

Part 30: Laboratories
Section 30.8 (2), Fume hoods
Section 30.10, Ducting

Purpose:

In consideration of the number and complexity of variances received to date, Part 30 needs to be reviewed to ensure the requirements pertaining to laboratory fume hoods are up-to-date with current design technologies and standards covering the safe operation of fume hoods.

Rationale for Change:

Section 30.10 requires each hood to be serviced by its own dedicated exhaust duct. Many laboratories have adopted a common duct system where exhaust ducts from a number of hoods are routed to a common duct serviced by a single exhaust stack. As well, current scientific information on fume hood operation indicates that the airflow velocity currently prescribed by section 30.8 (2) is too high and could result in a risk of exposure of workers to hazardous substances escaping from the fume hood. A review is recommended to incorporate new design technologies currently available including testing protocols and requirements for alarm systems. These new technologies are covered by recent editions of ANSI/AIHA, and ANSI/ASHRAE standards. These standards will be reviewed with specific requirements incorporated into the proposed amendments.

Key Issues:

- Section 30.10 is outdated and should reflect current standards covering the design, operation and other criteria for laboratory hoods.
- Current standards allow for multiple hood exhaust systems to be routed to a single exhaust stack (manifold system),
 - Most university and other laboratories have installed manifold systems.
- Maintaining an average airflow of 150 feet/min across the face of the laboratory fume hood, as required by section 30.8 (2), is considered excessive,
- Problems with cross-drafts adversely affecting the safe operation of a fume hood is not addressed, nor is it currently stipulated what steps are required when airflows are too low or too high.

Evaluative Mechanism:

The proposed amendments will:

- Update regulations to current standards; and
- Reduce the number of requests for variances and enable the industry and WorkSafeBC to devote more time to other health and safety areas requiring attention.

Source:

Worker and Employer Services Division

Please note that proposed deletions in the regulatory amendments are identified with a ~~strikethrough~~ and additions are identified in **bold**.

PART 30: LABORATORIES

GENERAL REQUIREMENTS

- Definition** **30.7.1** In sections 30.8 to 30.11, “fume hood” means a mechanically ventilated and partially enclosed workspace intended to contain and remove any gas, vapour or aerosol that is generated within the enclosed workspace.
- Fume hoods** **30.8** (1) Controls for the operation of a fume hood and its services must be located outside the fume hood and must be immediately accessible to the laboratory worker, except that water taps may be located inside the cabinet if the main shutoff valve is in a safe location outside the cabinet.
- (2) ~~A fume hood must be connected to a local exhaust ventilation system which will provide minimum air velocities over the operational face area of the hood of~~
- (a) ~~an average of 0.5 m/s (100 fpm) but not less than 0.4 m/s (80 fpm) at any point across the face, and~~
- (b) ~~an average of 0.75 m/s (150 fpm) but not less than 0.65 m/s (125 fpm) at any point across the face if the fume hood is used for carcinogenic substances referred to under section 5.57(1), or for radioactive materials~~
- A fume hood must**
- (a) **be connected to a local exhaust ventilation system,**
- (b) **provide average face velocities of 0.4 m/s (80 fpm) to 0.6 m/s (120 fpm), and**
- (c) **not have velocities more than or less than 20% of the average face velocity at any point across the operational face of the hood.**
- (2.1) **On and after January 1, 2008, a fume hood must be tested after it is installed and before it is used in accordance with the methods described in *ANSI/ASHRAE Standard 110-1995, Method of Testing Performance of Laboratory Fume Hoods*.**
- (2.2) **A fume hood tested under subsection (2.1) must provide containment not greater than the control level of 0.10 ppm when tested under “as used” test conditions.**
- (2.3) **The installation and testing of a fume hood must be certified by a professional engineer.**
- (3) A fume hood must be located to prevent cross drafts or other disruptive forces from lowering the air flow across the operational face to unacceptable levels.
- (3.1) **Fume hoods must not be subjected to cross drafts exceeding 40% of the average face velocity.**
- (4) A fume hood and its ductwork must be constructed from materials compatible with its use.

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- (2) ~~Fume hoods located in separate rooms must not be connected to a common exhaust duct unless effective controls prevent pressure imbalances and prior written permission has been obtained from the Board.~~

Despite subsection (1), fume hoods used for perchloric acid or radioactive materials must not be connected to a manifold system.

- (3) Ducting used in the installation of a fume hood must be designed in accordance with established engineering principles.

Exhaust discharge

- 30.11** Fume hood local exhaust ventilation systems must discharge to the atmosphere in such a manner that the discharged air will not be recirculated into the laboratory or other work areas.

