

SECTION 11610

LABORATORY FUME HOODS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Fiberglass bench-mounted fume hoods.
- B. Stainless steel radioisotope fume hoods with automatic by-pass air flow system for use with remotely-located motor/blower.
- C. Stainless steel perchloric acid fume hoods with automatic by-pass air flow system for use with remotely-located motor/blower.
- D. Fiberglass walk-in fume hoods with automatic by-pass air flow system for use with remotely-located motor/blower.

1.2 RELATED SECTIONS

- A. Section 11600 - Laboratory Equipment.
- B. Section 12351 - Laboratory Casework.
- C. Section 15400 - Plumbing.
- D. Section 16200 - Electrical.

1.3 REFERENCES

- A. AGA - American Gas Association.
- B. ANSI Z 9.5 - Laboratory Ventilation.
- C. ASHRAE 110 - Method of Testing Performance of Laboratory Fume Hoods.
- D. ASTM E 84 - Surface Burning Characteristics of Building Materials.
- E. CGA - Canadian Gas Association.
- F. NFPA 45 - Fire Protection for Laboratories Using Chemicals.
- G. SEFA 1 - Laboratory Fume Hoods.
- H. \_\_\_\_\_.

#### 1.4 SUBMITTALS

- A. Submit under provisions of Section 01300.
- B. Product Data: Manufacturer's catalog data, specification sheets, and product manuals.
- C. Shop Drawings: Prepared specifically for this project; show dimensions and interface with other products.
- D. Selection Samples: Hood exterior wall material, interior liner and baffle, epoxy work surface material, and front panel color chips.

#### 1.5 QUALITY ASSURANCE

- A. Maintain testing facility at manufacturer's place of business for testing and evaluating laboratory fume hoods under both ideal and adverse conditions, in accordance with ASHRAE Standard 110.
- B. Make manufacturing facility, testing facility, and quality control procedures available for owner inspection.
- C. Manufacturer Qualifications: Minimum 5 years manufacturing fume hoods as a principal product.

#### 1.6 DELIVERY, STORAGE AND HANDLING

- A. Deliver fume hoods, work surfaces, and accessories free of damage.
- B. Store and handle in a manner to prevent damage to fume hoods, work surfaces, accessories, or adjacent work.

#### 1.7 WARRANTY

- A. Warrant against defects in materials and workmanship on fume hoods, work surfaces, and accessories; include labor and replacement parts (except lamps).
- B. Warranty Period: One year from date of installation or two years from date of purchase, whichever is sooner.

## PART 2 PRODUCTS

### 2.1 MANUFACTURERS

- A. Acceptable Manufacturer: Provide products made by Labconco Corporation, 8811 Prospect, Kansas City, MO 64132. ASD. Tel: (816) 333-8811 or (800) 821-5525. Fax: (816) 363-0130.
- B. Requests for substitutions will be considered in accordance with provisions of Section 01600.
- C. Substitutions: Not permitted.
- D. Provide all laboratory fume hoods from a single manufacturer.

### 2.2 MANUFACTURED UNITS

- A. Fiberglass bench-mounted fume hoods.
- B. Stainless steel radioisotope fume hoods with automatic by-pass air flow system for use with remotely-located motor/blower.
- C. Stainless steel perchloric acid fume hoods with automatic by-pass air flow system for use with remotely-located motor/blower.
- D. Fiberglass walk-in fume hoods with automatic by-pass air flow system for use with remotely-located motor/blower.
  - 1. By-pass air flow design configuration.
  - 2. Auxiliary air flow design configuration.
  - 3. Vapor-proof electrical configuration.
  - 4. Explosion-proof electrical configuration.
  - 5. For use with remote blowers.
  - 6. For use with built-in blowers.
  - 7. No service fixtures.
  - 8. Remotely controlled service fixtures.
  - 9. Vertical-rising sashes.
  - 10. Horizontal sliding sashes.
  - 11. Combination horizontal/vertical sliding sashes.
  - 12. Size:
    - a. 4 foot (1.22 m): 47 inches wide, 59 inches high, 32-1/4 inches deep (1.19 x 1.50 x 0.82 m).
    - b. 5 foot (1.52 m): 59 inches wide, 59 inches high, 32-1/4 inches deep (1.50 x 1.50 x 0.82 m).
    - c. 6 foot (1.83 m): 70 inches wide, 59 inches high, 32-1/4 inches deep (1.78 x 1.50 x 0.82 m).

