SECTION 11610

LABORATORY FUME HOODS

Any deviation from these design criteria must be reviewed and approved by EH&S.

PART 1 – GENERAL

1.1 SUMMARY:

A. Section Includes:
   1. Laboratory fume hoods, support cabinets and related service fixtures.

B. Related Sections:
   1. Section 11611 - Laboratory Biological Safety Cabinets.
   2. Division 12 - Furnishings: Laboratory casework and service fixtures.
   3. Section 15852 - Special Exhaust System: Laboratory fume hood exhaust systems including from hood duct collar to hood exhaust system.
   4. Division 16 - Electrical.
   5. 15400 series sections - Plumbing connections.
   6. Division 15 - Mechanical

1.2 SUBMITTALS:

A. Product Data:
   1. Submit manufacturer's data and installation instructions for each type of fume hood.

B. Shop Drawings:
   1. Submit shop drawings for fume hoods showing plans, elevations, ends, cross-sections, service run spaces, location and type of service fixtures with lines thereto; details and location of anchorages and fitting to floors, walls, and base; layout of units with relation to surrounding walls, doors, windows, lighting and air-conditioning fixtures, and other building components; connection to hood exhaust system; location of access doors, cut-off valves, junction boxes.
      a. Coordinate shop drawings with other work involved.
      b. Include roughing-in drawings for mechanical and electrical services.
C. Performance Tests:
   1. Submit as manufactured quality control performance test reports, prepared by manufacturer's testing personnel following requirements of ASHRAE 110-95 for each type and size of fume hood required.

D. Operation and Maintenance Instructions:
   1. Submit 5 copies of written instructions for fume hoods.

1.3 QUALITY ASSURANCE:

A. Single Source Responsibility:
   1. Provide laboratory fume hoods manufactured by a single manufacturer.

B. General Performance:
   1. It is the responsibility of the project designer to design hoods that, when connected to exhaust system that provides proper exhaust volume under normal laboratory conditions, will operate in a safe, efficient manner, within acceptable tolerances for face velocities specified. Dead air pockets and reverse air currents will not be permitted along surface of hood interiors.

   2. Constant-volume chemical fume hoods should be capable of maintaining 80-100 fpm minimum face velocity through the sash opening with the sash door at 13 inches, measured from the top of the airfoil or 14” above work surface if airfoil is not present or is flush with work surface. *

   3. Variable-Air-Volume fume hoods should be capable of maintaining 80-100 fpm at all sash heights below 13” measured from the top of the airfoil or 14” above work surface if airfoil is not present or is flush with work surface. *

   4. Some low flow, high efficiency fume hoods may have face velocities lower than the recommended range. These will approved by EH&S on a case by case basis.

   *These FPM measurements are guidelines. Final certification will be determined by EH&S using face velocity measurements.

   5. Floor Mounted (Walk-In) Fume Hoods – HVAC Design Engineer shall consult EH&S for minimum face velocity at specified sash position(s).

   6. Combination Vertical and Horizontal Sash Fume Hoods - HVAC Design Engineer shall consult EH&S for minimum face velocity at specified sash position(s).
C. Source Quality Control:

1. Manufacturer must demonstrate hood performance prior to shipment to prove compliance with contract requirements. Test hoods, testing facility, necessary instrumentation, apparatus and equipment will be supplied by manufacturer at no cost to Owner.

2. Prior to shipment of any laboratory fume hoods, test all sizes of each type of fume hood required for the project in the manufacturer's hood test room to verify conformance with performance requirements of the hood design, in accordance with the following:

   a. ASHRAE Standard 110-1995, 125 feet/minute face velocity with the sash in the full open position wherein:

      1) $4.0 = \text{tracer gas release rate in liters/minute.}$
      2) $\text{AM} = \text{as manufactured.}$
      3) $0.010 = \text{level of control of tracer gas in parts per million (ppm) in sampling bag.}$

3. Failure to meet the performance specified shall be cause for rejection of the hoods.


5. Location of Tests and Test Facility: Perform all tests referenced herein in the manufacturer's fume hood test facility.

6. The test facility shall meet the following requirements:

   a. Provide a test facility with sufficient area so that a minimum of 10' of clear space is available in front of and 5' on both sides of the hood for viewing tests.

   b. Provide facility's ventilation system with adequate heating and air conditioning so that room air and auxiliary air temperatures can be maintained within the desired ranges.

   c. Room air currents in the test area shall be less than 20 fpm.

   d. Properly calibrate hood exhaust and auxiliary air systems so that the desired air volumes can be easily attained.

D. Instrumentation, Equipment and Test Personnel:

1. Qualified personnel to perform the tests shall be supplied by the manufacturer.
2. Instrumentation and equipment required shall be supplied by the manufacturer.


1.4 WARRANTY:

A. The manufacturer shall guarantee all materials and workmanship provided for a period of 1 year from date of Notice of Acceptance. Any defects due to the use of improper material or workmanship on the part of the manufacturer occurring within that time shall be promptly rectified, by repair or replacement of the defective materials or correction of defective workmanship by manufacturer at his own expense, after notification by the Owner.

PART 2 – PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS:

A. Provide fume hoods by one of the following:

1. Fisher Hamilton Scientific, Inc.
3. Labconco Corporation.
4. Hanson Lab Furniture

2.2 DESIGN AND CONSTRUCTION

A. Construction

1. Double Wall End Panels: Provide panels with a streamlined section ensuring a smooth, even flow of air into the hood. Design the hood interior end panels flush with the entrance shape to prevent eddy currents and backflow of air. Close the area between the double wall ends to house remote control valves required.

