ADDENDUM NO 2 (Rev 01/2017)

ISSUE DATE: June 29, 2020

RE: Zoology 1st Floor Wang Lab Renovation
University of Wisconsin – Madison
Madison, Wisconsin
MSN Project No. 0401-1803 / UWSA Project No. A-19-006

BID OPENING: MEP – 2:00 pm, July 9, 2020
GPC – 2:00 pm, July 23, 2020

FROM: Aro Eberle Architects
116 King Street, Suite 202
Madison, WI 53703

TO: Prospective Bidders

This addendum forms a part of the Contract Documents and modifies the original Contract Documents dated March 28, 2020 as noted below. Acknowledge receipt of this Addendum by inserting the number and issue date of this addendum in the blank space provided on the Bid Form. Failure to do so may subject the Bidder to disqualification.

This Addendum consists of 3 pages and the attached documents:
Specification Sections: Table of Contents GPC Bidders, Table of Contents MEP Bidders, Table of Contents Technical Specifications, 08 14 00, 08 70 00, and 11 53 13.

CHANGES TO BIDDING REQUIREMENTS:
Volume 1 - GPC
1. Table of Contents GPC Bidders; Replace table of contents (pages TC-1 through TC-4) with revised (pages TC-1 through TC-4) issued with this Addendum.

Volume 1 – MEP
2. Table of Contents MEP Bidders; Replace table of contents (pages TC-1 through TC-4) with revised (pages TC-1 through TC-4) issued with this Addendum.

Volume 2 – Technical Specification
3. Table of Contents Technical Specifications; Replace table of contents (pages TC-1 through TC-4) with revised (pages TC-1 through TC-4) issued with this Addendum.

CHANGES TO SPECIFICATIONS (2 THRU 33):
4. Section 08 14 00 – Flush Wood Doors; Replace specification with revised issued with this Addendum.
a. Page 3; Lines 29-43 - Added door louver information.
b. Page 3; Lines 51-53 – Added fabrication information for door lites and louvers.
5. Section 08 70 00 – Hardware; Replace specification with revised issued with this Addendum.
6. Section 11 53 13 – High Performance Laboratory Fume Hoods; Replace specification with revised issued with this Addendum.
a. Updated entire spec with current campus standard hood specification.

CHANGES TO DRAWINGS:
7. Sheet A002 – Door Schedule and Material Schedule; Replace Sheet with Revised Sheet issued with this Addendum.
a. Revised door 112.1 to be new larger door and frame and new hardware set.
b. Revised door 112F.1 to be a new larger door and frame.
8. Sheet D101 – First Floor Demolition Plan; Replace Sheet with Revised Sheet issued with this Addendum.
   a. Added keyed note 28 at hallway door.

9. Sheet A101 – First Floor Plan; Replace Sheet with Revised Sheet issued with this Addendum.
   a. Revised door 112.1 and 112F.1 to be larger.

10. Sheet A401 – Interior Elevations; Replace Sheet with Revised Sheet issued with this Addendum.
    a. Interior elevations 6 and 16 updated.

11. Sheet L001 – Laboratory Symbols, Abbreviations, Schedules, and General Notes; Replace Sheet with Revised Sheet issued with this Addendum.
    a. Revised owner provided equipment information for numbers 4, 5 and 6.

12. Sheet L101 – First Floor Laboratory Plan; Replace Sheet with Revised Sheet issued with this Addendum.
    a. Updated plan sheet showing enlarged doors 112.1 and 112F.1.

    a. Revise scope of work required between Plumbing Contractor and Owner’s Separate Demolition and Abatement Contractors.
    b. Add General Note 2 for PC to coordinate with Owner’s Separate Demolition and Abatement Contractors for extent of all Plumbing demolition.
    c. Revise Keyed Notes 1, 2 and 3 to clarify scope of work required between Plumbing Contractor and Owner’s Separate Demolition Contractor.
    d. Add Keyed Note 8 with direction for Owner’s Separate Demolition Contractor to disconnect piping at valves.
    e. Add Keyed Note 9 with direction for Owner’s Separate Abatement Contractor to remove fixture and associated piping and components.

14. Sheet MD101 – First Floor Mechanical Demolition Plan: Replace sheet with revised issued with this Addendum.
    a. Revise Keyed Note 4 clarifying Owner’s Demolition Contractor to remove existing dual duct terminals at perimeter wall and leave detached for reinstall by this Contractor.
    b. Add Keyed Note 10 with direction on existing Cold Room thermostat to remain.
    c. Add Keyed Note 11 with direction to salvage existing dual duct terminals.
    d. Add Keyed Note 12 clarifying existing fume hoods to be removed by Owner’s Demolition Contractor.

15. Sheet M101 – First Floor Mechanical Plan: Replace sheet with revised issued with this Addendum.
    a. Revise Keyed Note 1 clarifying existing dual duct terminals at perimeter shall be reinstalled by this Contractor.
    b. Add Keyed Note 14 with direction on existing Cold Room thermostat mounting.

    a. Add Keyed Note 5 clarifying Owner’s Demolition Contractor to remove existing fire alarm devices.
    b. Add Keyed Note 6 clarifying Owner’s Demolition Contractor to remove existing smoke detectors. Owner shall replace demolished smoke detectors with heat detectors. Heat detectors will be demolished by this Contractor upon new smoke detectors activation.
    c. Add Keyed Note 7 clarifying Owner’s Demolition Contractor to remove existing receptacles within demolished bench.
    d. Add Keyed Note 8 clarifying Abatement Contractor’s demolition of existing wiring serving light fixtures and this Contractor’s demolition of existing light fixtures.
    e. Add Keyed Note 9 clarifying Owner’s Demolition Contractor to remove existing fume hood.

END OF ADDENDUM
HAZARDOUS MATERIALS ABATEMENT IS BY OWNER'S SEPARATE CONTRACT. SEE SHEET ED101 FOR ADDITIONAL ELECTRICAL DEMOLITION ITEMS.

FIRST FLOOR DEMOLITION PLAN

TEMPORARY LIGHTING IS THE RESPONSIBILITY OF THE ELECTRICAL CONTRACTOR.

VERIFY CONSTRUCTION OF ALL PARTITIONS TO BE REMOVED.

REFER TO MECHANICAL AND ELECTRICAL DRAWINGS FOR ADDITIONAL COORDINATE WITH SPECIFICATION SECTION 01 74 19 FOR DEMOLITION ITEMS.

PORTIONS OF EXISTING CONSTRUCTION MAY HAVE BEEN REMOVED BY OWNER.

CONTRACTORS ARE RESPONSIBLE FOR MAINTAINING CONTINUOUS UTILITY SERVICE TO ALL SPACES IN THE BUILDING NOT AFFECTED BY THIS WORK. ANY DISRUPTION IN SERVICE REQUIRED TO PERFORM WORK OR TO MODIFY EXISTING DUCTWORK, PIPING, CONDUIT, CIRCUITS OR ANY ASSOCIATED EQUIPMENT, MUST BE COORDINATED IN ADVANCE WITH REQUIREMENTS.

THE OWNER UNDER SEPARATE ABATEMENT/SELECTIVE DEMOLITION HARD PACKED PIPE INSULATION THAT CONTAIN ACM. OWNER WILL ALSO REMOVE ITEMS AS INDICATED ON THE PLAN PRIOR TO THE START OF CONSTRUCTION.
GENERAL NOTES

REMOVE EMERGENCY SHOW ER AND ALL ASSOCIATED PIPING AND COMPONENTS.

REMOVE PIPING AS SHOWN AND CAP AT SANITARY/VENT STACK.

OWNER'S SEPARATE DEMOLITION CONTRACTOR WILL DISCONNECT AND REMOVE BACK TO MAIN.

EXISTING PIPING IN WALLS TO REMAIN SHALL BE ABANDONED.

DISCONNECT ALL SAN, V, CW, HW, AND DI WATER AT SINK AND REMOVE PIPING.

OWNER'S SEPARATE DEMOLITION CONTRACTOR WILL REMOVE FIXTURES AND GASES BACK TO MAIN.

REVISIONS:
No:  1 06/29/20 ADDENDUM 02

ZOOLOGY 1ST FLOOR WANG LAB
RENOVATION

THE BOARD OF Regents of the
University of Wisconsin System

Front Street Center
300 Park Street
Madison, WI 53706

(608) 262-2682

PD101

SCALE: 1/4" = 1'-0"

1/2" = 1'-0"

2020.2.20

1/3" = 1'-0"

1/8" = 1'-0"

1/16" = 1'-0"

1/32" = 1'-0"

1/64" = 1'-0"

1/128" = 1'-0"

1/256" = 1'-0"

1/512" = 1'-0"

1/1024" = 1'-0"

1/2048" = 1'-0"

1/4096" = 1'-0"

1/8192" = 1'-0"

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1. Mechanical contractor to field verify existing condition prior to performing work.
2. Coordinate demolition equipment with all trades, G.C., and architect.
3. M.C. shall repair and/or replace any unintended damages done to surrounding areas due to demolition.
4. Owner shall have first salvage rights of demo'd equipment. Dispose of equipment according to code. Recycle all recyclable materials.
5. PC/MC to include approximately 50LF of piping insulation to re-insulate existing piping due to asbestos removal.

