

DEADLINE APPROACHES

January 1, 2008, Hoods Shall Be Equipped With A Quantitative Airflow Monitor

Subchapter 7. General Industry Safety Orders Group 16. Control of Hazardous Substances Article 107. Dusts, Fumes, Mists, Vapors and Gases

§5154.1. Ventilation Requirements for Laboratory-Type Hood Operations.

(a) Scope. When laboratory-type hoods, also known as laboratory fume hoods, as defined below are used to prevent harmful exposure to hazardous substances, such hoods shall conform to all applicable provisions of Article 107, and shall conform to provisions of this section.

Exception No. 1: Inspection doors or clean-out doors in exhaust ducts required by Section 5143(a)(3) do not apply to laboratory-type hood operations.

Exception No. 2: Biological safety cabinets as defined below are exempt from the requirements of this section. ... Biological safety cabinets may be used to control harmful exposure to aerosols and particulate matter, provided the substance does not present a risk of fire or explosion.

Definitions.

Hazardous Substance, One which by reason of being explosive, flammable, poisonous, an irritant, or otherwise harmful and is likely to cause injury or illness if not used with effective control methods.

Laboratory-Type Hood. A device enclosed except for necessary exhaust purposes on three sides and top and bottom, designed to draw air inward by means of mechanical ventilation, operated with insertion of only the hands and arms of the user, and used to control exposure to hazardous substances. These devices are also known as laboratory fume hoods.

(c) Ventilation Rates.

(1) Laboratory-type hood face velocities shall be sufficient to maintain an inward flow of air at all openings into the hood under operating conditions. The hood shall provide confinement of the possible hazards and protection of the employees for the work that is performed. The exhaust system shall provide an average face velocity of at least 100 feet per minute with a minimum of 70 fpm at any point, except where more stringent special requirements are prescribed in other sections of the General Industry Safety Orders, such as Section 5209. The minimum velocity requirement excludes those measurements made within 1 inch of the perimeter of the work opening.

(2) When a laboratory-type hood is in use to contain airborne hazardous substances and no employee is in the immediate area of the hood opening, the ventilation rate may be reduced from the minimum average face velocity of at least 100 feet per minute to a minimum average face velocity of 60 feet per minute if the following conditions are met:

(A) The reduction in face velocity is controlled by an automatic system which does not require manual intervention. The automatic system shall increase the airflow to the flow required by (c)(1) when the hood is accessed.

(B) The laboratory-type hood has been tested at the reduced flow rate according to the tracer gas method specified in Section 7, Tracer Gas Test Procedure, of ANSI/ASHRAE 110-1995, Method of Testing Performance of Laboratory Fume Hoods, which is hereby incorporated by reference, and has a hood performance rating of 4.0 AU 0.1 or less. The test may be performed with or without the mannequin described in the ANSI/ASHRAE 110-1995 tracer gas method.

The tracer gas test need only be performed once per hood. However, if employers have chosen to perform the tracer gas test on subsequent occasions, it is the most recent record of test results and test configuration that shall be maintained pursuant to subsection (c)(2)(C).

(C) The record of the most recent tracer gas test results and the "as used" test configuration shall be maintained as long as the automatic system is operable and thereafter for five years.

(d) Operation. Mechanical ventilation shall remain in operation at all times when hoods are in use and for a sufficient time thereafter to clear hoods of airborne hazardous substances. When mechanical ventilation is not in operation, hazardous substances in the hood shall be covered or capped off.

(e) Special Requirements.

(1) The face velocity required by subsection (c) should be obtainable with the movable sashes fully opened. Where the required velocity can only be obtained by partly closing the sash, the sash and/or jamb shall be marked to show the maximum opening at which the hood face velocity will meet the requirements of subsection (c). Any hood failing to meet requirements of subsection (c) and this paragraph shall be considered deficient in airflow and shall be posted with placards, plainly visible, which prohibit use of hazardous substances within the hood.

