

# **SECTION 11 53 13**

(FORMERLY 11610)

## LABORATORY FUME HOODS

### **PART 1 – GENERAL**

#### **Summary:**

This Specification identifies the minimum material and construction standards that are required to deliver a quality installation of laboratory fume hoods. Fume hoods shall be supplied in accordance with the requirements of this Specification. The fume hoods identified in this Specification shall include the miscellaneous metal panels and other related components as identified on the Drawings and that are necessary for the complete installation.

Hoods shall function as ventilated, enclosed work spaces, designed to capture, confine and exhaust fumes, vapours and particulate matter produced or generated within the enclosure.

#### **1.1 SECTION INCLUDES**

- A. Laboratory Fume Hoods

#### **1.2 RELATED SECTIONS**

- A. Division 09 Section 65 13, “Resilient Base and Accessories”
- B. Division 12 Section 36 00, “Countertops”
- C. Division 12 Section 35 53, “Manufactured Metal Casework
- D. Division 12 Section 32 00, “Manufactured Wood Casework”
- E. Division 13 Section 21 00, “Controlled Environment Rooms”
- F. Division 22 Section 40 00, “Plumbing Fixtures”
- G. Division 23 Section 30 00, “HVAC Air Distribution”
- H. Division 26 Section 05 00, “Common Work Results for Electrical”
- I. Related Work To Be Performed By Others:
  - 1. Final installation of all plumbing, service and electrical fixtures attached to fume hood or countertop (excluding piping and wiring within fume hoods).
  - 2. Final connection to service lines of all plumbing, service and electrical fixtures attached to laboratory casework or fume hoods.

#### **1.3 REFERENCES**

- A. SEFA 1-2002: Laboratory Fume Hoods – Design, Materials, Use and Testing Guidelines  
Science Equipment and Furniture Association (SEFA)
- B. ISO 9001:2008 – Quality Management  
International Standards Organization (ISO)
- C. ADA (ATBCB ADAAG) Americans with Disabilities Act Accessibility Guidelines  
Americans with Disabilities Act (ADA)

#### 1.4 SUBMITTALS

Refer to Section 01 33 00, "Submittal Procedures," for requirements, procedures, etc.

##### A. Product Data:

1. Drawings shall include data and details for construction of the laboratory fume hoods as well as information regarding the name, quantity, type and construction of materials (such as hardware, gauges, etc), that will be used to complete the project.

##### B. Shop Drawings:

1. The laboratory casework manufacturer shall furnish shop drawings illustrating the layout and placement of all laboratory casework and fume hoods as well as any products included in this section.
2. Indicate the type and location of all service fittings and associated supply connections.
3. Preparation instructions and recommendations.
4. Storage and handling requirements and recommendations.
5. Installation methods.

##### C. Selection Samples:

Submit the following:

1. One complete set of color chips representing the manufacturer's full range of available colors. Minimum sample size 2 inches by 3 inches (50mm x 76mm).

##### D. Quality Assurance/Control

1. Design Data/Test Reports: Manufacturer shall submit test data and design criteria which are in compliance with the project specifications.
2. Performance: Fume Hoods, Sigma Systems "Pro" model, shall be designed to meet or exceed the American Standard for Laboratory Ventilation and the American Industrial Hygiene Association standard as described in ANSI/AIHA Z9.5. This standard of performance shall be verified through factory testing in accordance with the established protocol as set out by the ANSI/ASHRAE 110 standard.

3. Certificates: All certifications required in the specifications shall be submitted with the original submittal package under separate cover. Certificates must be provided with the signature of a qualified individual of the supplier.
4. Manufacturers' Instructions: Provide manufacturer's instructions for installation and maintenance of all products provided and installed within this section. Instructions will be in bound form, tabbed and organized by section number.
5. Submit copy of the corrosion resistant label to be attached to the fume hood exterior with condensed information covering recommended locations for apparatus and accessories.

## **1.5 QUALITY ASSURANCE**

### **A. Manufacturer Qualifications:**

1. The following list of information will be provide to the Architect at least ten (10) days prior to the bid opening:
  2. List of manufacturing facilities;
  3. Manufacturer of fume hoods shall have the capability within their facility of performing fume hood tests based on the latest ANSI/ASHRAE Specification 110.
  4. A list of ten (10) installations of comparable stature completed within the past 5 years;
  5. Construction details depicting the materials, sizes and methods of construction;

### **B. Mock-Ups**

1. Area mockups shall be as indicated on the shop drawings. Post bid mockup areas must be priced for disassembly and reassembly and used within the project.
2. Do not proceed with remaining work until installation is approved by Architect.
  - a) Install base cabinet with specified hardware.
  - b) Install fume hood with specified fixtures.

