



SECTION 11 53 13
LABORATORY FUME HOODS V1.1

1.01 FUME HOOD GENERAL DESIGN REQUIREMENTS

- A. Fume hoods shall function as ventilated, enclosed workspaces, designed to capture, confine and exhaust fumes, vapors and particulate matter produced or generated within the enclosure.
- B. Design fume hoods for consistent and safe air flow through the hood face. Negative variations of face velocity shall not exceed 20% of the average face velocity at any designated measuring point as defined in this section.
- C. Average illumination of work area: Minimum 80 foot-candles. Work area shall be defined as the area inside the superstructure from side to side and from face of baffle to the inside face of the sash, and from the working surface to a height of 28 inches.
- D. Fume hood shall be designed to minimize static pressure loss with adequate slot area and stainless steel exhaust collar configuration. Maximum average static pressure loss readings taken three diameters above the hood outlet from four points, 90 degrees apart, shall not exceed the following maximums.

Face Velocity	Measured S. P. L. (W.G)
100 F.P.M.	.30 inches
125 F.P.M.	.45 inches
150 F.P.M.	.60 inches

1.02 SUBMITTALS

- A. Shop Drawings: Indicate equipment locations, large-scale plans, elevations, and cross sections, rough in and anchor placement dimensions and tolerances and all required clearances.
- B. Product Data: Submit manufacturer's data for each component and item of laboratory equipment specified. Include component dimensions, configurations, construction details, joint details, and attachments, utility and service requirements and locations.
- C. Samples: Submit 3" x 6" inch samples of finish for fume hood, work surfaces and for other pre finished equipment and accessories for selection by Architect.
- D. Test Reports: Submit test reports verifying conformance to test performances specified. Submit independent tests as specified.

1.03 QUALITY ASSURANCE

- A. Single source responsibility: Fume hood casework, work surfaces, and other laboratory equipment and accessories shall be manufactured or furnished by a single laboratory furniture company.

B. Manufacturer's qualifications: Modern plant with proper tools, dies, fixtures and skilled worker to produce high quality laboratory casework and equipment, and shall meet the following minimum requirements:

1. Ten years or more experience in manufacturing of laboratory casework and equipment of type specified.
2. Ten installations of equal or larger size and requirements.

C. Installer's qualifications: Factory certified by the manufacturer.

1.04 DELIVERY, STORAGE AND HANDLING

A. Schedule delivery of equipment so that spaces are sufficiently complete that equipment can be installed immediately following delivery.

B. Protect finished surfaces from soiling or damage during handling and installation. Keep covered with polyethylene film or other protective coating.

C. Protect all work surfaces throughout construction period with 1/4" corrugated cardboard completely covering the top and securely taped to edges. Mark cardboard in large lettering "No Standing."

1.05 PROJECT CONDITIONS

A. Do not deliver or install equipment until the following conditions have been met:

1. Windows and doors are installed and the building is secure and weather tight.
2. Plumbing, overhead ductwork and lighting are installed.
3. All painting is completed and floor tile located below casework is installed.

2.01 FUME HOOD MATERIALS

A. Steel: High quality, cold rolled, mild steel meeting requirements of ASTM A366; gauges

B. Stainless Steel: Type 304 or 316; gauges

C. Ceiling closure panels: Minimum 18 gauge; finish to match hood exterior.

D. Bypass grilles: Low resistant type, 18 gauge steel, upward directional louvers.

E. Safety glass: 7/32" thick laminated safety glass.

F. Sash cables: 7 x 7 steel, coated, 1/8" diameter coated to 5/32".

- G. Sash guides: A full length extruded corrosion resistant polyvinyl chloride or powder coated steel with PVC guides to protect against metal to metal contact.
- H. Pulley assembly for sash cable: 2" diameter, steel construction, ball bearing type, with cable retaining device.
- I. Sash pull: Full width 16 gauge steel to match hood color.
- J. Interior access panels: To be made of the same material as the fume hood liner with an easily removable PVC gasket.
- K. Fastenings:
 - 1. Exterior structural members attachments: Sheet metal screws, zinc plated.
 - 2. Interior fastening devices concealed. Exposed screws not acceptable.
 - 3. Exterior panel member fastening devices to be corrosion resistant non-metallic material. Exposed screws not acceptable.