General Notes:
- Remove existing exhaust grilles and associated duct through wall.
- Patch and seal wall opening between Room 112F and cold room.
- Existing cold room evaporator/compressor and associated drain piping in Room 112F to remain.
- Salvage existing mixing box serving women's toilet and janitor closet.
- Existing wall mounted thermostats to be removed by owner's demolition contractor. Remove remaining temperature controls for existing to remain dual duct terminals including all associated control air tubing back to source. Owner's demolition contractor will be disconnecting and removing existing dual duct terminal to complete abatement work. Dual duct terminal will remain loose for reinstallation by this contractor.
- Demo exhaust duct back through shaft opening to riser to allow new duct connection per new work plans.
- Demo exhaust duct back through shaft opening and riser connection. Patch existing exhaust riser and shaft opening to equivalent fire rating.
- Demo cold and hot deck supply ducts back through wall opening to riser. Patch duct riser and wall openings to equivalent fire rating and provide new connections per new work plans.
- Provide pre-balanced of lab exhaust system (LX-2A, 2B, 2C) and associated exhaust valves (AV-1, AV-2, AV-3) to establish total system airflow and airflow outside of renovation area. Pre-balanced airflow shall be used to verify airflow to existing areas are reestablished after renovation work is complete.
- Remove existing exhaust grille and provide new exhaust duct connection and grille per new work plans. Seal around existing opening and new duct to provide air tight exhaust path from space above cold room enclosure.
- Existing cold room thermostat to remain.
- Remove and salvage existing dual duct terminal and associated controls and turn over to owner.
- Existing fume hood to be disconnected from existing exhaust system and removed by owner. Contractor shall be responsible for demolition of all remaining fume hood exhaust duct as shown.
GENERAL NOTES

EXISTING PIPING DUE TO ASBESTOS REMOVAL. PC/MC TO INCLUDE APPROXIMATELY 50LF OF PIPING INSULATION TO REMOVE. COLOR TO BE SELECTED BY ARCHITECT.

MOUNT EXISTING COLD ROOM THERMOSTAT ON WALL AND PROVIDE WIRE DEVICE AND RESERVOIR WITH FLOAT AND FILTER.

SWITCH TO TURN OFF FCU IF PUMP FAILS. PUMP KIT SHALL INCLUDE ANTI SIPHON DRAIN PIPING CONNECTION FROM PUMP OUTLET. UNIT SHALL INCLUDE SAFETY BRACKET. PROVIDE DRAIN PAN OUTLET CONNECTION TO PUMP RESERVIOR AND WITH 2 GPH CAPACITY A 23 FT WC AND MOUNT TO FAN COIL WITH ANTI VIBRATION PROVIDE NEW EXHAUST DUCT AND GRILLE CONNECTION TO SPACE ABOVE LAB EQUIPMENT PLANS FOR EQUIPMENT INFORMATION.

CONDITION AND ALARM FOR OFOI FREEZER/INCUBATOR/COOLER UNIT. REFER TO PROVIDE TEMPERATURE SENSOR AND DDC CONNECTION WITH TEMPERATURE OR EXISTING MIXING BOX.

PROVIDE NEW DDC TEMPERATURE CONTROL AND EXTEND TO ASSOCIATED NEW FLOOR DRAIN.

EXTEND FAN COIL COOLING COIL CONDENSATE PIPING DOWN TO BASEMENT PER NEW WORK PLANS.

RENOVATION AREA EXHAUST MODIFICATIONS TO PROVIDE NEW EXHAUST FLOWS REBALANCE EXISTING EXHAUST FANS AND EXHAUST VALVES ASSOCIATED WITH OFOI LAB EQUIPMENT. REFER TO LAB EQUIPMENT PLANS FOR ADDITIONAL PROVIDE TEMPERATURE MONITORING AND ALARM VIA AUXILIARY CONTACT TO PROVIDE NEW COLD AND HOT DECK SUPPLY CONNECTIONS TO RISER AT TOP OF BOX LOCATION. REBALANCE MIXING BOX TO AIR FLOW SHOWN ON PLANS.

RELOCATE EXISTING MIXING BOX xMB TEMPERATURE SENSOR MONITORING AND ALARM FOR FUTURE OFOI FREEZER. CONNECT EXHAUST DUCT TO FUME HOOD AND BALANCE TO 500 CFM. CONTROL AS A SECOND TEMPERATURE MONITORING POINT.

AIR FLOWS.

POINTS PER SPECIFICATION, AND REBALANCE TERMINAL TO PROVIDE SPECIFIED EXISTING PNEUMATIC ACTUATORS AND CONTROLS WITH NEW DDC CONTROLLER, AND DAMPERS AND PROVIDE NEW SPACE TEMPERATURE SENSOR. REPLACE CONNECTIONS AND SUPPLY GRILLE. REPLACE AIR FLOW MEASURING STATIONS.
1. REFER TO E001 FOR SYMBOLS, NOTES, ABREVIATIONS, AND SCHEDULES.

2. DEMOLISH AND RETAIN EXISTING WALL MOUNTED FIRE ALARM DEVICES FOR USE IN NEW LAB SPACE.

3. RETAIN EXISTING SMOKE DETECTORS FOR REUSE WITHIN NEW LAB SPACE.

4. FIELD COORDINATE EXISTING FLUSH MOUNTED BACK BOX LOCATIONS THAT MAY BE ABLE TO BE REUSED WITH NEW LOCATIONS.

5. EXISTING PROJECT AREA IS PRIMARILY SERVED BY EXISTING PANEL "IRD".

GENERAL NOTES

1. RETAIN EXISTING BACKBOX FOR REUSE WITH NEW DEVICE.

2. EXISTING FIRE ALARM CONDUIT TO BE REMOVED AND RELOCATED ABOVE NEW CEILING.

3. SURFACE RACEWAY, RECEPTACLES, DATA/VOICE OUTLETS, AND FITTINGS SHALL BE DEMOLISHED BY OWNER'S DEMOLITION CONTRACTOR UNDER SEPARATE CONTRACT. HOMERUN CONDUIT AND WIRING SHALL BE REMOVED BACK TO SOURCE BY ELECTRICAL CONTRACTOR.

4. EXISTING FIRE ALARM DEVICES SHALL BE DEMOLISHED BY OWNER'S DEMOLITION CONTRACTOR UNDER SEPARATE CONTRACT.

5. EXISTING SMOKE DETECTOR TO BE DEMOLISHED BY OWNER'S DEMOLITION CONTRACTOR AND REPLACED BY OWNER TO HEAT DETECTOR DURING SELECTIVE DEMO. HEAT DETECTOR SHALL BE DEMOLISHED BY ELECTRICAL CONTRACTOR UPON NEW SMOKE DETECTORS ACTIVATION.

6. BENCH RECEPTACLES SHALL BE DEMOLISHED BY OWNER'S DEMOLITION CONTRACTOR UNDER SEPARATE CONTRACT.

7. WIRING SERVING EXISTING LIGHTING FIXTURE SHALL BE DEMOLISHED BY ABATEMENT CONTRACTOR. ELECTRICAL CONTRACTOR SHALL DEMOLISH EXISTING LIGHT FIXTURE.

8. FUME HOOD SHALL BE DEMOLISHED BY OWNER'S DEMOLITION CONTRACTOR UNDER SEPARATE CONTRACT.

KEYED NOTES

1. EXISTING SIEMENS "MXL" FIRE ALARM PANEL

2. EXISTING 2-POST DATA RACK CURRENTLY SERVING THE PROJECT AREA.

3. EXISTING 1ST FLOOR PANEL "IRD" CURRENTLY SERVED FROM END SECTION OF SWITCHBOARD

4. EXISTING SERVICE ENTRANCE SWITCHBOARD
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SECTION 08 14 00
FLUSH WOOD DOORS

PART 1 - GENERAL

SUMMARY
Section Includes:
Solid-core doors with wood-veneer faces.
Factory finishing flush wood doors.
Factory fitting flush wood doors to frames and factory machining for hardware.

ACTION SUBMITTALS
Product Data: For each type of door. Include details of core and edge construction and trim for openings.
Include factory-finishing specifications.

Environmental Data:
Product Data for adhesives and composite wood products, indicating that product contains no urea formaldehyde.