2. Air Foil: Install at the bottom of the hood opening. Provide foil with a 1" open space between the foil and the top front edge of the working surface to direct an air stream across the hood work top to prevent any backflow of air at this point. Extend air foil back under the sash, so that the sash does not close the 1" opening. Low profile airfoil or airfoil that is flush with work surface is acceptable if its design reduces the turbulence of air entering the hood.

3. Hood Exteriors: Provide hood exteriors constructed of cold rolled steel with component parts screwed together to allow the removal of the end panels, front end fascia pieces, top fascia and air foil strips to allow replacements or to afford access to the plumbing lines and service fittings. Weld spacers or reinforcements to these main parts. After fabrication of all cold rolled steel parts, but before final assembly, all component parts shall be given a chemical resistant finish on both exterior and interior surfaces.
4. Punch the hood fascia panels to receive the required number remote controlled service fittings at each side of the hood.

5. Provide knock-outs for installation of fume hood controls to be installed under Section 15852.

6. Hood Services: Services consist of a cup drain with a minimum 3/8” lip above work surface and 1 each air, gas, vacuum and cold water plumbing services as specified in Section 12349 conforming to the same color coding requirements.

7. Prepiple and prewire all hoods to a single point.

8. Electrical services consist of three 2-gang duplex, 20A, 125V receptacles; one light switch.
   a. One of the three 2-gang duplex, 20A, 125V receptacle shall be located on top panel of hood to accommodate fume hood airflow alarm.
   b. A removable cover shall be located over the power adapter plug to assure its fixed placement in the receptacle, (e.g. A WP1000 Series Weatherproof Receptacle Cover manufactured by Intermatic corp. http://www.intermatic.com/?action=prod&pid=8761
   c. Alarm shall be located on fume hood so that it is visible and accessible to hood user and installed per manufacturer specifications.

9. Vertical (up and down) Sliding Sash:
   b. Provide vertical sliding sash of 18 gage painted steel shape with corners mitered, welded and ground smooth, or frameless laminated safety glass sash. Glaze with laminated safety glass set into chemical resistant glazing channels. Counterbalance the sash with a single weight and sash cable system to prevent any tilting of the sash during operation.
   c. Provide 16 gage, type 304 sliding sash frames with No. 4 satin finish within vertical sliding sash assembly.
   d. Design the sash suspension system to include a safety feature to prevent free fall. Spring type counterbalances will not be acceptable. Provide stainless steel sash cables operating on ball bearing sheaves. Equip the sash frame to operate in PVC sash guides.
   e. Provide sash with stops located 18” above working surface and with override release.

10. Hood base cabinets and venting
    a. Decide acid and/or flammable storage.
b. Provide compatible venting. Each cabinet shall be vented separately and with sufficient mixing distance so as not to create chemical incompatibility.

c. Materials used for venting must meet an NFPA Flame Spread Rating of 25 or less.

d. Materials used for venting must be rigid construction, flexible material will not be acceptable.

e. Corrosive cabinets shall be vented through hood work surface using Manufacturer’s vent kit. When two corrosive cabinets are used, each cabinet must be vented separately through work surface. Vent duct shall terminate below lower baffle and at least 1” above work surface. Penetration between work surface and vent duct must be sealed with chemical resistant type caulk.

11. Provide a low air flow alarm with audible and visual indications when face velocity, as measured at the sash face, drops below 75 fpm face velocity.

12. Provide hood exterior mounted single point or remote adjustment baffle.

PART 3 – EXECUTION

3.1 DEMOLITION:

A. General:

1. If a project's scope includes or will affect either supply or exhaust ventilation, the design team shall verify if there are fume hoods or other special exhaust systems that could be affected.

2. For hood disposal or relocation, hood owners/users shall complete a Property Services, Facilities Management, Environmental Health & Safety Equipment Disposal/Resale Form, return the original to EH&S with a copy to the Party responsible for the project, and post a copy on the fume hood for the Contractor.

3. Interior room duct(s) that serviced disposed fume hood(s) should be removed and capped at the wall or ceiling so lab /room occupants cannot access the ducts for unauthorized use. All remaining hoods or special exhaust equipment must be balanced to conform to Section 15852 or Manufacturer’s specifications immediately following the removal of hood from exhaust ventilation system.

3.2 INSTALLATION:

A. General:

1. Coordinate sequence of work with mechanical and electrical trades and laboratory casework and fixtures specified in Division 12.

2. The design consultant shall inspect fume hood for proper design and construction as specified in this Section prior to installation.
3. Hoods shall be located more than 10 feet from any door or doorway and should not be located on a main traffic aisle. Hoods shall be located in close proximity to where chemicals are stored, and should be located a minimum of 10 feet from any door or doorway or where interfering air currents and cross drafts from windows, high traffic areas, HVAC systems, or other apparatus, could adversely affect the proper function of the hood enclosure. Any source which decreases a hood’s containment ability or capture efficiency shall be mitigated.

3.3 FIELD QUALITY CONTROL:

A. Field Test:

1. Field test each unit after completion of installation to verify proper operation of hoods in accordance with specified requirements. Perform field tests in accordance with Section 7 of Scientific Apparatus Makers Association Standard LF-10. Submit field test results.

2. Notify EH&S, so that hood can be certified for safe operation at completion of the Project.

3.4 DEMONSTRATION:

A. Demonstrate use, cleaning and maintenance of fume hoods.

END OF SECTION 11610