, as defined in the *International Fire Code*, shall not be exhausted through the same hazardous exhaust system. Hazardous exhaust systems shall not share common shafts with other duct systems, except where such systems are hazardous exhaust systems originating in the same fire area.

Exception: The provision of this section shall not apply to laboratory exhaust systems where all of the following conditions apply:

1. All of the hazardous exhaust ductwork and other laboratory exhaust within both the occupied space and the shafts is under negative pressure while in operation
2. The hazardous exhaust ductwork manifolded together within the occupied space must originate within the same fire area.
3. Each control branch has a flow regulating device
4. Perchloric acid hoods and connected exhaust shall be prohibited from manifolding
5. Radioisotope hoods are equipped with filtration and/or carbon beds where required by the registered design professional.
6. Biological safety cabinets are filtered.
7. Provision is made for continuous maintenance of negative static pressure in the ductwork

Contaminated air shall not be recirculated to occupied areas unless the contaminants have been removed. Air contaminated with explosive or flammable vapors, fumes, or dusts; flammable or toxic gases; or radioactive material shall not be recirculated.

510.7 Suppression required. Ducts shall be protected with an approved automatic fire suppression system installed in accordance with the *International Building Code*.

Exceptions:

1. An approved automatic fire suppression system shall not be required in ducts conveying materials, fumes, mists, and vapors that are nonflammable and noncombustible under all conditions and at any concentrations
2. An approved automatic fire suppression system shall not be required in ducts where the largest cross-sectional diameter of the duct is less than 10 inches (254 mm).
3. For laboratories, as defined in Section 510.1, automatic fire protection systems shall not be required in laboratory hoods or exhaust systems.

Commenter's Reason: This proposed change is necessary to provide improved safety conditions in research laboratories. The nature of laboratories is one of a wide variety of chemicals used in small quantities. Of the most important personnel safety considerations for the control of hazardous materials in the lab and at roof emission points are uninterrupted exhaust and high in-duct and point of emission dilution rates, achieved through exhaust manifolding. IMC 510, with its reference to prohibition of exhausting incompatible materials through the same hazardous exhaust system, has led to an unnecessary departure from manifolding of laboratory exhaust systems., therefore missing the safety benefits of added dilution and reliable exhaust availability. In addition, the requirement for laboratory duct fire suppression is unnecessary, and may increase rather than decrease overall risk in the laboratory. The revision to IMC 510 proposed does not change the text for non-laboratory environments, only addresses means to provide improved safety for laboratory operations.

Scope – The scope of the exception requested for the referenced sections of IMC 510 is laboratories. The proposed definition of laboratories provided in Section 510.1 is intended to describe those environments which, unlike manufacturing operations which may use large quantities of chemicals on a constant basis, are characterized by the use of a wide variety of chemicals in very small quantities, and often for very short periods of time on a very infrequent basis. These are operations in which standard laboratory exhaust practices provide significant “in duct” dilution which prevent in-duct incompatible material reactions and buildup of flammable vapors.

Hazardous Exhaust System - The proposed modification of Section 510.2 for laboratories is to recognize the occasional presence of class 4 materials in laboratories in such small concentrations to preclude need for a hazardous exhaust system. Similarly, minute quantities used in middle school or high school chemistry labs should not drive the requirement for a hazardous exhaust system, as the current code language requires. The modification proposed will still address the need for a hazardous exhaust system when hazardous quantities of class 4 materials are in use in any lab environment and represents little change to existing IMC 510 code language.

Manifolding – Manifolding of laboratory exhaust duct 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. The increased fan discharge volume results in additional dilution and “throw” of the exhaust plume. 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. By including redundant exhaust fans, easy to do with a manifolded system, but not feasible with individual fans, loss of exhaust through a mechanical system failure is eliminated and there is also an opportunity to inspect and maintain the system components without shutting the system down. It is also more feasible to bring emergency power to a manifolded exhaust system. Concerns about incompatible material reactions in laboratory ductwork (which are now precluding use of manifolded systems) which are prevented by standard lab exhaust are displacing the real problems of interruption of exhaust due to mechanical failure and lessened exhaust dilution that are encountered routinely. The proposed text highlights those few conditions, referenced in other laboratory ventilation codes, that should preclude manifolded systems.

Fire Suppression – The ANSI/AIHA Z9.5 “Standard For Laboratory Ventilation” 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 ductwork 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 issue has also been thoroughly investigated and addressed in the past by the NFPA 45 committee which authored the chapter, “Fire Protection for Laboratories Using Chemicals.” The exemption language used in this section for laboratory exemption is identical to the language used in NFPA 45.