Shop Drawings: Indicate location, size, and hand of each door; elevation of each kind of door; construction details not covered in Product Data; location and extent of hardware blocking; and other pertinent data.
Indicate dimensions and locations of mortises and holes for hardware.
Indicate requirements for veneer matching.
Fire-Protection ratings for fire-rated doors.

Samples for Verification:
For factory-finished doors.

INFORMATIONAL SUBMITTALS
Sample Warranty: For special warranty.

QUALITY ASSURANCE
Source Limitations: Obtain flush wood doors through one source from a single manufacturer.
Quality Standards: Comply with AWI’s “Architectural Woodwork Quality Standards Illustrated.”

PROJECT CONDITIONS
Environmental Limitations: Do not deliver or install doors and frames until spaces are enclosed and weathertight, wet work in spaces is complete and dry, HVAC system is operating and maintaining temperature between 60 and 90 deg F and relative humidity between 25 and 55 percent during the remainder of the construction period.

WARRANTY
Special Warranty: Manufacturer’s standard form, signed by manufacturer, Installer, and Contractor, in which manufacturer agrees to repair or replace doors that fail in materials or workmanship, or have warped (bow, cup, or twist) more than ¼ inch in a 42-by-84-inch section.
Warranty shall also include installation and finishing that may be required due to repair or replacement of defective doors.
Warranty shall be in effect during the following period from date of Substantial Completion.
Solid-Core Interior Doors: Life of installation.
PART 2 - PRODUCTS

MANUFACTURERS
Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   Algoma Hardwoods, Inc.
   Eggers Industries.
   Graham Wood Doors
   Marshfield Door Systems, Inc.

DOOR CONSTRUCTION, GENERAL
Doors for Transparent Finish:
   Grade: Premium, with Grade A veneer.
   Species and Cut:
      Birch; Rotary cut; stain finish (match existing).
   Match between Veneer Leaves: Book match
   Assembly of Veneer Leaves on Door Faces: Balance.
   Pair and Set Match: Provide for doors hung in same opening.
   Room Match: Provide door faces of compatible color and grain within each separate room.

SOLID-CORE DOORS
Interior Veneer-Faced Doors:
   Core: Particleboard: ANSI A208.1, Grade LD-2; made without the use of added urea formaldehyde.
   Construction: Five plies with stiles and rails bonded to core, then entire unit abrasive planed before veneering.

LIGHT FRAMES AND LOUVERS
Wood Beads for Light Openings in Wood Doors: Provide manufacturer's standard wood beads unless otherwise indicated.
   Wood Species: Same species as door faces
   Profile: Manufacturer's standard shape.

Metal Louvers:
   Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
      Anemostat Products; a Mestek company.
      L & L Louvers, Inc.
      McGill Architectural Products.
   Metal and Finish: Hot-dip galvanized steel, 0.040 inch thick, with baked-enamel- or powder-coated finish to match existing door louvers.

FABRICATION
Factory fit doors to suit frame-opening sizes indicated, with the following uniform clearances and bevels, unless otherwise indicated:
   Comply with clearance requirements of referenced quality standard for fitting.

Openings: Factory cut and trim openings through doors.
   Light Openings: Trim openings with moldings of material and profile indicated.
   Louvers: Factory install louvers in prepared openings.

FACTORY FINISHING
General: Comply with AWI’s “Architectural Woodwork Quality Standards Illustrated” for factory finishing.
Finish doors at factory.

Transparent Finish:
  Grade: Premium.
  Finish: Manufacturer’s standard finish with performance comparable to AWI System
  Conversion Varnish Transparent.
  Staining: Match existing.
  Sheen: Satin, 30-50 gloss units.

PART 3 - EXECUTION

EXAMINATION
Examine doors and installed door frames before hanging doors.
  Verify that frames comply with indicated requirements for type, size, location, and swing
  characteristics and have been installed with level heads and plumb jambs.
  Reject doors with defects.
  Proceed with installation only after unsatisfactory conditions have been corrected.

INSTALLATION
Hardware: For installation, see Division 08 Section "Hardware."
  Manufacturer's Written Instructions: Install doors to comply with manufacturer's written instructions,
  referenced quality standard, and as indicated.
  Factory-Fitted Doors: Align in frames for uniform clearance at each edge.
  Factory-Finished Doors: Restore finish before installation if fitting or machining is required at Project site.

ADJUSTING
Operation: Rehang or replace doors that do not swing or operate freely.
  Finished Doors: Replace doors that are damaged or do not comply with requirements. Doors may be
  repaired or refinished if Work complies with requirements and shows no evidence of repair or refinishing.

END OF SECTION
SECTION 08 70 00
HARDWARE

PART 1 – GENERAL

RELATED DOCUMENTS
Drawings and general provisions of the Contract, including General and Supplementary Conditions and
Division 1 Specification Sections, apply to this Section.

SUMMARY
Section includes:

Mechanical door hardware for the following: Swinging doors.

Related Sections include the following:
Division 1 Section “Sustainable Design Requirements” for additional requirements and
procedures for achieving the most environmentally conscious Work possible within the
limits of the Construction Schedule, Contract Sum, and available materials, equipment,
and products.

Division 08 Section “Hollow Metal Frames”
Division 08 Section “Flush Wood Doors”

ACTION SUBMITTALS
Product Data: Include installation details, material descriptions, dimensions of individual components and
profiles, and finishes.

Samples for Initial Selection: Manufacturer’s color charts consisting of units or sections of units showing
the full range of colors, textures, and patterns available for each type of door hardware indicated as
requested by Architect.

Door Hardware Schedule: Prepared by or under the supervision of supplier, detailing fabrication and
assembly of door hardware, as well as installation procedures and diagrams. Coordinate final Door
Hardware Schedule with doors, frames, and related work to ensure proper size, thickness, hand, function,
and finish of door hardware.

Format: Comply with scheduling sequence and vertical or horizontal format in DHI's
"Sequence and Format for the Hardware Schedule."

Organization: Organize the Door Hardware Schedule into door hardware sets indicating
complete designations of every item required for each door or opening.

Content: Include the following information:

  Type, style, function, size, label, hand, and finish of each door hardware item.
  Manufacturer of each item.
  Fastenings and other pertinent information.
  Locations of each door hardware set, cross-referenced to Drawings on floor
  plans and to door and frame schedule.
  Explanation of abbreviations, symbols, and codes contained in schedule.
  Mounting locations for door hardware.
Door and frame sizes and materials.

Submittal Sequence: Submit initial draft of final schedule along with essential Product Data to facilitate the fabrication of other work that is critical in the Project construction schedule. Submit the final Door Hardware Schedule after Samples, Product Data, coordination with Shop Drawings of other work, delivery schedules, and similar information has been completed and accepted.

Submittal Sequence: Submit the final Door Hardware Schedule at earliest possible date particularly where approval of the Door Hardware Schedule must precede fabrication of other work that is critical in the Project construction schedule. Include Product Data, Samples, Shop Drawings of other work affected by door hardware, and other information essential to the coordinated review of the Door Hardware Schedule.

INFORMATIONAL SUBMITTALS
Qualification Data: For firms and persons specified in “Quality Assurance” Article.
Include lists of completed projects with project names and addresses of architects and owners, and other information specified.

Warranties: Special warranties specified in this Section.

CLOSEOUT SUBMITTALS
Maintenance Data: For each type of door hardware to include in maintenance manuals specified in Division 1.

QUALITY ASSURANCE
Installer Qualifications: An experienced installer who has completed door hardware similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.

Supplier Qualifications: Door hardware supplier with warehousing facilities in Project’s vicinity and who is or employs a qualified Architectural Hardware Consultant, available during the course of the Work to consult with Contractor, Architect, and Owner about door hardware and keying.

Scheduling Responsibility: Preparation of door hardware and keying schedules.

Architectural Hardware Consultant Qualifications: A person who is currently certified by the Door and Hardware Institute as an Architectural Hardware Consultant and who is experienced in providing consulting services for door hardware installations that are comparable in material, design, and extent to that indicated for this Project.

Source Limitations: Obtain each type and variety of door hardware from a single manufacturer unless otherwise indicated.

Regulatory Requirements: Comply with provisions of the following:
Where indicated to comply with accessibility requirements, comply with Wisconsin Enrolled Building Code, Chapter 11. As follows:
Handles, Pulls, Latches, Locks, and other Operating Devices: Shape that is easy to grasp with one hand and does not require tight grasping, tight pinching, or twisting of the wrist.

Door Closers: Comply with the following maximum opening-force requirements indicated:
Interior Hinged Doors: 5 lbf applied perpendicular to door.