- d. 8 foot (2.44 m): 96 inches wide, 59 inches high, 32-1/4 inches deep (2.44 x 1.50 x 0.82 m).
13. Size:
- a. 4 foot (1.22 m): 47 inches wide, 59 inches high, 42-1/4 inches deep (1.19 x 1.50 x 1.07 m).
  - b. 5 foot (1.52 m): 59 inches wide, 59 inches high, 42-1/4 inches deep (1.50 x 1.50 x 1.07 m).
  - c. 6 foot (1.83 m): 70 inches wide, 59 inches high, 42-1/4 inches deep (1.78 x 1.50 x 1.07 m).
  - d. 8 foot (2.44 m): 96 inches wide, 59 inches high, 42-1/4 inches deep (2.44 x 1.50 x 1.07 m).
14. Size:
- a. 4 foot (1.22 m): 47 inches wide, 59 inches high, 32-1/4 inches deep (1.19 x 1.50 x 0.82 m).
  - b. 5 foot (1.52 m): 59 inches wide, 59 inches high, 32-1/4 inches deep (1.50 x 1.50 x 0.82 m).
  - c. 6 foot (1.83 m): 70 inches wide, 59 inches high, 32-1/4 inches deep (1.78 x 1.50 x 0.82 m).
15. Size:
- a. 5 foot (1.52 m): 59 inches wide, 95 inches high, 32-1/4 inches deep (1.50 x 2.41 x 0.82 m).
  - b. 6 foot (1.83 m): 70 inches wide, 95 inches high, 32-1/4 inches deep (1.78 x 2.41 x 0.82 m).
  - c. 8 foot (2.44 m): 96 inches wide, 95 inches high, 32-1/4 inches deep (2.44 x 2.41 x 0.82 m).

## 2.3 MATERIALS

- A. Sheet Steel: ASTM A 366.
- B. Stainless Steel: ASTM A 167, types as specified.
- C. Work Surfaces for Bench-Mounted Fume Hoods: Black epoxy resin.
- D. Floor Surfaces for Walk-In Fume Hoods: Black epoxy resin.

## 2.4 FINISHES

- A. Exterior Sheet Steel Surfaces: Properly prepared and coated, electrostatically applied.
  - 1. Hood Exterior: Epoxy coating, dry powder.
  - 2. Hood Front Panel: Baked-on dry powder epoxy coating, electrostatically applied; glacier white.
  - 3. Hood Front panel: Wet enamel overspray, color selected by Architect.
- B. Stainless Steel: Finishes as specified.

- C. Fiberglass Interior Liners and Baffles: Chemically-resistant white gel-coat, flame spread less than 25 per ASTM E 84.

## 2.5 COMPONENTS

- A. Hood Exteriors: Minimum 20 gage cold-rolled sheet steel.
- B. Hood Interior Liners: One-piece molded fiberglass reinforced polyester resin, minimum 3/16 inch (5 mm) thick, with coved corners; no interior access panels. (Maintenance performed from front of hood.)
- C. Baffles: Removable, tamper-resistant one-piece molded fiberglass reinforced polyester resin, minimum 3/16 inch (5 mm) thick.
- D. Hood Interior Liners, Baffles, and Work Surfaces: One-piece Type 304 stainless steel welded construction, minimum 20 gage, with 5 inch (127 mm) cupsink, coved corners, joints ground smooth and polished; no interior access panels. (Maintenance performed from front of hood.)
- E. Hood Interior Liners, Baffles, and Work Surfaces with Drain Trough: One-piece Type 316 stainless steel welded construction, minimum 20 gage, fully coved corner, bottom with drain trough at rear, joints ground smooth and polished; no interior access panels. (Maintenance performed from front of hood.)
  - 1. Provide baffles without slots or adjustment capability.
  - 2. Provide adjustment capability at upper edge of lower baffles.
  - 3. Provide other baffles without slots or adjustment capability.
- F. Corner Covers: 20 gage stainless steel, pre-punched and plugged to accommodate up to four service fixtures and two electrical boxes on each side.
- G. Hood Rear Exterior Panels: 16 gage galvanized sheet steel.
- H. Belled Entry Cones, Belled Exhaust Connection and Condensation Collection Rings: LS 8200 PVC(R) as manufactured by Georgia Gulf Company; include neoprene drain hose.
- I. Exhaust Connection Rings: Type 304 stainless steel.
- J. Duct Connections: Type 316 stainless steel.

