SECTION 11 53 13
(FORMERLY 11610)

OBSERVATION2 PLUS STYLE GLASS WALLED 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 workspaces, designed to capture, confine and exhaust fumes, vapours and particulate matter produced or generated within the enclosure. Observation2 Plus fume hoods are not suited to highly corrosive situations.

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 - 2020: Laboratory Fume Hoods – Design, Materials, Use and Testing Guidelines
Science Equipment and Furniture Association (SEFA)

B. ISO 9001:2015 – Quality Management
International Standards Organization (ISO)

C. ADA (ATBCB ADAAG) Americans with Disabilities Act Accessibility Guidelines Americans with Disabilities Act (ADA)

D. ANSI/ASHRAE: (American National Standards Institute - American Society of Heating, Refrigerating and Air Conditioning Engineers) 110, 2016 Methods of Testing Performance of Laboratory Fume Hoods

E. UL 1805: Underwriters Laboratories requirements for ducted fume hoods

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: [Delete if colors have already been selected]**
1. One complete set of color chips representing the manufacturer's full range of available colors. Minimum sample size 2 inches by 2-1/2 inches (50mm x 64mm).

D. **Quality Assurance/Control**
1. Design Data/Test Reports: Manufacturer shall submit test data and design criteria which follow the project specifications.

2. Performance: Fume Hoods, "Observation2 Plus" 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. UL 1805 listed fume hood requirements as specified and tested.

4. 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.

5. Manufacturers' Instructions: Provide manufacturer's instructions for installation and maintenance of all products provided and installed within this section.

6. 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 provided 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 (5) installations of comparable stature completed within the past 5 years.

5. Construction details depicting the materials, sizes and methods of construction.

B. Mock-Ups [Delete section if project size doesn't warrant taking mock-up precaution]

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 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 always be used 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 is 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.

   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:**
   a. Mott Manufacturing Ltd.as distributed by **New England Lab**® (NEL).
      i. Boston Corporate Offices - 1 Arrow Drive Woburn, MA 01801
         1. (888) 635-2080
      ii. Baltimore Office - 2707 N. Rolling Road Suite 110 Baltimore, MD 21244
         1. (410) 944-7060
      iii. North Carolina Office - 2175 Presidential Drive Suite 130 Durham, NC 27703
         1. (919) 469-8054
      iv. For pricing - info@newenglandlab.com
      v. For product questions – Rand Weyler - rand@newenglandlab.com

B. **Substitutions:**
   Must meet all specification requirements and have prior approval.

C. **Requests for substitutions:**
   All requests will be considered in accordance with the provisions of Section 11 53 13.

2.2 FUME HOOD MATERIALS

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

1. Exterior Panels Framing Members, and Furring Panels: Cold rolled and leveled mild steel and shall conform to ASTM A1008/A1008M, finished as in Para. 2.4. Optional 316 stainless steel is also available.

2. Screws: Interior fastening devices; stainless steel screws.

3. By-Pass: 18 Ga (1.2mm) thick mild steel downward directional, finished same as exterior panels.

4. Upper front panel: to be 20 Ga (0.9mm) thick mild steel powder coated that is removed without the use of tools and doesn't have any exposed screws.

5. Lower Foil / Flush Sill: Type 316-4 stainless steel powder coated.

6. Safety Glass: All glass panels shall be laminated type ¼" (6mm) thick.

7. Angled Baffles:
    a. Single sided hoods: removable 3/16" thick fiberglass reinforced polyester thermoset resin. Final appearance shall be smooth and white in color. Hoods with glass rear viewing windows shall be 5/32" tempered safety glass, complying to ASTM C1048 standards, Type 1, Class 1, Kind FT.

    b. Double sided hoods: removable 5/32" tempered safety glass, complying to ASTM C1048 standards, Type 1, Class 1, Kind FT.

8. Sash guides: Track shall be corrosion resistant polyvinyl chloride (PVC).

9. Sash Chain: #35 hardened.

10. Sash Pull: Type 316, 18 Ga (1.2mm) thick stainless steel with an ANSI #4 satin finish.

11. Sprocket System for Sash Chain: Sprockets with one full width shaft per sash running in ball bearings.

12. Duct Stubs: Rectangular Type 316, 18 Ga (1.2mm) stainless steel.

13. Light Switches: Light switch shall be combination style with one NEMA 5-20R receptacle, white in color, commercial spec grade or higher and shall be UL and CSA approved and shall located in the left side post.

14. Electrical receptacles: Electrical receptacles shall be white combination style with two NEMA 5-20R receptacles and two USB charging receptacles in each, and be UL and CSA approved and shall be located in the bottom of the right-side post.

