

1.0 **GENERAL**

1.1 **Related UBC Guidelines**

- .1 Section 12 35 53 Laboratory Casework
- .2 Section 23 38 16 Fume Hood Exhaust Systems
- .3 Section 20 00 08 Mechanical Identification for the details for fume hood labelling requirements.

1.2 **Co-ordination Requirements**

- .1 Design development protocols will be issued by Fume Hood Safety Committee to the Consultant defining in detail the laboratory function, requirements, and systems to be provided.
- .2 Review design intent and additional requirements with UBC Risk Management Services. Co-ordinate with Risk Management Services early in the design process.
- .3 Consult with Facilities Maintenance on requirements to tie Fume Hoods into existing Building Management Systems.
- .4 The selection of fume hoods and biological safety cabinets is to be made in consultation with Risk Management Services, Facilities Maintenance and the principal researcher to ensure that the scientific, safety and engineering concerns are properly addressed.
- .5 Operable windows are not to be installed in labs in order to allow negative pressures to be maintained relative to adjacent spaces and to prevent draft conditions.

2.0 **MATERIAL AND DESIGN REQUIREMENTS**

2.1 **Design Requirements**

- .1 All fume hoods and exhaust systems shall conform to Part 30 Laboratories, of the Occupational Health and Safety (OHS) Regulation under the inspection jurisdiction of WorkSafeBC, and the latest edition for CSA-Z- 316.5 Fume Hoods, and Associated Exhaust Systems, and show evidence of being performance tested in accordance with ASHRAE 110, Method of Testing Performance of Laboratory Fume Hoods.

2.2 **Certification and Commissioning Requirements**

- .1 Testing of fume hood airflow performance shall be done by a party approved by UBC. Note that the face velocity requirement is more stringent than WSBC and that efforts shall be made to ensure that all tests are in the middle of their range. The reason for this is that fumehoods which are passed near the limit of the passing values have been found to be less likely to pass their annual re-certifications for the life of the fumehoods. The test report requires the following results as part of UBC Safety and Risk Services' requirement to approve fume hoods for occupancy:
 - .1 Average face velocity is measured between 0.43-0.57m/s (85-115FPM).
 - .2 No single point in the average face velocity is less than 80% of the average face velocity.

- .3 No single point in the average face velocity is greater than 120% of the average face velocity.
 - .4 Cross draft measurements are less than 50% of the average face velocity (as measured 45cm from the face of the sash, using the procedure described in CSA Z316.5).
 - .5 Good smoke containment shown with a smoke test.
- .2 It must be demonstrated to the UBC Project Manager, and UBC Risk Management Services that the fume hoods have been designed and installed to meet all requirements of the UBC Technical Guidelines.

2.3 Performance Standards

- .3 Fume hoods shall conform to the following function-specific requirements, including as applicable:
- .1 Laboratory Bio-Safety Guidelines, (latest revision), published Public Health Agency of Canada.
 - .2 Containment Standards for Veterinary Facilities, Canadian Food Inspection Agency, Publication 1921/E.
 - .3 Canadian Nuclear Safety Commission Standard GD-52, Design Guidelines for Basic and Intermediate Level Radioisotope Laboratories.
 - .4 NSF (National Science Facilities) standards: for all biosafety cabinets; fully reticulating HEPA filters typical.
 - .5 CSA: including requirement for flow sensors.
 - .6 Controls for the operation of the fume hood and service fixtures must be located external to the fume hood, per WorkSafeBC.
 - .7 UBC Risk Management Services to determine additional regulatory and construction standards.
 - .8 Performance.
 - .1 Life Cycle Costing is to be calculated based on a 15 year life.

2.4 General Requirements

- .1 Set the fume hood sash at 15" (375 mm).
- .2 The correct operating height of the sash must be clearly marked on the cabinet frame.
- .3 A fume hood must be connected to a local exhaust ventilation system which will provide air velocities over the operational face area of the hood that meet the current Work Safe BC / OHS Requirements.
- .4 *All fumehoods shall be installed with an airflow monitor which complies with WSBC 30.9(5), (6). Any fumehoods within a project's boundaries (i.e. lab renovation) that do not have an existing airflow monitor shall have an airflow monitor installed as part of the project.*
- .5 Design of building structure to accommodate the provision of shielded radio isotope hoods (UBC to establish which hoods).

- .6 Whenever a project permits, conform to the most stringent Containment Level requirements to allow flexibility of use.
- .7 Hoods intended for use with Perchloric acid shall be specifically designed for that use and shall be reviewed with UBC Risk Management Services and Building Operations, Technical Services. Material that is resistant to Perchloric Acid must be used for the fume hood, duct work, fans and stacks. Stainless steel is not an acceptable material for this service.
- .8 *For new lab buildings with numerous fumehoods, manifolded central systems which meet the requirements of ANSI Z9.5 are generally preferred complete with variable volume hoods, redundant high plume central fans and pressure independent air control valves. In situations with only a few hoods, constant volume hoods with a 1:1 hood to fan ratio may be more economical, simpler and have lower operating costs.*

2.5 Seismic Restraint Requirements

- .1 A professional engineer registered in BC, shall be engaged by manufacturer, and shall seal shop drawings, confirmed by Letters of Assurance, for seismic restraints including anchorage.
- .2 Means for attachment for seismic restraint to be incorporated in the manufacture of fume hoods and bio-safety cabinets. Restraints and anchorage shall be designed to the BC Building Code.