Tactile Warning: Doors that lead to areas that may be dangerous to a blind person, including doors to loading platforms, boiler rooms, stages, and as indicated on door schedule, shall be made identifiable to the touch by a knurled texture to the lever handle applied to the contact side.
DELIVERY, STORAGE, AND HANDLING
Inventory door hardware on receipt and provide secure lock-up for door hardware delivered to Project site.
Tag each item or package separately with identification coordinated with the final Door Hardware Schedule, and include basic installation instructions, templates, and necessary fasteners with each item or package.
Deliver keys to Owner’s keying agent by registered mail or overnight package service.

COORDINATION
Installation Templates: Obtain and distribute to parties involved for doors, frames, and other work specified to be factory prepared for installing door hardware. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.
Existing Openings: Where hardware components are scheduled for application to existing construction or where modifications to existing door hardware are required, field verify existing conditions and coordinate installation of door hardware to suit opening conditions and to provide proper door operation.

WARRANTY
General Warranty: Special warranties specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.
Special Warranty: Written warranty, executed by manufacturer agreeing to repair or replace components of door hardware that fail in materials or workmanship within specified warranty period. Failures include, but are not limited to, the following:
Structural failures including excessive deflection, cracking, or breakage.
Faulty operation of doors and door hardware.
Deterioration of metals, metal finishes, and other materials beyond normal weathering and use.
Warranty Period: Three years from date of Substantial Completion, unless otherwise indicated.
Warranty Period for Manual Closers: 10 years from date of Substantial Completion.

MAINTENANCE SERVICE
Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions as needed for Owner's continued adjustment, maintenance, and removal and replacement of door hardware.
Maintenance Service: Beginning at Substantial Completion, provide six months' full maintenance by skilled employees of door hardware Installer. Include quarterly preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper door and door hardware operation. Provide parts and supplies that are the same as those used in the manufacture and installation of original products.

PART 2 – PRODUCTS
SCHEDULED DOOR HARDWARE
General: Provide door hardware for each door to comply with requirements in this Section, door hardware sets indicated in door and frame schedule, and the Door Hardware Schedule at the end of Part 3.
Door Hardware Sets: Provide quantity, item, size, finish or color indicated, and named manufacturers' products.

Designations: Requirements for design, grade, function, finish, size, and other distinctive qualities of each type of door hardware are indicated in Part 3 "Door Hardware Schedule" Article. Products are identified by using door hardware designations, as follows:

Named Manufacturers' Products: Product designation and manufacturer are listed for each door hardware type required for the purpose of establishing minimum requirements. Manufacturers' names are abbreviated in Part 3 "Door Hardware Schedule" Article.

HINGES

Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

Manufacturers: Subject to compliance with requirements, provide products by one of the following:

Hinges:
- IVES Hardware; an Allegion PLC Company.
- Hager Hinge Company

Standards: Comply with the following:
- Butts and Hinges: BHMA A156.1
- Template Hinge Dimensions: BHMA A156.7

Quantity: Provide the following, unless otherwise indicated:
- Two Hinges: For doors with heights up to 60 inches (1524 mm).
- Three Hinges: For doors with heights 61 to 90 inches (1549 to 2286 mm).
- Four Hinges: For doors with heights 91 to 120 inches (2311 to 3048 mm).
- For doors with heights more than 120 inches (3048 mm), provide 4 hinges, plus 1 hinge for every 30 inches (750 mm) of door height greater than 120 inches (3048 mm).

Size: Provide the following, unless otherwise indicated, with hinge widths sized for door thickness and clearances required:

<table>
<thead>
<tr>
<th>Maximum Door Size (inches)</th>
<th>Hinge Height (inches)</th>
<th>Metal Thickness (inches)</th>
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<tr>
<td>32 by 84 by 1-3/8”</td>
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</tr>
<tr>
<td>36 by 84 by 1-3/8”</td>
<td>4</td>
<td>0.130</td>
</tr>
<tr>
<td>36 by 84 by 1-3/8”</td>
<td>4-1/2</td>
<td>0.134</td>
</tr>
<tr>
<td>42 by 90 by 1-3/8”</td>
<td>4-1/2</td>
<td>0.134</td>
</tr>
<tr>
<td>48 by 120 by 1-3/4”</td>
<td>5</td>
<td>0.146</td>
</tr>
</tbody>
</table>

Template Requirements: Except for Hinges and pivots to be installed entirely (both leaves) into wood doors and frames, provide only template-produces units.

Hinge Weight: Unless otherwise indicated, provide the following:
- Doors with Closers: Anti-friction-bearing hinges.
- Interior Doors: Standard-weight hinges.

Hinge Base Metal: Unless otherwise indicated, provide the following:
- Interior Hinges: Steel, with Steel pin.
- Hinges for Fire-Rated Assemblies: Steel, with steel pin.

Hinge Options: Comply with the following where indicated in the Door Hardware Schedule or on Drawings.
Non-removable Pins: Provide set screw in hinge barrel that, when tightened in a groove in hinge pin, prevents removal of pin while door is closed; for the following applications:

- Outswing corridor doors with locks,
- Corners: Square.

Fasteners: Comply with the following:
- Machine Screws: For metal doors and frames. Install into drilled and tapped holes.
- Wood Screws: For wood doors and frames.
- Threaded-to-the-Head Wood Screws: For fire-rated wood doors.
- Screws: Phillips flat-head screws; finish screw heads to match surface of hinges

MECHANICAL LOCKS AND LATCHES
Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

- Mechanical Locks and Latches:
  - Schlage Commercial Lock Division; an Allegion PLC Company. Provided by Owner.

Standards: Comply with the following:
- Mortise Locks and Latches: BHMA A156.12.
- Mortised Locks: BHMA Grade 1, Series 4000

Certified Products: Provide door hardware listed in the following BHMA directories:
- Mechanical Locks and Latches: BHMA’s “Directory of Certified Locks & Latches.”

Lock Trim: Comply with the following:
- Lockset Designs: Provide the lockset design designated below or, if sets are provided by another manufacturer, provide designs that match those designated:
  - Mortise Locks: Provide Schlage “L” series 03N design.

Lock Functions: Function numbers and descriptions indicated in the Door Hardware Schedule comply with the following:

Lock Throw: Comply with testing requirements for length of bolts required for labeled fire doors, and as follows:

Backset: 2-3/4 inches (70 mm), unless otherwise indicated.

CYLINDERS AND KEYING
Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

Manufacturers: Subject to compliance with requirements, cylinders and cores provided by UW Lock Shop. Final installation by UW Lock Shop.

Standards: Comply with the following:
- Cylinders: BHMA A156.5

Cylinder Grade: BHMA Grade 1
Cylinders: Manufacturer’s standard tumbler type, constructed from brass or bronze, stainless steel, or nickel silver, and complying with the following:
- Number of pins: Utility patented, 6-pin solid brass construction.
Rim Type: Cylinders with back plate, flat-type vertical or horizontal tailpiece, and raised trim ring.
Mortise-Lock Type: Cylinders with tailpiece to suit locks.

Construction Keying: Provide temporary construction cylinders for use of Contractor for securing rooms during construction.

Keys: Provide nickel-silver keys complying with the following:
Quantity: One (1) blank key for each lock. Provide keys to UW Lock Shop.

STRIKES
Manufacturers: Subject to compliance with requirements, provide products by one of the following:
IVES Hardware; an Allegion PLC Company.

Standards: Comply with the following:

Strikes: Provide manufacturer's standard strike with strike box for each latch or lock bolt, with curved lip extended to protect frame, finished to match door hardware set, unless otherwise indicated, and as follows:
Flat-Lip Strikes: For locks with three-piece antifriction latch bolts, as recommended by manufacturer.
Extra-Long-Lip Strikes: For locks used on frames with applied wood casing trim.
Aluminum-Frame Strike Box: Manufacturer's special strike box fabricated for aluminum framing.

CLOSERS
Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
Surface-Mounted Closers:
LCN Closers; an Ingersoll-Rand company. Provided by Owner.

Standards: Comply with the following:
Closers: BHMA A156.4
Surface Closers: BHMA Grade 1.

Certified Products: Provide door closers listed in BHMA’s “Directory of Certified Door Closers.”
Size of Units: Unless otherwise indicated, comply with manufacturer's written recommendations for size of door closers depending on size of door, exposure to weather, and anticipated frequency of use. Provide factory-sized closers, adjustable to meet field conditions and requirements for opening force.

OPERATING TRIM
Operating trim: BHMA A156.6; aluminum, unless otherwise indicated.

Manufacturers: Subject to compliance with requirements, provide products by one of the following:
IVES Hardware; an Allegion PLC Company.

PROTECTIVE TRIM UNITS
Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
Manufacturers: Subject to compliance with requirements, provide products by one of the following:
Metal Protective Trim Units:
IVES Hardware; an Allegion PLC Company.

