

SECTION 11 53 13

LABORATORY FUME HOODS

('Pro' Series, Including Standard Laboratory, Hydrofluoric, Perchloric, Vision Panel, Demonstration, HOPEC, and Radioisotope types)

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 - Latest Edition: 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 110, 2016 Methods of Testing Performance of Laboratory Fume Hoods
- E. UL1805 Standard for Laboratory Hoods and Cabinets
- F. ASTM E84 Surface Burning Characteristics of Building Materials

1.4 SUBMITTALS

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

- A. Product Data:
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]**
Submit one complete set of color chips representing the manufacturer's full range of available colors. Minimum sample size 2-1/2 inches by 2-1/2 inches (63.5mm x 63.5 mm).
- 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, "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 shall be available through a QR code adhered to the face of the fume hood.

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. ISO 9001 Registered Quality Management System
 4. Manufacturer of fume hoods shall have the capability within their facility of performing fume hood tests based on the latest ANSI/ASHRAE Specification 110.
 5. A list of ten (10) installations of comparable stature completed within the past 5 years.
 6. 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 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:

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:

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:

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) are 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 such as, but not limited to, electrical devices and electronics, is limited to the warranty extended by that manufacturer to the hood manufacturer.

PART 2 – PRODUCTS

2.1 MANUFACTURER

A. Acceptable Manufacturers:

1. 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

2. Other manufacturers that comply with the minimum thicknesses of material and similar construction appearance and quality as specified and shown in drawings.

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 Fume Hood Exterior Finish Section.
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 Air Foil: Type 316-4 stainless steel 14 Ga (1.9mm).

[OR]

Bottom Air Foil/Sill Lower Flush Sill: Type 316-4 stainless steel 14 Ga (1.9mm) powder coated.

5. Upper Front Panel: to be 18 Ga (1.2mm) thick mild steel, with louvered bypass grills, finished same as exterior panels.
6. Sash Pull: Type 316, 18 Ga (1.2mm) thick stainless steel with an AISI #4 satin finish.
7. Laminated Safety Glass: 6mm (1/4") thick complying to ASTM C1172 standards.

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 Guides: Track shall be corrosion resistant polyvinyl chloride (PVC).
11. Baffle Supports: PVC hexagonal rods shall be used on hoods with FRP liners. Other liner baffles will be supported with material matching the liner material.
12. Duct Stubs: Bell shaped Type 316, 18 Ga (1.2mm) stainless steel.
13. Light Switches: Light switches shall be black in color unless otherwise noted, commercial spec grade or higher and shall be UL and CSA approved.
14. Electrical Receptacles: Electrical receptacles shall be black in color unless otherwise noted, commercial spec grade or higher and shall be UL and CSA approved.
15. Cover Plates: Electrical cover plates shall be black in color unless otherwise noted, nylon and UL and CSA approved.

B. Fume Hood Liner

1. FRP: Hood linings and baffles shall be fiberglass reinforced polyester thermoset resin of 3/16" (5mm) thickness. The fiberglass reinforced polyester panel shall have a minimum flexural strength of 15,000 psi (103,400 kPa), with a flame spread of 25 or less as per ASTM #E84. Final appearance shall be smooth and white in color.

[OR]

PVC Type: Hood lining and baffles shall be Poly Vinyl Chloride of 1/4" (6mm) thickness with square corners. Final appearance shall be smooth and white in colour.

[OR]

Stainless Steel: Hood lining and baffles shall be Type 316 stainless steel with square corners. Material used will be 18 Ga (1.2mm) minimum with a number 4 finish.

[OR]

Stainless Steel: Hood lining shall be Type 316 stainless steel with inside corners that are covered with a nominal 3/4" (19mm) radius. Liner and countertop will be integral. 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. Hood lining, countertop, and baffles shall be Type 316 stainless steel, 18 Ga (1.2mm) minimum with a number 4 finish.

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. Furring panel shall include a hinged access panel for maintenance purposes.

[OR]

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. 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 BENCH 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 five 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 and access panels on both inside liner walls. Assemble hood superstructure, fasten and connect inner and outer frame into a rigid self supporting entity.
- E. 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.
- F. Vertical Rising Sash: Fume hood sash shall be full view vertical type providing a clear and unobstructed side to side view of fume hood interior. Sash shall slide vertically in extruded polyvinyl chloride guide. Bottom and side sash rails shall be 18 Ga (1.2mm) stainless steel. Safety glass shall be set into rails with PVC glazing channel.

[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. 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.

[OR]

Dual Vertical Rising Sash: Fume hood sashes shall be side by side vertically rising, providing a clear and unobstructed side to side view of fume hood interior. Sashes shall slide vertically with one side being contained by extruded polyvinyl chloride guide and the other guided by a heavy duty retractable guide. Bottom handle and side sash rails shall be 18 Ga (1.2mm) stainless steel. Safety glass shall be set into rails with PVC glazing channel. This can also be referred to as a "split" sash.