(2) When flammable gases or liquids are used, or when combustible liquids are heated above their flashpoints, hoods shall be designed, constructed, and installed so that hood openings at all sash positions provide sufficient airflow to prevent ignitable concentrations. Concentrations in the duct shall not exceed 20% of the lower explosive limits.

(3) In addition to being tested as required by Section 5143(a)(5), hoods shall meet the following requirements:

(A) By January 1, 2008, hoods shall be equipped with a quantitative airflow monitor that continuously indicates whether air is flowing into the exhaust system during operation. The quantitative airflow monitor shall measure either the exact rate of inward airflow or the relative amount of inward airflow. Examples of acceptable devices that measure the relative amount of inward airflow include: diaphragm pressure gauges, inclined manometers, and vane gauges. The requirement for a quantitative airflow monitor may also be met by an airflow alarm system if the system provides an audible or visual alarm when the airflow decreases to less than 80% of the airflow required by subsection (c).

(B) Qualitative airflow measurements that indicate the ability of the hood to maintain an inward airflow at all openings of the hood as required by subsection (c)(1) shall be demonstrated using smoke tubes or other suitable qualitative methods. This demonstration shall be performed:

1. Upon initial installation;
2. On an annual basis;

Exception to Subsection (3)(B)2.: The frequency of the tests may be reduced to every two years if a calibration and maintenance program is in place for the quantitative airflow monitor or alarm system.

3. After repairs or renovations of the hood or the ventilation system in that part of the facility where the hood is located; or

4. After the addition of large equipment into the hood.

(4) Exhaust stacks shall be located in such a manner with respect to air intakes as to preclude the recirculation of laboratory-type hood emissions within a building. To protect employees on the roof, any one of the follow methods shall be utilized:

(A) Chemical treatment, absorption on activated charcoal, or scrubbers;

(B) Dilution of toxic materials below prescribed exposure limits prior to discharge;

(C) Locked gates, doors or other equivalent means acceptable to the Division which prevent employee access to exhaust stack discharge areas while hoods are in operation unless personnel are provided with appropriate respirators and other personal protection; or

(D) Exhaust stacks extending at least 7 feet above the roof and discharging vertically upward. Where rain protection is desired, high velocity discharge or concentric-duct, self-draining stacks (Figure V-9) or equivalent may be used. Rain caps which divert the exhaust toward the roof are prohibited.

(5) Where emissions from the exhaust stack are likely to cause harmful exposure to employees, an effective air cleaning system shall be provided. Where virulent pathogens are likely to be released in the hood, incinerators or equally effective means of disposal shall be provided in the exhaust system to prevent employee exposure. See Section 5154.2 for requirements for biological safety cabinets.

(6) Blowers exhausting laboratory-type hoods in which hazardous substances are used shall be mounted outside the building or in service rooms outside the working area. For hoods with single, independent exhaust systems, blowers may be mounted inside the building provided that corrosion-resistant, sealed-joint duct-work is used.

(7) When perchloric acid is evaporated in laboratory-type hoods, the provisions of Section 5143(a)(4) shall apply. The materials of construction shall be inert, smooth, and nonabsorbent. Organic polymers shall not be used except for inert fluoropolymers, such as polytetrafluoroethylene [PTFE] and tetrafluoroethylene-hexafluoropropylene copolymer [Teflon FEP], or similar nonreactive material. The hood and exhaust system shall be washed down with water for decontamination and prior to opening for maintenance.

Exception: Portable laboratory scrubbing apparatus for perchloric acid digestions may be used in lieu of the special requirements of this paragraph.

(f) Operator Qualifications. The employer shall ensure that employees who use laboratory-type hoods are trained to:

(1) Use the hood and its features safely;

(2) Determine the date of the last performance test conducted pursuant to subsection (c)(2)(B) and if the hood performance met the requirements of this section;

(3) Understand the general hood purpose, airflow characteristics, and potential for turbulent airflow and escape of hazardous substances from the hood; and,

(4) Know where the quantitative airflow monitor or alarm system is located on the hood and how it is used to indicate an inward airflow during hood operation.

<http://www.dir.state.ca.us/oshsb/ventilationrequirements2005ISOR.doc>