Biological safety cabinets

- 30.12** (1) The limitations of a biological safety cabinet must be clearly posted on the unit and followed by workers.
- (2) Biological safety cabinets must be certified by a qualified person at least annually and before use after
- (a) initial installation,
 - (b) change of the HEPA (high efficiency particulate air) filter,
 - (c) moving of the unit, and
 - (d) any repair or maintenance that could affect the seal of the HEPA filter.
- (3) Certification procedures used for compliance with subsection (2) must meet the requirements of the *National Sanitation Foundation (NSF) Standard 49-1992, Class II (Laminar Flow) Biohazard Cabinetry*, and a record of the results must be maintained.
- (4) Recirculation of exhaust air into a workspace from a biological safety cabinet is not permitted where volatile toxic materials or flammable liquids or gases are used in the cabinet, or where radioactive materials are used in amounts greater than specified by the Atomic Energy Control Board, or any successor agency.
- (5) Any recirculated air must be directed through a HEPA filter.
- (6) ~~Biological organisms listed as Risk Groups 3 or 4 under the Medical Research Council of Canada (MRCC) or World Health Organization (WHO) system of risk groups must be handled in biological safety cabinets that exhaust to the outdoors through dedicated ducting.~~

Infectious agents as defined in section 6.33 must be handled in biological safety cabinets that exhaust to the outdoors through dedicated ducting.

Explanatory Note:

In consideration of the number and complexity of variances received to date, Part 30 needs to be reviewed to ensure the requirements pertaining to laboratory fume hoods are up-to-date with current design technologies and standards covering the safe operation of fume hoods.

A new definition is provided in proposed new section 30.7.1 to clarify what is meant by a “fume hood”.

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The proposed amendments to section 30.8 (2) bring the requirements in line with current requirements covering airflow velocities entering the fume hood. This is based on specifications detailed in the *ANSI/AIHA Z9.5-2003, Laboratory Ventilation* standard. Face velocities as high as those prescribed in existing subsection (2) (i.e., 150 feet/min) have been demonstrated to cause outflow of contaminated air from within the hood exposing workers to potentially hazardous substances. Consistent with the ANSI/AIHA and other standards, the distinction between airflow requirements for carcinogens and radioactive materials and the airflow requirements for other hazardous substances has been removed.

Proposed new sections 30.8 (2.1), (2.2), and (2.3) introduce requirements for the testing of fume hoods in accordance with the *ANSI/ASHRAE 110-1995, Method of Testing Performance of Laboratory Fume Hoods* standard. An important consideration is the requirement that the hood be tested after installation in "as used" conditions to ensure effective containment of hazardous substances within the hood under normal use conditions.

Consistent with proposed new sections 30.8 (2.1), (2.2) and (2.3) is new subsection (3.1) which ensures that the operation of a fume hood is not adversely affected by cross-drafts that may arise from an adjacent doorway, or from an exhaust outlet of the heating / ventilation / air-conditioning (HVAC) system. This requirement is based on information provided by *ANSI/AIHA Standard Z9.5-2003* in the "Airflow Visualization Tests" section.

The proposed amendment to section 30.8 (5) provides clarity by way of example: fume hoods with any restrictions include those that are dedicated for perchloric acid or radioactive material use.

Proposed new sections 30.8 (7) and (8) addresses two concerns. Firstly, equipment used within a fume hood, such as distillation columns and heaters, must be placed at least 15 cm (6 inches) away from the operational face of the hood to minimize interference with air movement across the sash. Secondly, to ensure consistency in training and education of workers using fume hoods, written procedures must be developed and implemented.

The intent of the proposed amendments to section 30.9 (1) and proposed new section 30.9 (1.1) is to establish timelines and trigger point criteria for testing airflows, to ensure that fume hoods are operated in a safe manner whenever it is used, and to ensure corrective action is taken when the hood is not operating properly. The indicated upper and lower values for airflow are based on information contained in *ANSI/AIHA Standard Z9.5-2003*.

Proposed new section 30.9 (2.1) brings newly installed equipment up-to-date with current fume hood designs by requiring the installation of alarms when the airflow drops below acceptable levels as defined in section 30.8 (2). This ties in with proposed new section 30.9 (1.1).

The proposed amendments to section 30.10 will bring this section up-to-date with new ventilation design technologies for fume hoods. These new technologies are covered by current ANSI/AIHA, ANSI/ASHRAE standards, which allow for multiple fume hood exhaust ducts to be routed to a single exhaust duct. This is not permitted under the current requirements. A key amendment is the proposed requirement that the ventilation and installation be certified by a professional engineer.

For clarification, the proposed amendment to section 30.10 (2) specifies that fume hoods used for perchloric acid and radioactive materials must not be connected to a manifold system.

The proposed amendment to section 30.12 (6) covering biological safety cabinets bring it into line with the proposed amendments to Part 6 covering infectious agents and materials. The proposed amendments to section 6.33 provide a new definition for an infectious agent.