- K. Hose Connectors: Injection molded PVDF - Kynar7.
- L. Hose Connectors: Chrome-plated brass.
  
- M. Hood Sashes: 3/16 inch (5 mm) thick tempered safety glass surrounded in an extruded polyvinyl chloride (PVC) frame.
- N. Sash Foils: 14 gage cold-rolled steel, epoxy coated.
- O. Hood Service Fixtures: 1/4 inch (6 mm) copper tubing, forged brass valves and seats, TFE-coated silicone bronze stem, TFE packing, and injection-molded PVDF 10-serration hose connectors.
  - 1. Fixture Handles: Anti-s snag, round plastic without projections; color-code and label for designated service.
  
- P. Gas Valves: AGA/CGA listed with tin-lined copper service lines.
- Q. Fluorescent Light Fixtures: Two-tube fixtures (tubes included).
- R. Incandescent Light Fixtures: Explosion-proof 100-watt, 115-volt, 50/60 Hz fixtures (bulbs included).
- S. Work Surfaces, Bench-Mounted Fume Hoods: 1-1/4 inches (32 mm) thick, 3/8 inch (10 mm) deep dished solid epoxy resin surface conforming to hood interior.
- T. Work Surfaces, Radioisotope Fume Hoods: Type 304 stainless steel, 1/4 inch (6 mm) deep dished seamless surface welded to hood interior, joints ground smooth and polished; provide supporting substrate to satisfactorily mount hood to base cabinet.
  - 1. Stainless steel cup sink, 5 inch (127 mm) diameter, left front, with 1-1/2 inch (38 mm) drain.
- U. Work Surfaces, Perchloric Acid Fume Hoods: Type 316 stainless steel, 1/4 inch (6 mm) deep dished seamless surface welded to hood interior, joints ground smooth and polished; provide supporting substrate to satisfactorily mount hood to base cabinet.
  - 1. Washwater drain trough at rear edge, with 2 inch (50 mm) drain connection at right end.
- V. Floor Surfaces: 1-1/4 inches (32 mm) thick surface conforming to hood interior.
- W. Work Surfaces, Walk-In Fume Hoods: 1-1/4 inches (32 mm) thick, with 6 inch by 3 inch (150 x 75 mm) oval cutouts to clear molded cup sinks.
  
- X. Removable Internal Support Bench (to convert hood for distillation use): 1 inch (25 mm) thick epoxy, 15 inches

(380 mm) high by 15 inches (380 mm) deep by internal width of fume hood.

Y. Distillation Grid: \_\_\_\_\_.

## 2.6 FABRICATION

- A. Fabricate bench-mounted fume hoods in one piece, double wall construction, epoxy coated cold-rolled steel exterior, gel-coated fiberglass reinforced polyester internal liner and baffle, able to pass through a 33 inch (0.84 m) opening without disassembly.
- B. Fabricate radioisotope fume hoods in one piece, double wall construction, epoxy coated cold-rolled steel exterior, type 304 stainless steel internal liner and baffle, joints welded and ground smooth, able to pass through a 33 inch (0.84 m) opening without disassembly.
- C. Fabricate perchloric acid fume hoods in one piece, double wall construction, epoxy coated cold-rolled steel exterior, type 316 stainless steel internal liner and baffle, able to pass through a 33 inch (0.84 m) opening without disassembly.
- D. Fabricate walk-in fume hoods as two individual assemblies, double wall construction, epoxy coated cold-rolled steel exterior, gel-coated fiberglass reinforced polyester internal liner and baffle, each assembly able to pass through a 33 inch (0.84 m) opening without further disassembly.
  1. Provide vertical rising 3/16 inch (5 mm) thick tempered safety glass sash framed with extruded polyvinyl chloride; epoxy-coated steel sash tracks; single counterbalance weight.
  2. Provide postless dual vertical rising sash of independent sash assemblies, 3/16 inch (5 mm) thick tempered safety glass framed with extruded polyvinyl chloride; epoxy-coated steel sash tracks; single counterbalance weight.
  3. Provide two horizontal sliding panels, 3/16 inch (5 mm) thick tempered safety glass sash, each framed with extruded polyvinyl chloride; epoxy-coated steel sash tracks; single counterbalance weight.
  4. Provide four horizontal sliding panels, 3/16 inch (5 mm) thick tempered safety glass sash, each framed with extruded polyvinyl chloride; epoxy-coated steel sash tracks; single counterbalance weight.