B. **Fume Hood Interior**
1. Interior shall be powder coated 18 Ga. galvanized or galvannealed mild cold rolled steel to match the rest of the fume hood. Optional 316 stainless steel liner is also available.

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 oil canning. Panels shall be held in place with hidden snap clips and shall be easily removable for maintenance purposes. Exposed screw heads are not acceptable.

3. Finish shall match fume hood to which it is connected.

2.3 FUME HOOD CONSTRUCTION

A. Units may be double or single chamber. Single-face fume hoods shall have a sloped sash (optional combination sash). Double-face fume hoods shall have both sashes sloped (optional combination sashes). Specification applies to both single-faced and a double-faced hood however only reads as single-faced for clarity.

B. Bottom/Side walls shall be designed to accept service outlets.

C. Interior members shall be fastened by means of exposed and concealed screws.

D. Exterior members shall be fastened by means that conceal all screws. Exposed screws are not acceptable. Snap-off top panel, and front post covers shall be easily removable with the use of simple hand tools.

E. Provide access to remote-controlled front load fixture valves through front post and interior removable panel. A maximum of four plumbing fixtures shall fit in each post and shall ship pre-plumbed from the factory using 3/8" OD cross linked polyethylene tubing with the exception of natural gas which shall be stainless steel tubing. Remote-controlled ball type or rod type valves must be mounted below the hood. Ball type or rod type fixtures will not ship pre-plumbed from the factory.

F. Front posts shall be 3" wide and 4-1/2" deep to maximize sash width and side wall recessed area.

[OPTIONAL]

Observation2 Plus fume hoods are available with both glass or solid side and rear viewing windows. Rear viewing window with removable tempered glass back viewing baffles; the glass baffles lift off for cleaning.

G. LED Light Fixture: Light located in the roof of the hood shall include a LED module and driver combination and provide 5900 lumens with a color temperature of 4000k with a nominal width of 22". One light on each hood up to 6 feet wide and two lights on each hood 8 feet wide shall be provided. Light(s) shall be isolated from the fume chamber by 6mm (0.236") thick safety glass sealed to the liner using a chemically resistant adhesive. Average interior illumination levels within the fume chamber shall be 80 foot-candles minimum. Efficiency of light shall be 120 lumens per watt, and life expectancy of 50,000 hours.

[OPTIONAL]

Light shall be dimmable if provided with optional 0-10v dimmer switch and shall be included in the UL classification for the fume hood.

[OPTIONAL]

A. Hood sash shall raise vertically into an enclosure box to assure a leak free chamber.

B. Fume hood sash shall be vertical rising full view type providing a clear and unobstructed side to side view of fume hood interior. Sight line into the hood shall be a minimum of 35" (865mm) above the work surface. Sash shall be laminated safety glass **[OR]** tempered safety glass. Bottom and side sash rails shall be 18 Ga (1.2mm) powder coated stainless steel. Bottom rail shall be an integral, formed, full width, flush pull and shall be anchored on each side to sash chains at bottom. Counterbalance system using weights, chains, bearings and shaft 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 chain failure. Superstructure shall have a single sash and counterbalance system. Sash shall open and close against rubber bumper stops.

[OR]

Vertical Rising Combination Sash: Fume hood sashes shall be full view combination vertical rising, and horizontal sliding type providing a clear and unobstructed side to side view of fume hood interior. Sight line into the hood shall be a minimum of 35" (865mm) above the work surface. Horizontal sliding panels shall be 6mm (1/4") safety glass not greater than 18" (460mm) wide. Sides of horizontal glass panels shall be ground and polished. Horizontal sliding panels shall ride on nylon tired steel ball bearing rollers in top track and be contained in an extruded aluminium bottom track with positive locking system to prevent inadvertent removal. Sash frame shall be powder coated and manufactured from 16 Ga (1.5mm) stainless tube and stainless sheet to provide a rigid frame. Bottom rail shall be an integral, formed, full width, flush pull and shall be anchored on each side to sash chains at bottom. Counterbalance system using weights, chains, bearings and shaft 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 chain failure. Superstructure shall have a single sash and counterbalance system. Sash shall open and close against rubber bumper stops.

[OPTIONAL]

Keyed sash lock shall be capable of locking the sash in the vertically closed position.

C. Self-Closing sash: A mechanism shall be provided which automatically lowers the sash to the chosen working height (height shall be specified at time of order). A latch shall also be provided to hold the sash fully open for setup/teardown of experiments. Below the chosen working height, the sash shall be neutrally balanced and function as a conventional sash.