Standard: Comply with BHMA A156.6.
Materials: Fabricate protection plates from the following:
Stainless Steel: 0.050 inch (1.3 mm) thick; beveled top and 2 sides.
Fasteners: Provide manufacturer’s standard exposed fasteners for door trim units consisting of either
machine or self-tapping screws.

Furnish protection plates sized 1-1/2 inches (38mm) less than door width on push side
and ½ inch (13 mm) less than door width on pull side, by height specified in Door
Hardware Schedule.

STOPS AND HOLDERS
Manufacturers: Subject to compliance with requirements, provide products by one of the following:

IVES Hardware; an Allegion PLC Company.

Glynn-Johnson; an Allegion PLC Company.

Standards: Comply with the following:

Stops and Bumpers: BHMA A156.16.

Mechanical Door Holders: BHMA A156.16.

Combination Overhead Holders and Stops: BHMA A156.8.

Door Silencers: BHMA A156.16.

Stops and Bumpers: BHMA Grade 1.

Mechanical Door Holders: BHMA Grade 1.

DOOR GASKETING
Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that
may be incorporated into the Work include, but are not limited to, the following:

Manufacturers: Subject to compliance with requirements, provide products by one of the following:

Door Gasketing:

National Guard Products.

Pemko Manufacturing Co.; an ASSA ABLOY Group company.

Zero International

Door Bottoms:

National Guard Products.

Pemko Manufacturing Co.; an ASSA ABLOY Group company.

Zero International

Standard: Comply with BHMA A156.22.

General: Provide continuous weather-strip gasketing on exterior doors and provide smoke, light or sound
gasketing on interior doors where indicated or scheduled. Provide noncorrosive fasteners for exterior
applications and elsewhere as indicated.

Perimeter Gasketing: Apply to head and jamb, forming seal between door and frame.

Meeting Stile Gasketing: Fasten to meeting stiles, forming seal when doors are closed.

Door Bottoms: Apply to bottom of door, forming seal with threshold when door is closed.

Air Leakage: Not to exceed 0.50 cfm per foot (0.000774 cu. m/s per m) of crack length for gasketing other
than for smoke control, as tested according to ASTM E 283.

Smoke-Labeled Gasketing: Assemblies complying with NFPA 105 that are listed and labeled by a testing
and inspecting agency acceptable to authorities having jurisdiction, for smoke-control ratings indicated,
based on testing according to UL 1784.

Provide smoke-labeled Gasketing on 20-minute-rated doors and on smoke-labeled doors.

Fire-Labeled Gasketing: Assemblies complying with NFPA 80 that are listed and labeled by a testing and
inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing
according to UL 10B or NFPA 252. Provide all Gasketing not provided by door manufacturer required to
meet requirements of Wisconsin Enrolled Building Code.
Sound-Rated Gasketing: Assemblies that are listed and labeled by a testing and inspecting agency for sound ratings indicated, based on testing according to ASTM E 1408.

Replaceable Seal Strips: Provide only those units where resilient or flexible seal strips are easily replaceable and readily available from stocks maintained by manufacturer.


**FABRICATION**

Manufacturer's Nameplate: Do not provide products that have manufacturer's name or trade name displayed in a visible location (omit removable nameplates) except in conjunction with required fire-rated labels and as otherwise approved by Architect.

Manufacturer's identification is permitted on rim of lock cylinders only.

Base Metals: Produce door hardware units of base metal, fabricated by forming method indicated, using manufacturer's standard metal alloy, composition, temper, and hardness. Furnish metals of a quality equal to or greater than that of specified door hardware units and BHMA A156.18 for finishes. Do not furnish manufacturer’s standard materials for forming methods if different from specified standard.

Fasteners: Provide door hardware manufactured to comply with published templates generally prepared for machine, wood, and sheet metal screws. Provide screws that comply with commercially recognized industry standards for application intended, except aluminum fasteners are not permitted. Provide Phillips flat-head screws with finished heads to match surface of door hardware, unless otherwise indicated.

Concealed Fasteners: For door hardware units that are exposed when door is closed, except for units already specified with concealed fasteners. Do not use through bolts for installation where bolt head or nut on opposite face is exposed unless it is the only means of securely attaching the door hardware. Where through bolts are used on hollow door and frame construction, provide sleeves for each through bolt.

Steel Machine or Wood Screws: For the following fire-rated applications:
- Mortise hinges to doors.
- Strike Plates to frames.
- Closers to doors and frames.

Steel Through Bolts: For the following fire-rated applications, unless door blocking is provided:
- Surface hinges to doors.
- Closers to doors and frames.
- Surface-mounted exit devices.

Spacers or Sex Bolts: For through bolting of hollow-metal doors.

Gasketing Fasteners: Provide noncorrosive fasteners for exterior applications and elsewhere as indicated.

**FINISHES**

Standard: Comply with BHMA A156.18.

Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

BHMA Designations: Comply with base material and finish requirements indicated by the following:
- Match Standard per Existing Building.
PART 3 – EXECUTION

EXAMINATION

Examine doors and frames, with Installer present, for compliance with requirements for installation tolerances, labeled fire-rated door assembly construction, wall and floor construction, and other conditions affecting performance.

Proceed with installation only after unsatisfactory conditions have been corrected.

PREPARATION

Steel Doors and Frames: For surface applied door hardware, drill and tap doors and frames according to ANSI/SDI A250.6.

INSTALLATION

Mounting Heights: Mount door hardware units at heights indicated in following applicable publications, unless specifically indicated or required to comply with governing regulations:


Install each door hardware item to comply with manufacturer's written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing work specified in Division 09 Sections. Do not install surface-mounted items until finishes have been completed on substrates involved.

Set units level, plumb, and true to line and location. Adjust and reinforce attachment substrates as necessary for proper installation and operation.

Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors according to industry standards.

ADJUSTING

Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.

Door Closers: Adjust sweep period so that, from an open position of 70 degrees, the door will take at least 3 seconds to move to a point 3 inches (75 mm) from the latch, measured to the leading edge of the door.

Six-Month Adjustment: Approximately six months after date of Substantial Completion, Installer shall perform the following:

Examine and readjust each item of door hardware, including adjusting operating forces, as necessary to ensure function of doors, door hardware, and electrified door hardware.

Consult with and instruct Owner’s personnel on recommended maintenance procedures.

Replace door hardware items that have deteriorated or failed due to faulty design, materials, or installation of door hardware units.

CLEANING AND PROTECTION

Clean adjacent surfaces soiled by door hardware installation.

Clean operating items as necessary to restore proper function and finish.

Provide final protection and maintain conditions that ensure that door hardware is without damage or deterioration at time of Substantial Completion.
**DEMONSTRATION**

Engage a factory-authorized service representative to train Owner’s maintenance personnel to adjust, operate, and maintain door hardware and door hardware finishes.

**DOOR HARDWARE SCHEDULE**

Guide: Door hardware items have been placed in sets which are intended to be a guide to design, grade, quality, function, operation, performance, exposure and other like characteristics of door hardware, and may not be complete. Provide door hardware required to make each set complete and operational. See other requirements of this Section relating to type, design, grade, quality, function, operation, performance, exposure and like characteristics of door hardware items.

Hardware set schedule does not reflect hand, backset, and method of fastening and like characteristics of door hardware and door operation.

Review door hardware sets with door types, sizes and details, and verify function of each item.

Door hardware items scheduled may indicate a reference for type, quality, size, function or like characteristics required. If no such reference is indicated, assign proper quantity, type, size, function or like characteristics to door hardware item.