5. Combination Sash: Two horizontal sliding sashes in an epoxy coated vertical rising frame; single counterbalance weight.
  6. Combination Sash: Four horizontal sliding sashes in an epoxy coated vertical rising frame; single counterbalance weight.
- E. Fabricate by-pass fume hoods to minimize face velocity fluctuations as sash is raised or lowered.
1. Inflow velocity with sash positioned 6 inches (150 mm) above air foil: Not less than twice the selected full open face velocity, nor greater than three times that amount.
- F. Fabricate auxiliary-air fume hoods with by-pass air feature to minimize face velocity fluctuations as sash is raised or lowered.
1. Inflow velocity with sash positioned 6 inches (150 mm) above air foil: Not less than twice the selected full open face velocity, nor greater than three times that amount.
  2. Introduce auxiliary air above sash face as an integral part of hood superstructure with removable plenum air deflector.
  3. Provide up to a maximum of 50 percent ratio of auxiliary air to total air exhaust volume, as determined by the intended application.
  4. Measure exhaust air volume with sash fully open and auxiliary air off, to develop face velocity profile.
- G. Equip fume hoods with belled entry cones, complete with condensation collectors and drain tubes, providing for exhaust connection leading from fume cavity.
- H. Equip fume hoods with duct connections.
- I. Equip fume hoods with internal washdown systems to wash behind baffle, serviced by additional cold water valve and supply lines. Provide connection points, plugged upon delivery, for connecting to internal manifold for feed to duct system wash rings.
- J. Equip fume hoods with interchangeable lift-away side panels and removable front panels to access plumbing fixtures, electrical wiring, counterbalance sash weights, and lighting fixtures; access all services from front of hoods.
- K. Mount corner covers vertically on each side of hood sash openings to access plumbing lines and valve connections from front of hoods.



- L. Provide minimum 4 inch (100 mm) wide air foil directly across bottom of sash opening, allowing air to bypass underneath and sweep across work surface and preventing back flow of fumes at front of hood. Extend air foil back under sash to prevent closure of lower by-pass opening when sash is fully closed.
- M. Provide 1 inch (25 mm) high air passage directly across bottom of sash opening, allowing air to bypass underneath and sweep across floor surface and preventing back flow of fumes at front of hood.
- N. Counterbalance sash with a single weight suspended by two vinyl coated stainless steel cables passing through nylon ball bearing pulleys.
- O. Counterbalance each sash assembly with individual weights, each suspended by two vinyl coated stainless steel cables passing through nylon ball bearing pulleys.
- P. Counterbalance dual telescoping vertical-rising sash with a single weight for the top sash, dual weights for the bottom sash, suspended by two vinyl coated stainless steel cables passing through nylon ball bearing pulleys.
- Q. Provide four-piece horizontal sliding sash system in dual track.
- R. Service fixtures are not required.
- S. Provide four fixtures located inside fume hood cavity, capable of hot and cold water, natural gas, air, vacuum, nitrogen, argon, and low pressure steam services.
- T. Provide three fixtures located inside fume hood cavity, capable of hot and cold water, natural gas, air, vacuum, nitrogen, argon, and low pressure steam services.
- U. Provide six fixtures located inside fume hood cavity, capable of hot and cold water, natural gas, air, vacuum, nitrogen, argon, and low pressure steam services.
- V. Provide swing-type gooseneck cold water fixtures with vacuum breaker; mount over molded 6 inch by 3 inch (150 x 75 mm) cupsink with 1-1/4 inch (32 mm) standard drain connection.
  - 1. Left rear.
  - 2. Right rear.
  - 3. One at left rear and one at right rear.
- W. Orient hose connectors to the rear of fume hoods.
- X. Orient hose connectors to be readily accessible without exposing operator's breathing zone to fume hood interior.
- Y. Completely pre-plumb services using 1/4 inch (6 mm) tin-lined copper tubing for upper right-hand gas fixture, 3/8

inch (10 mm) copper tubing for cold water gooseneck fixtures, 1/4 inch (6 mm) copper tubing for other fixtures.