## **1.6 DELIVERY, STORAGE AND HANDLING**

### **A. Packaging, Shipping, Handling and Unloading**

1. Packaging: Products shall have packaging adequate enough to protect finished surfaces from soiling or damage during shipping, delivery and installation.
2. Delivery: Fume hood delivery shall only take place after painting, utility rough-ins and related activities are completed that could otherwise damage, soil or deteriorate fume hoods in installation areas.
3. Handling: Care, such as the use of proper moving equipment, experienced movers, etc., shall be used at all times to avoid damaging the fume hoods. Until installation takes place, any wrapping, insulation or other method of protection applied to products from the factory will be left in place to avoid accidental damage.

**B. Acceptance at Site:**

1. Fume hoods will not be delivered or installed until the conditions specified under Part 3, Installation section of this document have been met.

**C. Storage:**

1. Fume hoods shall be stored in the area of installation. If, prior to installation, it is necessary for the fume hoods to be temporarily stored in an area other than the installation area, the environmental conditions shall meet the environmental requirements specified under the Project Site Conditions article of this section.

**D. Waste Management and Disposal:**

1. The supplier of the laboratory fume hoods are responsible for removing any waste or refuse resulting from the installation of, or work pertaining to laboratory fume hoods; thereby leaving the project site clean and free of debris. Trash container(s) to be provided by others.

## 1.7 PROJECT SITE CONDITIONS

- A. Building must be enclosed (windows and doors sealed and weather-tight);
- B. An operational HVAC system that maintains temperature and humidity at occupancy levels must be in place;
- C. Adjacent and related work shall be complete;
- D. Ceiling, overhead ductwork and lighting must be installed;
- E. Site must be free of any further construction such as "wet work";
- F. Required casework must be installed accurately and the project must be ready for fume hood installation.

## 1.8 WARRANTY

- A. Furnish a written warranty that Work performed under this Section shall remain free from defects as to materials and workmanship for a period of two (2) years from date of shipment. Defects in materials and workmanship that may develop within this time are to be replaced without cost or expense to the Owner.

Defects include, but are not limited to:

1. Ruptured, cracked, or stained coating
2. Discoloration or lack of finish integrity
3. Cracking or peeling of finish
4. Slippage, shift, or failure of attachment to wall, floor, or ceiling
5. Weld or structural failure

6. Warping or unloaded deflection of components
  7. Failure of hardware
- B. The warranty with respect to products of another manufacturer sold by Mott Manufacturing is limited to the warranty extended by that manufacturer to Mott Manufacturing.

## **PART 2 – PRODUCTS**

### **2.1 MANUFACTURER**

**A. Acceptable Manufacturer:**

Mott Manufacturing Ltd.; 452 Hardy Rd. Brantford, ON, Canada N3T 5L8. Tel: (519) 752-7825.  
Fax: (519) 752-2895. Email: [inquire@mott.ca](mailto:inquire@mott.ca), [www.mott.ca](http://www.mott.ca).

**B. Substitutions:**

Must meet all specification requirements and have prior approval.

**C. Requests for substitutions:**

All requests will be considered in accordance with provisions of Section 01 60 00.

### **2.2 FUME HOOD MATERIALS**

**A. Basic Materials**

*NOTE: A complete list of basic materials is provided here. Not all models use all materials listed.*

1. Exterior Panels Framing Members, and Furring Panels: Cold rolled and levelled mild steel and shall conform to ASTM A1008/A1008M, finished as in Para. 2.4.
2. Screws: Interior fastening devices; stainless steel screws complete with corrosion resistant plastic caps.
3. By-Pass Grilles: 18 Ga (1.2mm) thick mild steel directionally louvered upward, finished same as exterior panels.
4. Lower Foil: For hoods, form using 14 Ga (1.9mm) Type 316-4 stainless steel.
5. Safety Glass: Laminated type 6mm (1/4") thick as per Section 11 53 00.
6. Sash guides: Track shall be corrosion resistant polyvinyl chloride (PVC).
7. Sash Cable: 3/32" (2mm) stranded stainless steel 7 x 19 construction.
8. Sash Chain: #35 hardened
9. Sprocket system for Sash Chain: Hardened sprockets with one full width shaft per sash running in ball bearings.
10. Sash Pull: Type 316, 18 Ga (1.2mm) thick stainless steel with an AISI #4 satin finish.