Manufacturers and their abbreviations used this schedule:

- GLY Glynn-Johnson Hardware
- IVE H.B. Ives
- LCN LCN Closers
- NGP National Guard Products
- SCE Schlage Electronic Security
- SCH Schlage Lock Company
- VON Von Duprin

Reference: Provide door hardware sets as indicated on Drawings and in this Schedule. Hardware set designations specified correspond to set designations indicated on Drawings. The hardware sets are as follows:

**HARDWARE SETS**

**Hardware Set 01 (HS-01)**

Provide each single door with the following: Door 112B.1

<table>
<thead>
<tr>
<th>Qty</th>
<th>Description</th>
<th>Catalog Number</th>
<th>Finish</th>
<th>Mfr</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>HINGE</td>
<td>5BB1 4.5 X 4.5</td>
<td>652</td>
<td>IVE</td>
</tr>
<tr>
<td>1</td>
<td>PASSAGE SET</td>
<td>L9010 03N (by owner)</td>
<td>630</td>
<td>SCH</td>
</tr>
<tr>
<td>1</td>
<td>SURFACE CLOSER</td>
<td>4040XP H MC (by owner)</td>
<td>689</td>
<td>LCN</td>
</tr>
<tr>
<td>1</td>
<td>WALL STOP</td>
<td>WS401CVX</td>
<td>626</td>
<td>IVE</td>
</tr>
<tr>
<td>1</td>
<td>SEALS</td>
<td>5050B</td>
<td>BRN</td>
<td>NGP</td>
</tr>
</tbody>
</table>

**Hardware Set 02 (HS-02)**

Provide each single door with the following: Doors 112.3 and 112F.1

<table>
<thead>
<tr>
<th>Qty</th>
<th>Description</th>
<th>Catalog Number</th>
<th>Finish</th>
<th>Mfr</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>HINGE</td>
<td>5BB1 4.5 X 4.5</td>
<td>652</td>
<td>IVE</td>
</tr>
<tr>
<td>1</td>
<td>PASSAGE SET</td>
<td>L9010 03N (by owner)</td>
<td>630</td>
<td>SCH</td>
</tr>
<tr>
<td>1</td>
<td>SURFACE CLOSER</td>
<td>4040XP HCUSH MC (by owner)</td>
<td>689</td>
<td>LCN</td>
</tr>
<tr>
<td>1</td>
<td>SEALS</td>
<td>5050B</td>
<td>BRN</td>
<td>NGP</td>
</tr>
</tbody>
</table>
## Hardware Set 03 (HS-03)

Provide each single door with the following: Door 112C.1

<table>
<thead>
<tr>
<th>Qty</th>
<th>Description</th>
<th>Catalog Number</th>
<th>Finish</th>
<th>Mfr</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 EA</td>
<td>HINGE</td>
<td>5BB1 4.5 X 4.5</td>
<td>652</td>
<td>IVE</td>
</tr>
<tr>
<td>1 EA</td>
<td>CLASSROOM LOCK</td>
<td>L9070L 03N (by owner)</td>
<td>630</td>
<td>SCH</td>
</tr>
<tr>
<td>1 EA</td>
<td>MORTISE CYLINDER</td>
<td>30-007 (by owner)</td>
<td>626</td>
<td>SCH</td>
</tr>
<tr>
<td>1 EA</td>
<td>PERMANENT CORE</td>
<td>20-740-XP-LKB (by owner)</td>
<td>626</td>
<td>SCH</td>
</tr>
<tr>
<td>1 EA</td>
<td>SURFACE CLOSER</td>
<td>4040XP H MC (by owner)</td>
<td>689</td>
<td>LCN</td>
</tr>
<tr>
<td>1 EA</td>
<td>DOOR BOTTOM</td>
<td>422N</td>
<td>A</td>
<td>NGP</td>
</tr>
<tr>
<td>1 SET</td>
<td>SEALS</td>
<td>5050B</td>
<td>BRN</td>
<td></td>
</tr>
</tbody>
</table>

Doors are existing wood doors with mortise locksets. New lockset to replace existing, all other hardware is existing to remain.

## Hardware Set 04 (HS-04)

Provide each single door with the following: Door 112D.1, 112.2

<table>
<thead>
<tr>
<th>Qty</th>
<th>Description</th>
<th>Catalog Number</th>
<th>Finish</th>
<th>Mfr</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 EA</td>
<td>CLASSROOM LOCK</td>
<td>L9070L 03N (by owner)</td>
<td>630</td>
<td>SCH</td>
</tr>
<tr>
<td>1 EA</td>
<td>MORTISE CYLINDER</td>
<td>30-007 (by owner)</td>
<td>626</td>
<td>SCH</td>
</tr>
<tr>
<td>1 EA</td>
<td>PERMANENT CORE</td>
<td>20-740-XP-LKB (by owner)</td>
<td>626</td>
<td>SCH</td>
</tr>
<tr>
<td>1 SET</td>
<td>SEALS</td>
<td>5050B</td>
<td>BRN</td>
<td></td>
</tr>
</tbody>
</table>

Doors are existing wood doors with mortise locksets. New lockset to replace existing, all other hardware is existing to remain.

## Hardware Set 05 (HS-05)

Provide each single door with the following: Door 112.1

<table>
<thead>
<tr>
<th>Qty</th>
<th>Description</th>
<th>Catalog Number</th>
<th>Finish</th>
<th>Mfr</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 EA</td>
<td>HINGE</td>
<td>5BB1 4.5 X 4.5</td>
<td>652</td>
<td>IVE</td>
</tr>
<tr>
<td>1 EA</td>
<td>CLASSROOM LOCK</td>
<td>L9070L 03N (by owner)</td>
<td>630</td>
<td>SCH</td>
</tr>
<tr>
<td>1 EA</td>
<td>MORTISE CYLINDER</td>
<td>30-007 (by owner)</td>
<td>626</td>
<td>SCH</td>
</tr>
<tr>
<td>1 EA</td>
<td>PERMANENT CORE</td>
<td>20-740-XP-LKB (by owner)</td>
<td>626</td>
<td>SCH</td>
</tr>
<tr>
<td>1 SET</td>
<td>SEALS</td>
<td>5050B</td>
<td>BRN</td>
<td></td>
</tr>
</tbody>
</table>

Doors are existing wood doors with mortise locksets. New lockset to replace existing, all other hardware is existing to remain.

END OF SECTION
PART 1 – GENERAL

SCOPE
This section includes specifications for high performance laboratory fume hoods. Included are the following topics:

PART 1 – GENERAL
Scope
Related Work
Reference Standards
Design Requirements
Quality Assurance
Delivery, Storage and Handling
Project Conditions
Sequencing and Scheduling
Training
Submittals
Warranty

PART 2 – PRODUCTS
Manufacturers
Fume Hood Services, Fixtures and Accessories
Mott Manufacturing Limited Requirements
Flow Safe Requirements
Lab Crafters Requirements
Hamilton Requirements
Kewaunee Requirements
Performance Requirements

PART 3 – EXECUTION
Installation
Adjustments and Calibration
Cleaning
Protection of Finished Work
Construction Verification Items
Functional Performance Testing
Field Installed Testing
Agency Training
Instructional Signage

RELATED WORK
Applicable provisions of Division 1 shall govern all work under this section.

Related Sections and Divisions:
Section 11 53 43 Laboratory Fittings and Fixtures
Section 12 35 00 Wood Laboratory Casework
Section 12 36 53 Laboratory Casework Tops
Division 22 - Plumbing utilities and final connections to fume hoods.
Division 23 - HVAC utilities and final connection to fume hoods.
Division 26 - Electrical utilities and final connections to fume hoods.
REFERENCE STANDARDS

1. ANSI/AIHA Z9.5 - 2003 Laboratory Ventilation Standard
3. ASTM A336 Steel, Sheet, Carbon, Cold Rolled, Commercial Quality
4. ASTM E84 Surface Burning Characteristics of Building Materials
5. FS DD-G1403 Glass, Plate (Float), Sheet, Figured, and Spandrel (Heat Strengthened and Fully tempered).
7. NFPA 56F Non-Flammable Medical Gas Systems.
10. UL 1805 Laboratory Fume Hoods and Cabinets

DESIGN REQUIREMENTS

Fume hoods shall function as ventilated, enclosed work spaces, designed to capture, confine and exhaust fumes and vapors produced or generated within the enclosure in accordance with the performance requirements specified in Part 2 of this section.

Constant volume, bench-type fume hood shall maintain essentially constant exhaust volume at any sash position. Maximum variation in exhaust CFM, static pressure and average face velocity as a result of sash adjustment shall not exceed 5% for any sash position at the specified exhaust volume.

Design face velocity with sash in full open position is 50 feet per minute. The vertical sash opening height used to measure the face velocity shall be 27-1/2 inches.

Fume hood shall be designed to minimize static pressure drop through hood. Maximum average static pressure loss readings taken three diameters above the hood outlet from four points, 90 degrees apart, shall not exceed 0.15 inches water column with sash in full open position at design face velocity.

Fume hoods shall be available in standard width of 4 feet.

The fume hood manufacturer shall provide a pre-piped, pre-wired junction box at the top of the fume hood for a single point connection of 120v AC power to supply receptacles, light switch and fixture, along with any other control or accessory requiring an electrical supply. Transformers required to step voltage down for fume hood controls or accessories shall be pre-installed and pre-wired in the factory by the fume hood manufacturer. Division 26 contractor will provide 120v AC power connection at junction box.

All work must conform to all State of Wisconsin Codes.

QUALITY ASSURANCE

Fume Hood must be Underwriters Laboratories subject 1805 classified. The 1805 standard covers electrical and mechanical hazards, investigates the flammability of materials and measures the effectiveness of airflow characteristics. Proper labeling must be affixed to the face of each fume hood indicating classification to the UL 1805 standard for Laboratory Fume Hoods. UL listing covering electrical components only or other listings that do not encompass all issues covered in UL 1805 is insufficient. All factory testing shall be performed in a U.L. certified test facility.