2.02 FUME HOOD CONSTRUCTION

- A. Superstructure: Rigid, self-supporting assembly of double wall construction, maximum 5-1/4" thick.
 - 1. Wall consists of a sheet steel outer shell and a corrosion resistant inner liner, and houses remote operating service fixture mechanisms and electrical services.
 - 2. Access to fixture valves concealed in wall provided by exterior removable access panels, gasketed access panels on the inside liner walls, or through removable front posts.
 - 3. Hoods must be of full frame construction. Hoods that use metal brackets and spacers to hold interior and exterior panel in place are unacceptable.
- B. Exhaust outlet: 10" round, 20 gauge stainless steel exhaust collars.
- C. Access opening perimeter: Top and sides of face opening to be radiused or angled.
 - 1. Bottom horizontal: foil shall be a flush-mount type and provide a 1" bypass to insure a clean sweep and to minimize eddies along the work surface when sash is in the closed position. For ADA fume hoods, a secondary containment trough with flush mount airfoil to be provided.
 - 2. Bottom sash rail: 1-1/2" frame section, 16-gauge steel or PVC. Provide pull, full width of bottom rail.
 - 3. Set safety glass into rails in deep form, extruded polyvinyl chloride or neoprene glazing channels if a steel sash frame is being used.

- 4 Counter balance system: Single weight, pulley, cable, counter balance system which prevents sash tilting by means of a shaft driven" system and permits one finger operation at any point along full width pull. Sash not using this type of counter balance systems are unacceptable. Maximum 9 pounds pull required to raise or lower sash throughout its full length of travel. Design system to hold sash at any position without creep and to prevent sash drop in the event of cable failure.
 - 5 Open and close sash against rubber bumper stops.
- D. Fume hood liner: 3/16" Polyresin: Reinforced polyester panel smooth finish and white color in final appearance. Flexural strength: 14,000 psi. Flame spread: 15 or less per U.L. 723 and ASTM E84-80.
- E. Baffles: Fabricate fixed baffles providing controlled air vectors into and through the fume hood of the same material as the liner. Hoods with adjustable baffles are unacceptable. All baffle support brackets to be non-metallic.
- F. Service fixtures and fittings: Color-coded hose nozzle outlets and valves mounted inside the fume hood and controlled from the exterior with color-coded index handles (when specified).
1. Valves: Rod-driven needlepoint type with self-centering cone tip and seat of hardened stainless steel.
 2. Provide pre-piping for all service fixtures from valve to common point for final connection by respective trades. 1/2" OD copper tubing for water, air, gas and vacuum. All type "L" copper connections & elbows are made with Vega Pro-Press fittings.
 3. Fixtures exposed to hood interior: Brass with chemically resistant powder coating
 4. Remote control handles: Prong type, easy to grasp.
 5. Services: To be determined by Consultant.
- G. Hood light fixtures: Two lamp, rapid start, T-8 UL listed fluorescent light fixture with sound rated ballast installed on top panel.
1. Interior of fixture: White, high reflecting plastic enamel.
 2. Size of fixture: Largest possible up to 48" for hoods with superstructures up to six feet. Provide two 24" fixtures for hoods with eight foot superstructures.
 3. Include lamps with fixtures.
 4. Illumination: Per performance values, part 1 of this section
 5. Provide switch with black acid resistant thermoplastic (when specified).

6. 3-way switch on each side of double sided hoods (when specified).
- H. Electrical services: Provide on each front post of hoods. Three wire grounding type receptacles rated at 120v GFI, 20 amperes where specified. Flush Plates: Black acid resistant thermoplastic.
- I. Work surfaces: 1-1/4" thick dished a nominal 1/4" to contain spills.
1. Molded resin work surfaces for hoods with white Resisto Roc or Poly-resin liners. Front raised edge no more than 1/2" wide.
- J. Safety Monitor/Alarm System: Provide safety Monitor/Alarm system that monitors face velocity and provides audible and visual alarm if face velocity drops below safe levels. The technology used in the TEL 500 will be based on thermally compensated thermistor based in the alarm module. As the internal fume hood pressure changes as the sash opening is closed and opened, the flow passing over the thermistor is calibrated to a face velocity that is displayed on the front of the monitor.
1. Safety monitor: UL listed, tamper proof, with all alarm circuits, electric components, external tubing, and manifolds furnished complete and factory installed. Monitor shall have light emitting diode display that provides clear indication of airflow conditions.
 2. Calibration is the responsibility of the owner and is required once the hood is stationed and the hood exhausts and room supply systems are balanced. A secondary calibration has been factory set into the alarm's memory only to determine that the alarm is functional and ready for shipment. The primary calibration must be completed in the field
 3. Airflow sensor: Thermally compensated glass beaded thermistor, factory connected to a sidewall port on the interior of the fume hood.
 4. Alarm Signal: Audible signal and visual, red light emitting diode:
 - a. Silence pushbutton, which disables the audible alarm, shall be accessible on the front of the safety monitor.
 - b. Provide alternate mode in which visible alarm is silenced indefinitely but visual alarm remains activated until the alarm condition is corrected.
 - c. When alarm condition is corrected and face velocity and volume return to specified levels, the Safety Monitor will automatically reset and begin routine monitoring.
 - d. Provide test circuit to verify proper Safety Monitor operation.
 - e. Electrical rating: Maximum 12 VDC, and maximum current rating of 20 OMA.
 - f. Provide an option for a sash alarm / sensor if required.
- 2.03 CEILING ENCLOSURE: Provide ceiling enclosure from top of hood to accommodate a ceiling height (verify). Fabricate enclosure from 18 gauge steel to match the hood material and finish.
- A. Preparation: Spray clean metal with a heated cleaner/ phosphate solution.
 - B. Application: Electro statically apply powder coat of selected color and baked in controlled high temperature oven to assure a smooth, hard satin finish. Surfaces shall have a chemical resistant, high grade laboratory furniture quality finish of the following thickness:

1. Exterior and interior surfaces exposed to view: 1.5 mil average and 1.2 mil minimum.

2.04 SOURCE QUALITY CONTROL

- A. Demonstrate fume hood performance by means of documentation of a third party testing company to the ASHRAE 110-1995 methods of testing.

FUME HOOD GLOSSARY OF TERMS

Airfoil: Shaped or streamlined member at hood entrance designed to enhance movement of air into the hood.

Air Volume: Rate of airflow, normally expressed in cubic feet per minute (CFM).

ASHRAE: American Society of Heating, Refrigerating, and Air Conditioning Engineers, a professional organization that sets industry standards for fume hood testing procedures.

Auxiliary Air: Supply or makeup air delivered external to the chamber of a fume hood to reduce air consumption.

Baffle: Panels located across back of hood interior, which control pattern of air moving through the hood.

Blower: Air moving device (or fan) consisting of motor, impeller, and scroll.

Bypass: Compensating opening that helps maintain constant volume exhaust from fume hood, regardless of sash position.

Canopy Hood: Ceiling or wall suspended ventilating device for noncritical use with heat, water vapor, odors, etc.

CFM: Cubic Feet Per Minute, a unit of measurement of air volume.

Combination Sash: Horizontal panels in a vertically rising frame; see *sash*.

Constant Volume: Type of fume hood exhaust system that exhausts the same volume of air, regardless of sash position.

Containment: Extent to which fumes are confined within the hood compartment.

Damper: Device installed in duct to control air volume.

Demonstration Hood: Fume hood with glass panels on two or three sides to improve visibility for demonstrating experiments in a classroom setting.



Exhaust Volume/Parameters: Quantity of air exhausted by the fume hood; quantity of air required to maintain desired face velocity, expressed in cubic feet per minute (CFM).

Face Velocity: Speed of air moving into the fume hood through the face opening (through the sash), measured in feet per minute (FPM).

FPM: Feet per minute; measurement of air velocity.

Liner: Fume hood interior sides, back, and top, including baffle. **Lintel:** Portion of fume hood front located above access opening

Louvers: Slit-like openings in the lintel that allow bypass air to enter the hood when the sash is closed.

NFPA: National Fire Protection Association.

Negative Pressure: Pressures lower than one atmosphere. **Positive Pressure:** Pressures higher than one atmosphere.

Restricted Bypass Fume Hood: Fume hood operating type, designed with limited bypass area; commonly used in conjunction with Variable Air Volume (VAV) exhaust systems and restricted sash opening designs.

Sash: Sliding glass panel set in the fume hood face that provides access to the hood interior.

Service Fitting/Plumbing: Water faucets and gas valves mounted on or fastened to the fume hood.

Static Pressure: Air pressure, or resistance, in duct, expressed in inches of water.

U.L. 1805: Underwriters Laboratories conformance to electrical, mechanical, and airflow standards.

Variable Air Volume (VAV): Type of fume hood system that typically maintains constant fume hood face velocity by adjusting blower motor speed damper in response to changes in sash position

Velocity: Speed of air, measured in feet per minute (FPM).

Velocity Pressure: Force per square inch applied by moving air.

Volume: Quantity of air, usually measured in cubic feet per minute (CFM).

Work Surface: Top material; area in fume hood where apparatus rests and where work takes place.