11. Pulley Assembly For Sash Cable: 1-1/2" (38mm) diameter nylon rim, ball bearing roller, with cable retaining device. Provide interior access panels on both sides, and secure using special moulded white vinyl gasket designed to be removed and reinstalled without use of special tools.
12. Baffle support brackets: Same material as hood lining.
13. Duct Stubs: Bell shaped Type 316, 18 Ga (1.2mm) stainless steel.
14. Light Switches: Light switches shall be black in color, commercial spec grade or higher and shall be UL and CSA approved.
15. Electrical receptacles: Electrical receptacles shall be black in color, commercial spec grade or higher and shall be UL and CSA approved.
16. Cover Plates: Electrical cover plates shall be black in color, nylon and UL and CSA approved.
17. Fluorescent Fixture: Fixture shall be two tube rapid start or better. Energy saving cool white T8 lamps shall be provided. Ballast shall be sound rated to limit noise.

#### **B. Fume Hood Liner**

1. **Perchloric Acid type:** Hood linings and baffles shall be Poly Vinyl Chloride of 1/4" (6mm) thickness with radiused corners. Final appearance shall be smooth and white in colour.
2. Perchloric Stainless steel (optional):
  - a) 18 ga (1.2mm) 316 stainless steel with a number 4 finish. Inside corners shall be covered with a nominal 3/4" (19mm) radius. All joints in liner shall be butt welded using the TIG process. Welds shall be blended and polished to match the finish of adjacent material. Baffles and wash down trough shall be of the same material. Hood work surface and trough shall be an integral part of the hood lining.

#### **C. Fume Hood Furring Panels**

1. Where called for, provide matching furring panels to enclose the space between top edge of fume hoods and the finished ceiling.
2. Panels shall be flanged, notched and reinforced where required to form a well-fitted enclosure, free from oilcanning. Secure panels using cadmium-plated, self-tapping screws; panels shall be removable for maintenance purposes.
3. Finish shall match fume hood to which it is connected.

### **2.3 FUME HOOD CONSTRUCTION**

- A.** Fume hood superstructure shall be double wall construction consisting of an outer shell of sheet steel and an inner hood liner. Double wall shall house and conceal steel framing members,

attaching brackets and remote operating service fixture mechanisms. Overall double wall thickness; 4-3/4" (121mm) maximum.

- B. Front double-wall posts shall be pre-punched to accept up to 5 plumbing fittings per side, two electrical duplex outlets, light switch and optional monitor alarm where indicated on drawings. Electrical outlets and light switch shall be factory-wired and terminate at a junction box on roof of hood. All electrical components shall be UL listed/classified.
- C. Exterior panel members shall be fastened by means of concealed devices. Exposed screws are not acceptable.
- D. Provide access to remote-controlled fixture valves concealed between walls through removable panels on hood exterior. Assemble hood superstructure, fasten and connect inner and outer frame into a rigid self supporting entity.
- E. Install fluorescent lighting fixture on exterior of roof. Provide a 6mm (1/4") safety glass panel on hood "roof", sealed to isolate the lighting fixture from fume chamber. The 2-lamp fixture in each hood shall be largest possible for fume hood size. Average interior illumination levels within the fume chamber shall be 80 foot candles minimum. Finish fixture interior with white baked enamel.
- F. Fume hood sash(s) shall be full view type providing a clear and unobstructed side to side view of fume hood interior. Sash shall be laminated safety glass set into extruded polyvinyl chloride guide. Bottom and side sash rails shall be 18 Ga (1.2mm) stainless steel. Glass shall be set into rails with PVC glazing channel. Bottom rail shall be an integral, formed, full width, flush pull and shall be anchored on each side to sash cables at bottom. A single weight, pulley, cable, counter balance system shall be used for vertical operation of sash and prevent jamming to permit one finger operation at any point along full width sash pull and to maintain sash at any position without creep. Sash system shall be designed to prevent sash drop in the event of cable failure. Superstructure shall have a single sash and counter balance system. Sash shall open and close against rubber bumper stops. Floor mounted hoods shall be equipped with two vertically rising sashes in two tracks. Normal operation shall be with only one sash open. Both sashes shall be opened for set-up and teardown only.
- G. Fume hood sash shall be full view type providing a clear and unobstructed side to side view of fume hood interior. Sash shall be laminated safety glass set into extruded polyvinyl chloride guide. Bottom and side sash rails shall be 18 Ga (1.2mm) stainless steel. Glass shall be set into rails with PVC glazing channel. Bottom rail shall be an integral, formed, full width, flush pull and shall be anchored on each side to chains at bottom. A single weight, chain, bearing and shaft, counter balance system shall be used for vertical operation of sash and prevent jamming to permit one finger operation at any point along full width sash pull. Sash system shall be designed to prevent sash drop in the event of chain or cable failure. Superstructure shall have a single sash and counter balance system. Sash shall open and close against rubber bumper stops.
- H. Fume hood sash shall be a combination Vertical / Horizontal sash. Vertically rising frame shall be of stainless steel construction grade 316 or better. Horizontal sliding panels shall be 6mm (1/4") laminated safety glass with integral ground-in pulls. Sides of horizontal panels shall be protected with snap-on plastic edge guard. Horizontal sliding panels shall ride on rollers in an extruded aluminium bottom and top track with positive locking system to prevent inadvertent removal. Sash counterbalance mechanism shall be either chain or cable as required in main hood specification. Fume hoods shall also be equipped with a fixed panel located nominally 1" (25mm) behind the sash plane, covering the space between the interior roof of the fume hood and the upper edge of