Installer’s Qualifications: Factory trained and certified by the manufacturer, and have five years or more experience in installation of laboratory fume hoods, casework and equipment of type specified. Installer shall be knowledgeable with calibration procedures for the fume hood alarm and monitor specified in Part 2 – Products.

DELIVERY, STORAGE, AND HANDLING

Handling: Protect finished surfaces from soiling or damage during handling and installation. Keep covered with polyethylene film or other protective coating. Protect all work surfaces throughout construction period.
with 1/4 inch corrugated cardboard completely covering the top and securely taped to edges. Any tape used on fume hood surfaces shall be non-delaminating. Manufacturer shall be responsible for removal of taping adhesive. Sash and counterbalance mechanism shall be secured for shipping.

PROJECT CONDITIONS
The fume hood manufacturer and installer shall review all project conditions and building limitations such as doorway sizes, corridor widths, ceiling heights, obstructions, etc. prior to bidding the project. The fume hood manufacturer and installer shall determine any disassembly and re-assembly methods necessary for access of each fume hood into its final location. Costs associated with disassembly, re-assembly and access to the fume hood final locations shall be included in the bid.

SEQUENCING AND SCHEDULING
Do not deliver or install fume hoods until the following conditions have been met:
- Building areas requiring the installation of fume hoods shall be dry and not exposed to construction activities or adverse weather conditions which may damage finished materials.
- Interior building temperatures shall not register below 65 degrees F. in areas of fume hood installation to permit the proper curing of epoxy sealants and adhesives.
- Walls and partitions must be in place and finished with at least the primer coat of paint. If finish painting is to take place after fume hood installation, protect fume hoods by covering and masking prior to commencement.
- Overhead soffits and ceiling grid must be in place and overhead lighting must be installed and connected prior to fume hood installation.
- All flooring required to be placed under fume hoods and base cabinets must be installed prior to material delivery.

TRAINING
Fume hood manufacturer’s representative shall provide a minimum of 1 hour of training for owner’s designated personnel in the operation and maintenance of the fume hoods. Training shall include demonstration on procedures for testing and calibration of fume hood monitors and alarms and all control devices.

Provide the users with a professional quality CD (minimum 15 minutes in length) on proper hood usage. The CD shall convey:
- The basic concept of a fume hood and how it serves to protect users.
- The function of the sash and its proper use.
- Safety rules for proper movement in the work zone.
- Safety rules for fume hood loading.
- A high volume smoke demonstration on the hood’s containment potential and how improper use can compromise containment.
- Fume hood alarm features and how the user should respond to these.

SUBMITTALS
Submit sufficient quantities of shop drawing review copies to allow the following distribution:

Project Operating and Maintenance Manuals 2 copies
Division of Facilities Development 1 copy
A/E 1 copy

Each fume hood shop drawing review copy shall include the following information:
Manufacturer’s product data for each type of hood specified. Include component dimensions, configurations, construction details, joint details, and attachments. Indicate location, size, and service requirements for each utility connection. Clearly identify all features on the submittals.
3/4 inch = 1 foot scale plans and elevations of individual and/or battery of hoods showing cross sections, rough-in and anchor placements, tolerances, and clearances. Indicate relation to other laboratory equipment, surrounding walls, windows, doors, and other building components.

Provide 1/4 inch = 1 foot rough-in plan drawings for coordination with trades.

3 inch by 5 inch finish samples of color of finish for fume hoods, work surfaces and for other prefinished equipment and accessories for selection by the Owner’s Representative.

Sound data for 63, 125, 250, 500, 1000, 2000, 4000 hertz octave bands.

Test Reports for each size hood verifying conformance to performance tests specified in Part 2 - Products. Reports may be submitted in electronic format, but written copy’s must also be submitted. Reports must be “third party” validated.

Fume hood instructional signage specified in Part 2 – Products.

Operation and maintenance manuals outlining proper operating and maintenance procedures for each different type of fume hood. O&M manuals shall include a complete parts list for the fume hood.

Operation and calibration manual for the fume hood monitors and alarms.

WARRANTY
Provide a 1-year warranty for parts and labor against defects in materials and workmanship.

PART 2 - PRODUCTS

MANUFACTURERS
Subject to compliance with specification requirements, provide one of the following products:

• Mott Manufacturing, Wisconsin Model
• Flow Safe, Vortex II
• Lab Crafters, Air Sentry
• Hamilton Laboratory Solutions, Pioneer
• Kewaunee Scientific, Wisconsin Supreme Air
• Labconco, Wisconsin Hood

Other manufacturers and/or products must undergo independent testing according to the performance requirements specified in this section. Independent testing shall be conducted by a firm designated by UW-Madison. Results must be reviewed and approved by UW-Madison prior to approval for bidding.

FUME HOOD SERVICES, FIXTURES AND ACCESSORIES
Reference fume hood drawings, details and schedule for all service rough-in locations, fixture quantities and fixture mounting locations. The fume hood services and fixtures specified are common to both manufacturers listed above.

All service controls, switches and electrical receptacles shall be mounted at locations on the front of the fume hood post(s). Fume hoods specified or noted on the drawings to be ADA compliant shall have all fixture controls, switches and receptacles mounted at a maximum height of 54 inches off the floor.

PIPING SERVICES
Factory pre-piping shall extend 2 inches beyond top or bottom of the fume hood per rough-in locations on drawings. Pressure test all piping in factory. Pipe ends shall be capped until final connection is made by Division 22 and Division 23 contractors.
Natural Gas and Compressed Air

ASTM A53, type E or S, standard weight (schedule 40) black steel pipe with ASTM A197/ANSI B16.3 class 150 black malleable iron threaded fittings using thread lubricant or teflon tape.

PLUMBING FIXTURES
Natural Gas and Compressed Air Fixtures
As specified in Section 11 53 43 Laboratory Fittings and Fixtures

ELECTRICAL SERVICES
The following specifications are for factory pre-wired electrical services within the laboratory fume hood.
All materials and installation methods shall meet the requirements of the National Electric Code.

Wiring: minimum #12 copper, type THHN/THWN insulation. Wire color coding shall be black for current carrying conductors, white for neutral conductors and green for ground conductors.

Conduit: 1/2 inch, flexible metal conduit, galvanized spiral strip. Secure conduit to superstructure framework with conduit clamps.

Junction Boxes: 4 inch square by 2-1/8 inch deep, code gauge galvanized steel, screw covers.

Spring Wire Connectors: Solderless spring type pressure connector with insulating covers for splices and taps.

ELECTRICAL FIXTURES
All electrical devices shall be UL listed.

Fume hood light fixture shall have two lamps, rapid start, fluorescent type with sound rated electronic ballasts mounted on exterior of fume hood roof. Fixture shall be mounted in roof liner and sealed behind a laminated safety glass panel to isolate light fixture from fume hood interior. Interior of light fixture shall be white, high reflecting plastic enamel. Lamps shall be removable from the exterior of the fume hood.

Average illumination of work surface shall be at least 90 foot candles.

Lamps must be provided with fume hood light fixtures.

Light fixture switch shall be toggle type mounted in front post of superstructure. Switch cover plate shall be stainless steel with a brushed finish and labeled “LIGHT”.

Receptacles shall be duplex, GFCI, grounding type, hospital grade. Reference drawings for quantities, locations, amperage and voltage ratings of receptacles. Provide flush, stainless steel, brushed finish receptacle cover plates.

Unless noted otherwise, receptacles shall be 120v AC, 20A.

Fume light fixture, switch and receptacles shall be pre-wired by fume hood manufacturer to a junction box on the exterior roof of the fume hood for a single point power connection by the electrical contractor.

VENTILATION CONNECTIONS
Fume hood exhaust collar shall be rectangular or round with a parabolic, bell shaped, or tapered entry at the connection to fume hood to minimize static pressure drop. Collar shall be constructed of type 316L stainless steel or steel with a reagent resistant coating.

Coordinate with Division 23 contractor for final exhaust duct connection to fume hood collar.
Provide 1-1/2” diameter polypropylene vent pipe connecting from the rear of the acid storage base cabinet to the inside hood chamber behind the rear baffle plate. Seal vent pipe penetration and extend minimum of 1” above fume hood work surface.

CEILING CLOSURE PANELS AND FILL PANELS
Do not utilize or provide ceiling enclosure panels.

INSTRUCTIONAL SIGNAGE
Provide instructional signage to explain the fume hood operational and safety instructions. Mount the signage on the front of each fume hood in plain view of user. Signage shall be plastic engraved laminate or directly applied silkscreen using chemical resistant epoxy ink. Signage shall have red background and white lettering (Font equal to Arial, 14 pt. or equal) to provide visual attraction.

