

1.0 **GENERAL**

1.1 **Related Work and UBC Guidelines**

- .1 Section 12 35 53 Laboratory Casework
- .2 Section 20 00 08 Mechanical Identification for fume hood labelling type
- .3 Section 23 38 00 Fumehood, Lab and Contaminated Exhaust System for fume hood labelling requirements.
- .4 [UBC Resilience-Based Design Guide for Nonstructural Systems](#)

1.2 **Related External Documents**

- 1. Part 30 Laboratories, of the Occupational Health and Safety (OHS) Regulation under the inspection jurisdiction of WorkSafe BC, and the
- 2. Latest edition for CSA-Z- 316.5 Fume Hoods, and Associated Exhaust Systems.
- 3. Canadian Biosafety Standard 3rd Edition, (latest revision), published Public Health Agency of Canada.
- 4. Containment Standards for Veterinary Facilities, Canadian Food Inspection Agency, Publication 1921/E (latest revision).
- 5. Canadian Nuclear Safety Commission Standard GD-52, Design Guidelines for Basic and Intermediate Level Radioisotope Laboratories (latest revision).
- 6. NSF (National Science Facilities) standards (latest revision): for all biosafety cabinets; fully reticulating HEPA filters typical.

1.3 **Description**

- .1 Section includes design and fabrication of fume hoods and bio-safety cabinets.

1.4 **Coordination**

- .1 The Guidelines apply to all work completed within buildings on both UBC Vancouver and UBC Okanagan campuses unless stated otherwise.
- .2 In instances where conflicts are found between these guidelines and provincial regulations or codes, please notify the UBCV Technical Review Team Architect and UBCO Facilities Management.
- .3 These guidelines are intended to be read by design consultants and their content integrated into construction drawings and specifications. Construction documents are not to reference the technical guidelines directly.
- .4 The selection of fume hoods and biological safety cabinets is to be made in consultation with UBC Safety and Risk Services (UBC SRS), UBC Facilities and the principal researcher to ensure that the scientific, safety and engineering concerns are properly addressed.
- .5 Review design intent and additional requirements with UBC SRS. Coordinate with UBC SRS early in the design process.
- .6 Consult with UBC Facilities on requirements to tie fume hoods into existing Building Management Systems (BMS).
- .7 Consult with UBC Facilities on requirements for fume hood modifications in existing buildings and tie-in with existing Building Management Systems (BMS).
- .8 The Coordinating Registered Professional (CRP) is required to coordinate these requirements with other disciplines.

1.5 **Quality Assurance and Submittals**

- .1 Submittals in O&M manual:
 - .1 Manufacturer's data including product specifications.

.2 Maintenance instructions.

.2 Handover/Turn-Over Procedures

.1 Projects are responsible for commissioning and testing all fumehoods and BSC's. Provide a testing and commissioning report for SRS' review.

2.0 **DESIGN AND PERFORMANCE 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.
- .1 Fume hoods shall conform to the function-specific requirements as applicable in Section 1.2.
- .2 Controls for the operation of the fume hood and service fixtures must be located external to the fume hood, per WorkSafeBC.
- .3 Set the fume hood sash at 15"-18" (381 mm -457 mm).
- .4 The correct maximum operating height of the sash must be clearly marked on the cabinet frame.
- .5 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 WorkSafeBC / OHS Requirements.
- .6 All fumehoods and mechanical sash stops 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. 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.
- .7 Design of building structure to accommodate the provision of shielded radio isotope hoods (UBC to establish which hoods).
- .8 Design and construction must satisfy the containment levels required for foreseeable usage. Whenever a project permits, design and conform to Containment Level 2 requirements to allow flexibility of use even if foreseeable use requires only Containment Level 1.
- .9 Hoods intended for use with Perchloric acid shall be specifically designed for that use and shall be reviewed with UBC Safety & Risk 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. Wash down systems must extend to the height of the stack.
- .10 Hood baffles are required with top and bottom ventilation slots. These must be fully adjustable and of the same material as the hood liner.

- .11 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.
- .12 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 The fume hood must be prewired and CSA approved.
 - .5 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.
- .13 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.
- .14 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.
- .15 Seismic restraint requirements to be incorporated in the manufacture of fume hoods and bio-safety cabinets. Restraints and anchorage shall be designed to the BC Building Code. Coordinate with the [UBC Resilience-Based Design Guide for Nonstructural Systems for any requirements above and beyond the BCBC](#).
- .16 UBC Safety and Risk Services to determine additional regulatory and construction standards.

2.2 Performance Standards

- .1 Performance.
 - .1 Life Cycle Costing is to be calculated based on a 15 year life.

2.3 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 WorkSafeBC and that efforts shall be made to ensure that all tests are in the middle of their range. The reason for this is that fume hoods 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 fume hoods. 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 **Maximum** 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 UBC **Facilities** and UBC **Safety and Risk Services** that the fume hoods have been designed and installed to meet all requirements of the UBC Technical Guidelines.

3.0 **MATERIALS**

3.1 **Product Selection**

- .1 Consult with UBC **Facilities**, **Building Operations** for mandatory, approved, or not approved products and materials.
- .2 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.
- .3 Type 316L 16 gauge stainless steel number #4 finish and be of seamless one piece construction with all corners coved and radii.
- .4 All welds ground smooth and polished. A liner must be bolted and cemented to the steel framework forming a rigid and completely sealed chamber.
- .5 The duct stub must be 316L stainless steel.
- .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 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.
- .8 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.
- .9 Hoods intended for use with radioisotopes to have a reinforced work surface capable of supporting 500 kg.
- .10 Window sash to be equipped with a tempered safety glass.
- .11 Majority of bio-safety cabinets will be Class II Type A2. UBC **Safety and Risk Services (SRS)** to determine if Class II Type B1 or B2 cabinets are required at a meeting between the Consultants and UBC **SRS and end users**.

- .12 As per BCOHS regulation 30.21; an exhaust duct wash-down system shall be part of the design in perchloric acid fume hoods. Wash-down must extend to height of stack and rinsate collected in a reservoir for testing prior to release.

3.2 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.

3.3 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.

3.4 Service Connection to Biological Safety Cabinets

- .1 Natural Gas
 - .1 Natural gas connections to Biological Safety Cabinets are **not** 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/s to discuss and obtain approval from [UBC SRS](#).
- .3 Electrical
 - .1 A duplex outlet is required adjacent to each cabinet supplied from two separate circuits.

2.11 Labelling

- .1 Refer to [UBC Technical Guideline Sections 20 00 08 and 23 38 00](#).

END OF SECTION