the sash frame. 1" (25mm) space shall be left open to provide downwardly vectored by-pass air, thus reducing dead space behind closed sash.

- I. Hood shall be constant volume type with a built in automatic compensating by-pass to maintain constant exhaust volume regardless of sash position. By-pass shall be positive in action, and controlled by louvered panel in the area immediately above the top portion of the sash when closed. As the sash is lowered, the by-pass design limits the increase in face velocity to a maximum of 4-1/2 times average face velocity as measured with the sash fully open.
- J. Perimeter of sash opening shall have a lower air foil and streamlined shape side and top with angled opening toward hood interior. Air shall enter under the bottom horizontal foil through a nominal 1" (25mm) by-pass when the sash is in the closed position. Bottom foil shall be removable without the use of special tools. Sash shall close on air foil. Floor mounted hoods shall not be equipped with a lower airfoil. A one inch gap shall be provided to prevent vapour build-up behind closed lower sash.
- K. Three-piece main baffles shall provide controlled air vectors into and through the fume hood and be fabricated of the same material as the liner. Provide exhaust slots on the full perimeter of baffles, with top slot adjustable. A fixed, permanently-open, horizontal slot located at 31-1/2" (800mm) above the work surface shall be provided at the overlapping mid-point of the main baffles
- L. For safety, fume hood shall maintain essentially constant exhaust volume at any baffle position. Changes in average face velocity and exhaust volume as a result of baffle adjustment shall not exceed 5% for any baffle position at the specified face velocity.
- M. Design fume hoods to minimize static pressure loss with adequate slot area around the baffle and the bell shaped exhaust collar configuration. Measured average static pressure loss reading taken three diameters above the hood outlet from four points, 90° apart, shall not exceed the following values based on 60" (1524mm) wide hood:

<u>Face Velocity</u>		<u>Measured Static Pressure Loss</u>	
75 F.P.M.	(0.38 m/s)	0.15"	(45.8 Pa)
100 F.P.M.	(0.51 m/s)	0.20"	(87.1 Pa)
125 F.P.M.	(0.64 m/s)	0.25"	(136.9 Pa)

- N. Hood shall be designed and constructed to provide a water wash down system. Integral work surface shall have a raised edge at the front and a full width trough with drain connection at the rear. Wash down pipe shall be located behind the upper baffle with a minimum of 3 and a maximum of 5 spray nozzles dependant upon hood width. Spray nozzles shall be directed upward. System shall include a control valve and associated internal piping.
- O. Electrical convenience duplex outlets shown mounted on the face of fume hoods shall be installed in front posts and pre-wired to a junction box mounted on top of fume hood superstructure. Electrical devices shall be UL classified/listed.
- P. Bottom slot covered with stainless steel screen. Screen to be mounted horizontally behind baffle as low as possible. Screen to be 3/4" (19mm) x 3/4" (19mm) 18 ga pattern.
- Q. The minimum sash height shall be 36" (915mm) with a 6" (152mm) clear static panel mounted at the top of the sash.



- R. Attach corrosion resistant labels to units as specified in Para. 1.4.D.4

## **2.4 FUME HOOD EXTERIOR FINISH**

- A. Coating Performance data is available in Appendix 1

## **2.5 AIR FLOW MONITOR / ALARM**

- A. TEL AFA 1001 Mk3 digital airflow alarm or equivalent shall be provided.

# **PART 3 – EXECUTION**

## **3.1 INSTALLATION**

- A. In addition to requirements of Section 11 53 13, install fume hoods in positions shown, align and set level with levelling devices.
- B. Work in close cooperation with allied trades installing ductwork, wiring and other services.
- C. Apply small bead of sealant to junction of fume hood counter top and adjacent hood liner.
- D. Turn over to Mechanical Trades, service fitting remote control rods and valves for installation to fume hood superstructure and service lines.

**END OF SECTION**