- G. Bottom handle shall be an integral, formed, full width, flush pull and shall be anchored on each side to counter weight system.
- H. A counter balance system using a single weight, sprockets, and chain shall be used for each 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.
- I. Sash shall be capable of opening to 28.5" above the lower air foil.
- J. Sash system shall be designed to prevent sash drop in the event of counter weight failure. Sash shall open and close against rubber bumper stops.

[OPTIONAL]

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

[OPTIONAL]

- L. Self-Lowering 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 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.
- M. 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.

[OR]

- Restricted Bypass Option: Standard front panel shall be supplemented by the addition of an adjustable panel behind louvered area. Adjustable panel shall be made of a material matching the liner material. It shall be possible to achieve bypass opening ranging from a nominal 25mm (1") to the maximum available opening of 406mm (16"). Lower edge of the adjustable bypass panel shall be equipped with a flexible rubberized fabric flap to reduce leakage. The adjustable bypass panel shall be moved to the final setting by the ventilation contractor who is responsible for fume hood controls.
- N. 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.
 - O. Three-piece fixed 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.

[OPTIONAL]

- P. Bottom slot covered with stainless steel screen. Screen to be mounted horizontally behind baffle as low as possible. 18 Ga screens to be 3/4" (19mm) x 3/4" (19mm) pattern.
- Q. 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:

Face Velocity		Measured Static Pressure Loss	
80 F.P.M.	(0.38 m/s)	0.15"	(37.3 Pa)
100 F.P.M.	(0.51 m/s)	0.20"	(49.8 Pa)

- R. Electrical 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.

[OR]

- S. Electrical duplex outlets shown mounted on the face of fume hoods shall be GFCI type and 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.

2.4 FLOOR MOUNTED 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. Dual Vertical Sashes: Fume hood sashes shall consist of two full view type sashes providing a clear and unobstructed side to side view of fume hood interior. Sashes shall slide vertically in extruded polyvinyl chloride guide. A nominal 1" (25mm) gap shall be provided between lower sash and floor to maintain airflow through bottom of hood chamber when sash is fully closed. Normal operation shall be with only one sash open. Both sashes shall be opened for set-up and teardown only.

[OR]

Dual Vertical Rising Sashes with Upper Combination Sash: Fume hood lower sash shall be full view type providing a clear and unobstructed side to side view of fume hood interior. Fume hood upper vertical rising sash shall contain 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. Bottom handle, top and side vertical rising sash rails shall be welded to form an integral structure. Both sashes shall be opened vertically for set-up and teardown only.

[OR]

Top Hung Horizontally Sliding: Fume hood shall be equipped with multiple horizontal sliding framed glass doors. Each door shall be equipped with multiple nylon tired ball bearing rollers which shall ride in a two channel formed stainless steel upper track and slide in a non-weight bearing lower track formed of 316 stainless steel. Each framed glass panel shall consist of a minimum 18 Ga 316 stainless steel formed front and liner with center section cut out to receive 6mm thick safety glass. The bottom edge of each sliding panel shall be equipped with guide pins designed to run in the lower track. Each vertical side of the sliding panels shall be equipped with a continuous formed channel finger pull.

[OR]

Tri-Access Door System: Fume hoods shall be equipped with two horizontal sliding assemblies incorporating an inverted L shaped frame within which a hinged door is installed. The inverted L shaped frame shall be made from rectangular 316 stainless steel tubing measuring 1" x 2" x 11 Ga

wall thickness. The top horizontal portion of the L shaped frame shall be equipped with adjustable stainless steel ball bearings rollers which engage in a two track formed channel attached to the hood superstructure. The hinged door frame shall be divided into two apertures with a fixed horizontal rail located between 36 and 42 inches above floor level. Within the hinged door, combination sash type sliders are installed in each aperture. Size and number of combination sliders shall be as per drawings. Users shall be able to slide the individual small horizontal panels to access all areas of the fume hood without creating a large opening, thereby maintaining comparatively low airflow requirements. During setup and teardown activity, the large door frames may be slid to left or right as needed. When full access is needed such as when moving mobile tables into and out of the fume hood, the sliders may be slide to one side, unlatched and hinged open to provide an opening equal to the fume hood face opening less 4" in width.

- C. Floor mounted hoods with vertical rising sashes shall not be equipped with a lower air foil. A 1" gap shall be provided to prevent vapour build-up behind closed lower sash.

[OR]

Floor mounted hoods with horizontal sliding sashes shall be equipped with a lower sash track.

- D. All other features of the floor mounted fume hood superstructure and sash are specified under "Bench Fume Hood Construction".

[Delete any of the following sections that do not apply to the project being specified.]