- Z. Provide minimum 66 inch (1.67 m) feed lines to service fixtures.
- AA. Provide fluorescent light fixture located behind tempered glass safety shield, serviceable from outside fume hood cavity. Include light switch, blower switch, and all internal wiring to circuit junction boxes located in upper right and/or left front of plenum area.
- BB. Provide two fluorescent light fixtures located behind tempered glass safety shield, serviceable from outside fume hood cavity. Include light switch, blower switch, and all internal wiring to circuit junction boxes located in upper right and/or left front of plenum area.
- CC. Provide incandescent light fixture without internal wiring, switches, or receptacles.
- DD. Provide two incandescent light fixtures without internal wiring, switches, or receptacles.
- EE. Provide three incandescent light fixtures without internal wiring, switches, or receptacles.
- FF. Provide one 115-volt, 3-wire polarized and grounded electrical duplex receptacle mounted in right corner cover assembly; wire to separate electrical circuit.
- GG. Provide two 115-volt, 15-amp, 60 Hz electrical duplex receptacles, one mounted on each side; wire receptacles to separate electrical circuits.
- HH. Provide one 115-volt, 3-wire polarized and grounded electrical duplex receptacle mounted in right corner cover assembly and one 230-volt 10-amp receptacle mounted on right side; wire receptacles to separate electrical circuits with 230-volt receptacle sheathed in flex conduit coiled in the plenum without junction box.
- II. Provide two 115-volt, 3-wire polarized and grounded electrical duplex receptacles, one mounted in each corner cover assembly; wire receptacles to separate electrical circuits.
- JJ. Provide work surfaces with cutout relief holes for passage of service utility lines.
- KK. Provide vent holes at rear edge of work surfaces for connection to provision for venting of acid or solvent storage cabinets.
- LL. Provide floor surfaces with cutout relief holes for passage of service fixture lines.
  - 1. Quantity: One.

2. Quantity: Two.
- MM. Provide 6 inch by 3 inch (150 by 75 mm) oval epoxy cupsinks in work surfaces, each with 1-1/2 inch (38 mm) drain connection.
1. Quantity: One.
  2. Quantity: Two.
  3. Quantity: \_\_\_\_\_.
- NN. Factory-modify fume hoods to include bypass block, sash position alarm, and sash stop(s) to conserve air loss.
- OO. Provide face velocity alarms to monitor hood performance, for factory or field installation.
- PP. Provide fire suppression system for installation in fume hood interior.

### PART 3 EXECUTION

#### 3.1 EXAMINATION

- A. Verify equipment rough-in before proceeding with work, including rough opening dimensions required for fume hood installation.
- B. Coordinate with other trades for proper installation of plumbing and electrical services.

#### 3.2 INSTALLATION

- A. Install in accordance with manufacturer's instructions; comply with standards required by authorities having jurisdiction.
- B. Install equipment plumb, square, and straight, without distortion; securely anchor.
- C. Schedule installation to ensure that utility connections are achieved in an orderly and expeditious manner.
- D. Demonstrate fume hood operations and functions to Owner at completion of installation.

#### 3.3 ADJUSTING AND CLEANING

- A. Adjust operating equipment, with the exception of air moving equipment, to provide efficient operation for intended use and as required by manufacturer.
  - 1. Vertical-Rising Sashes: Operate smoothly without tilting when raised or lowered from either end; remain at rest in any open position.
  - 2. Horizontal Sliding Sashes: Operate smoothly without binding.
- B. Clean equipment, casework, countertops, and other surfaces as recommended by manufacturer, rendering work in new and unused appearance.
- C. Clean adjacent construction and surfaces soiled in the course of installation of this work.
- D. Touch up minor damaged surfaces caused by installation. Replace damaged components as directed by Architect.

#### 3.4 PROTECTION

- A. Provide protective measures to prevent equipment and surfaces from exposure to other construction activity.

END OF SECTION