2.6 Components

- .1 Fume hoods to be either stainless steel lined or epoxy lined. All fume hood materials must be non-flammable. Radioisotope hoods to be of stainless steel construction.
- .2 Hoods intended for use with radioisotopes to have a reinforced work surface capable of supporting 500 kg.
- .3 Window sash to be equipped with a tempered safety glass.
- .4 Majority of bio-safety cabinets will be Class II Type A2. UBC Risk Management Services to determine if Class II Type B1 or B2 cabinets are required at a meeting between the Consultants and UBC Risk Management Services.
- .5 As per BCOHS regulation 30.21; an exhaust duct wash down system shall be part of the design in Perchloric Acid fume hoods.

2.7 Finishes

- .1 All fittings or trim in fume hoods to be non-corrosive. Chrome-plated or similar types of 'non-corrosive' finishes are not acceptable.

2.8 Fabrication

- .1 The fume hood must be double walled construction permitting mechanical and electrical service fittings to be mounted on the vertical front stiles.
- .2 Heavy duty galvanized steel framework as well as the service fixture valves and boxes must be housed and concealed within the service chase on both sides of the hood.

- .3 Exterior or interior panels must be independently mounted and easily removable, complete with panels required completing service connections. Exterior service panels are preferred where the installation permits.
- .4 The exterior panels and front stiles must be minimum 1.2 mm powder coated epoxy steel. Air foil must be Type 316L 1.5 mm gauge stainless steel, number 4 finish.

2.9 Materials

- .1 Consult with UBC Building Operations for UBC Mandatory, approved, or not approved products and materials.
- .2 Type 316L 16 gauge stainless steel number #4 finish and be of seamless one piece construction with all corners coved and radii.
- .3 All welds ground smooth and polished. A liner must be bolted and cemented to the steel framework forming a rigid and completely sealed chamber.
- .4 The duct stub must be 316L stainless steel.
- .5 Hood baffles are required with top and bottom ventilation slots. These must be fully adjustable and of the same material as the hood liner.
- .6 The vertical sliding sash must be full view type with 6 mm thick tempered safety glass panel and stainless steel pull, and be counter balanced for smooth operation. Sash shall latch when fully open and when released shall automatically close by gravity.
- .7 Fume hoods and biological safety cabinets shall be equipped with a positive lockable latching system. The locking system must allow for the addition of a tradesman's lock that complies with lockout procedures.
- .8 For a stainless steel liner, hood work surface must be type 316L 16 gauge stainless steel, seamless welded and integral with liner. The work surface must have 6 mm high marine type edge. The underside of the work surface must have a 20 mm thick plywood sheet bonded to it for rigidity and sound deadening.
- .9 For an epoxy lined hood, the hood work surface must be 20 mm solid black epoxy sealed to the hood liner with a 6 mm high marine type edge sealed to the hood liner.
- .10 A recess mounted electronic air monitor shall be mounted on the front face of the hood, indicating high, normal and low air flows, complete with audio and visual alarms.
- .11 Where provided, the hood accessories must conform to the following specifications:
 - .1 Provide outside controls for all fume hoods as per OHS requirements.
 - .2 Sinks must be integrally welded to the work top or, if epoxy, sealed and recessed into the counter with 38 mm tail pieces.
 - .3 Flush type electrical receptacle consisting of a box 120 volt 15 amp U ground duplex stainless steel face plate must be located on the exterior of the fume hood preferably on the vertical stile.

- .4 A flush mounted stop/start blower switch must be located in the fume hood front stile. The switch must be suitable for the specified horsepower characteristics of the fan and be labeled as to its function and status.
- .5 The fume hood must be prewired and CSA approved.
- .6 The hood must be equipped with a vapor proof lamp and light switch and all wired to a junction box on top of the hood.

2.10 Service Connection to Biological Safety Cabinets

- .1 Natural Gas
 - .1 Natural gas connections to Biological Safety Cabinets are no longer permitted by the Public Health Agency of Canada (PHAC).
- .2 Water, Drain and Vacuum Services
 - .1 Water, drain, air and vacuum are normally not recommended. In instances where users request any of these services, the Consultant to discuss and obtain approval from Risk Management Services.
- .3 Electrical
 - .1 A duplex outlet is required adjacent to each cabinet supplied from two separate circuits.

2.11 Labelling

- .1 Refer to section 2.1.5 in Section 23 38 00 Fumehood, Lab and Contaminated Exhaust System.

*****END OF SECTION*****