2.5 HYDROFLUORIC SPECIFIC FUME HOOD FEATURES

Materials, features and performance of hoods are to match the previous specified part 2 paragraphs above except for the following changes:

- A. Sash and light lens glass is to be 6mm (1/4") thick clear polycarbonate to replace glass specified.
- B. Sash Frame: Finish on frame shall include PTFE corrosion resistant coating.
- C. Duct Stubs: Finish on bell shaped duct shall include PTFE corrosion resistant coating.
- D. PVC type liner and baffles shall be Poly Vinyl Chloride of 1/4" (6mm) thickness. Final appearance shall be smooth and white in color.
- E. Fume hood sash shall be full view type providing a clear and unobstructed side to side view of fume hood interior. Sash shall be clear polycarbonate set into extruded polyvinyl chloride guide. Bottom and side sash rails shall be 18 Ga (1.2mm) stainless steel with PTFE corrosion resistant coating. Polycarbonate shall be set into rails with PVC glazing channel.

2.6 VISION PANEL SPECIFIC FUME HOOD FEATURES

Materials, features and performance of hoods are to match the previous specified part 2 paragraphs including vertical rising sash paragraph above except for the following changes:

- A. Upper Panel: Laminated safety glass type 6mm (1/4") thick. Viewing height of 44" above counter top shall be provided. Louvers in panel above sash are not acceptable. Vision Panel shall be used on VAV fume hoods only.

2.7 DEMONSTRATION (DOUBLE SIDED) FUME HOOD FEATURES

Materials, features and performance of hoods are to match the previous specified part 2 paragraphs above except for the following changes:

- A. Fume hood sashes 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. Superstructure shall have a double sash and cable driven counter balance system. Both counter balance weights shall be placed on one end of the hood to allow for plumbing on the opposite end.
- B. V-Baffle only mounted near the roof of the hood shall distribute air uniformly along its length.
- C. Sash interlock option allows only one sash to be opened at a time.
- D. Keyed sash lock shall be capable of locking the sashes in the closed position.

2.8 PERCHLORIC SPECIFIC FUME HOOD FEATURES

Materials, features and performance of hoods are to match the previous specified part 2 paragraphs above except for the following changes:

- A. Hood lining shall be one-piece Poly Vinyl Chloride of 1/4" (6mm) thickness. Final appearance shall be smooth and white in colour. Liner and countertop with wash down drainage trough will be integral. Baffles shall be of the same material.

[OR]

Stainless steel: Hood lining shall be Type 316 stainless steel with inside corners being coved with a nominal 3/4" (19mm) radius. Liner and countertop with wash down drainage trough will be integral. 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. Hood lining, countertop with trough, and baffles shall be Type 316 stainless steel, 18 Ga (1.2mm) minimum with a number 4 finish. Perchloric stainless steel liner is to only be used with straight perchloric acid.

- B. Removable access panels on either interior wall are not provided for service access on perchloric hoods. Access can only be provided through means of removable panels on hood exterior.
- C. 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 dependent upon hood width. Spray nozzles shall be directed upward. System shall include a control valve and associated internal piping.

2.9 RADIOISOTOPE SPECIFIC FUME HOOD FEATURES

Materials, features and performance of hoods are to match the previous specified part 2 paragraphs above except for the following changes:

- A. Stainless steel: Hood lining shall be Type 316 stainless steel with inside corners being coved with a nominal 3/4" (19mm) radius. Liner and countertop will be integral. 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. Hood lining, countertop and baffles shall be Type 316 stainless steel, 18 Ga (1.2mm) minimum with a number 4 finish.
- B. The integral countertop shall be reinforced with galvanized steel "hat" channels for strength.

- C. Removable access panels on either interior wall are not provided for service access on radioisotope hoods. Access can only be provided through means of removable panels on hood exterior.

2.10 HOPEC SPECIFIC FUME HOOD FEATURES

Materials, features and performance of hoods are to match the previous specified part 2 paragraphs including vertical rising combination sash paragraph above except for the following changes:

- A. Performance: Fume Hoods, "HOPEC" 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.
- B. Sash perimeter including lower air foil shall have streamlined shape with angled openings toward hood interior. Air shall enter under the sash handles and the bottom horizontal foil through a nominal 1" (25mm) by-pass when the sash is in the closed position. Bottom air foil shall be flush with the counter top and include a secondary containment trough. Sash shall close in front of air foil leaving a 1" (25mm) space to provide downwardly vectored by-pass air. For ease of cleaning air foil shall be hinged and removable without the use of special tools.
- C. Fume hood sash frame shall include a fixed safety glass panel mounted at the top of the sash restricting air flow during horizontal sash open usage while not obstructing viewing area.
- D. Sash height shall be limited to have two sets of integral sash height limiting hardware mounted on the hood which prevents raising the vertical sash above certain points unless manually defeated by the operator. Set points shall be closed and at 15" (381mm) above counter top.
- E. The minimum sash height shall be 36" (915mm) with a 6" (152mm) clear static panel mounted at the top of the sash.

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

2.11 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, 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 analog output for the sash position.

2.12 FUME HOOD EXTERIOR FINISH

- A. Coating Performance data is available in Appendix 1

[OPTIONAL (For CAV Hoods Only)]

2.13 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