D. 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 shaped 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.

[OR]

Optional Restricted Bypass (VAV use): Dual exhaust collar and single-face models only - Standard front panel shall be supplemented by the addition of a panel behind the by-pass panel area. Panel shall be made of the same material as the hood interior.

E. Perimeter of sash opening shall have a lower air foil and streamlined shape sides and top with radius openings toward hood interior.

F. Air shall enter under the bottom flush sill 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 flush sill.

G. The rear angled baffles shall provide controlled air vectors into and through the fume hood.

H. Design fume hoods to minimize static pressure loss with adequate slot area around the baffle and the rectangular shaped exhaust collar configuration. Measured average static pressure loss reading taken above the hood duct collar, shall not exceed the following values based on 60" (1524mm) wide hood:

Face Velocity	Measured Static Pressure Loss
100 F.P.M. (0.51 m/s)	0.40
60 F.P.M. (0.30 m/s)	0.35

I. Airflow Requirements: Observation2 Plus fume hood is designed to function with the following exhaust volumes. Double-faced units would exhaust double the volumes noted below.

Single-Faced Exhaust Parameters	100 FPM 18"Sash Opening		60 FPM 18" Max Sash Opening		100 FPM Combo Sash Open Horizontally Only	
Hood Size	**CFM**	**SP**	**CFM**	**SP**	**CFM**	**SP**
48" (1220 mm)	525	0.35	315	0.20	408	0.30
60" (1524 mm)	675	0.40	405	0.25	525	0.35
72" (1829 mm)	825	0.45	495	0.30	642	0.40

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

[Delete the following section unless a motorized automatic sash operator is required.]

2.4 AUTOMATIC SASH OPERATOR

A. Single vertical rising sash fume hoods shall be equipped with a motion sensor and an electrically operated motorized sash having the capability of automatically closing when the fume hood is left unattended. Automatic close shall have a user adjustable delay from 30 seconds to 30 minutes in increments of 1 minute.

B. A touch screen user interface shall be provided with the following features:
   1. Push-to-open button
   2. Push-to-close button
   3. One hour hold feature prevents sash from closing for extended experiment setup
   4. Countdown timer gives feedback to user when sash will close
   5. Setup menu with simple intuitive close delay setting
   6. Control of fume hood light between OFF and AUTOMATIC and ON mode
   7. Chime sounds before sash closes
   8. RED alert screen when an obstruction is detected with reset button
   9. Lab administration settings with password protected access

C. The system shall also have the capability of opening the sash when the operator returns to the area and presses a push-to-open button that is separate from the touch screen push-to-open button. A second press of the push-to-open button shall cancel upward travel.

D. The system shall have a touch and go feature capable of opening the sash fully to a lab administrator's set height when user applies momentary force to raise sash.

E. The motor shall be powered by 24V DC and shall be equipped with dual single direction electric clutches of the overrunning type. The user shall be able to manually push the sash open at a faster rate than the system is driving, and the overrunning clutch shall allow such operation without drag. When the motor is not operating the clutch shall be disengaged and manual operation of the

sash shall be drag free. Systems using pneumatic cylinders or motors without overrunning clutches are unacceptable.

F. The drive system shall be equipped with motor load sensing which will stop if resistance is encountered due to an obstruction. If an obstruction is sensed during downward travel, the sash shall stop and start travelling upwards, an audible alarm shall sound, and a fault indicator shall illuminate. In addition, a relay shall close for remote monitoring of fault conditions. This will be a steady state until the user presses the button to clear the alarms and return the system to run mode. During upward travel if resistance is encountered such as the user attempting to prevent upward motion, the motor shall stop, and a brief beep shall sound before the system returns to run mode.

G. The drive system shall be equipped with an electronic sash stop feature that can be released by the touch screen or disabled by the lab administrator.

H. The fume hood light shall be connected through a 24 volt relay to allow automatic operation. When the hood is left unattended and the sash closes, the light will automatically turn off. When the user returns to the area or opens the sash, the light will automatically turn on.

I. The system shall include an analogue output for the sash position.

J. Input shall be available for external signal to close sash by building systems that require a closed sash in the event of a fire.

K. Optional setting shall prevent the automatic closing delay from being longer than five minutes per the 2019 California Building Code.

[OPTIONAL]

L. System and software shall include an obstruction detection light curtain as is required by the 2019 California Building Code in addition to the motor load sensing safety feature.

2.5 FUME HOOD EXTERIOR FINISH

A. Coating Performance data is available in Appendix 1

[OPTIONAL (typically not provided on VAV Hoods)]

2.6 AIR FLOW MONITOR / ALARM

A. Constant Volume units shall have TEL AFA 1000 series digital airflow alarm. On Variable Air Volume units controls are provided by others.

PART 3 – EXECUTION

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