See templates attached to the end of this specification for signage wording.

Sign shall also include manufacturer’s model number for the fume hood.

OPERATION and MAINTENANCE MANUALS AND TRAINING CD
The fume hood manufacturer shall provide a 8-1/2 x 11 sized, rigid plastic or stainless steel pocket permanently attached to the front of each fume hood for storage of operation and maintenance manuals.

Each fume hood shall be provided with its own copy of the fume hood operation and maintenance manual and the fume hood monitor/alarm operation and calibration manual that was approved during the shop drawing review. Note that these copies do not need to be the actual stamped and approved copies, but they must be duplicates of the shop drawing review copies that were stamped and approved. The manuals shall be provided in the pocket permanently attached to each fume hood.

A jacketed copy of the instructional training CD shall be provided for each fume hood in the permanently attached pocket on the fume hood.

SAFETY MONITOR AND ALARM SYSTEM
Acceptable safety monitors/alarms are:

TSI, Model FMH 10
Flow Safe, Model HAM-VFV
TEL, Model AFA 1000

Safety monitor and alarm shall continuously monitor face velocity and provide audible and visual alarm if face velocity falls below low alarm setpoint or rises above high alarm setpoint.

The monitor shall have one set of dry contacts for connecting alarm to either set back sequence or building management system.

Monitor and velocity sensor shall be factory installed and prewired on hood complete with low voltage transformer and transformer cable.

The calibration of the monitor shall be completed in the field by the fume hood installer. Reference Part 3 – Execution. Monitor shall be adjusted for an 40 FPM low alarm, 500 FPM high alarm.

All fume hoods will have VAV fume hood controls provided by Division 23 with the fume hood monitor provided with the VAV fume hood controls. Fume hoods do not require fume hood monitors to be provided with the fume hoods. There are no fume hoods on the project that require factory installed monitors.
MOTT MANUFACTURING LIMITED REQUIREMENTS

SUPERSTRUCTURE

Rigid, self-supporting assembly of double wall construction, maximum 4-7/8” thick. Wall consists of a sheet steel exterior shell and a corrosion resistant inner liner, and houses and conceals steel framing members, attaching brackets and remote operating service fixture mechanisms and services.

Exterior shell to be high quality, cold rolled, mild steel meeting requirements of ASTM A366; gauges U.S. Standard and galvanized. Finish with electrostatically applied reagent resistant polyester/urethane powder coat, minimum thickness 1.2 mils. Panels shall be fastened together using galvanized steel angles and channels, minimum 14 gauge. Panels and brackets attached with stainless steel screws with plastic caps on hood interior as needed for a secure superstructure.

Overall depth of fume hood superstructure, not including down-flow airflow chamber, shall be 38.625 inches.

Inner liner shall be fiberglass reinforced polyester panel; smooth finish and white color in final appearance. Flexural strength: 14,000 psi. Flame spread: 25 or less per U.L. 723 and ASTM E84-80. All interior seams to be sealed and caulked.

Access to fixture valves concealed in wall provided by exterior removable access panels and gasketed access panels on the inside liner walls. Gaskets: White 70 durometer PVC for interior access panels. Gasket interior access panels to eliminate air leakage and to retain liquids inside hood.

Baffle providing controlled air vectors into and through the fume hood shall be fabricated of the same material as the liner. Supports, and brackets to be non-metallic. High performance 1-piece baffle will be used. Baffle shall incorporate exhaust opening at work surface. Baffle to be non-adjustable, but removable for periodic cleaning and retrieval of debris.

Fume hood shall be equipped with a 2” high rectangular exhaust duct connection measuring 36” long x 3” wide.

Access opening perimeter shall have air foil or streamlined shape with all right angle corners radiused or angled.

Bottom horizontal air foil shall be angled design to minimize reverse flows and eddy currents at the work surface. Bottom air foil shall be stainless steel with polyester/urethane powder coating to increase acid and abrasion resistance. Air foil and sill to be no more than ½” above the height of the work surface.

Air foil shall not be removable without use of special tools.

Provide a steel safety bar with polyester/urethane powder coating across the full width of the bottom in front of the air foil positioned to prevent users from directly blocking the air foil with their body. The safety bar shall be located approximately 4 inches from the front edge of the bottom air foil and should not be removable without special tools.

FASTENINGS

Exterior structural members attachments: Sheet metal screws, zinc plated.

Interior fastening devices protected by plastic caps. Exposed screws not acceptable.

Exterior side access panel member fastening devices to be concealed spring steel clips.

WORK SURFACE

Modified epoxy resin 1-1/4” thick surface, dished at least 1/2” to contain spills, color: black.
SASH
Combination vertical and horizontal sash shall have a 26 inch high access opening along with a fixed top
viewing panel to provide a 35” high overall sight line. Sash frame on sides shall be no more than 1.5” wide,
corrosion resistant steel with chemical resistant powder coating. Sash frame shall ride in extruded PVC sash
guides. Bottom edge of sash frame shall be formed to minimize air flow turbulence into the hood. Horizontal
sliding panels shall be 7/32” thick laminated safety glass, top hung on nylon tired stainless steel ball bearing
wheels and provided with finger pulls. Horizontal sash panels shall be mounted to prevent easy removal.
Fixed top viewing panel shall be minimum 7/32” thick laminated safety glass. Exposed glass edges of
viewing panels and sash panes shall have stainless steel or plastic trim to protect operators from injury and
prevent glass edges from chipping.

Sash counter balance system with sprocket and chain drive with single weight shall be self-leveling, prevent
sash tilting, and permit ease of operation at any point along full width pull. Maximum 7 pounds pull required
to raise or lower sash throughout its full length of opening. Life cycle test sash and weight. Open and close
sash against rubber bumper stops.

Sash chain and pulley assembly: Chain to be ANSI #35 steel, single strand with an average tensile strength
of 2,400 pounds, maximum working load of 480 pounds. Pulley assembly for sash chain shall be finished
bored steel drive sprockets. Idler sprockets; double sealed ball bearings type, lubricated. All sprockets steel
with zinc dichromate finish.

Auto-Sash mechanism shall be designed to promote usage of sash as an upper body and face shield. Sash
operating position shall be based on the combination sash fully lowered with horizontal panels opened to the
desired configuration of the user. Combination sash shall have the capability to be raised to full 26” vertical
opening for loading, unloading and setup of large apparatus. A lock-open lever shall be provided. When
lock-open is not engaged, the combination sash shall lower automatically to a nominal 18” position when
released. Auto-sash function shall be life cycle tested and not incorporate the need for motor drives.

DOWN-FLOW AIRFLOW CHAMBER
Airflow chamber shall assist fume hood containment by directing room air between the operator and the hood
from above sash opening. Chamber will be low resistance, 18 gauge steel with integral distribution media
and polycarbonate honeycomb flow straightener at outlet. Multiple 24v DC Axial Fans shall be an integral
part of the chamber. Housing to be powder-coat finished. The fans shall activate automatically when the
combination sash is raised above the 18 inch open position. Fan speed is adjustable by a rheostat. The fans
shall be controlled by a circuit board mounted on the top of the airflow chamber in a steel housing complete
with rocker on/off switch to facilitate hood servicing. Vertical sash position shall be monitored by a string-
pot type linear encoder. Upper and lower limits shall be re-programmable in the field if needed. Circuit board
shall be equipped with an audible and visual alarm which will sound and illuminate if any one of the fans
stops turning when needed. Down-flow fan control circuit board shall have integral monitoring with the
following sequence of operation:

-When sash is raised above upper limit (18”) fans turn on, amber light turn on, intermittent alarm
turns on.

-If tachometer sensor for any of the fans shows zero rotation, constant alarm turns on. RED indicator
lamp turns on and fault output relay closes.

-continue monitoring fan rotation as long as sash is above upper limit - cancel alarm, red light and
relay if all fans start spinning.

-When sash is below upper limit (18”) for more than 1 minute, turn off fans, stop monitoring fans.

-if sash is between lower limit (1”) and upper limit (18”), illuminate amber light.

-if sash is below lower (1”) limit, illuminate green light.
In addition to the above, the down-flow fan controller shall have the following features:
- RED, AMBER AND GREEN panel mount indicator lights on hood side post
- TTL level RS232 communications port for future use
- 0 to 5v analog output proportional to sash position
- Volt-free relay output for remote monitoring of fault condition
- Support for up to eight axial fan with tachometer monitoring for each
- Microcontroller shall be replaceable for future software updates
- Audible alarm shall be of the piezo type with a frequency of 4khz and a sound pressure level of 75 dbA measured 12” from the buzzer.

SAFETY MONITOR AND ALARM SYSTEM
Reference fume hood services, fixtures and accessories.

FLOW SAFE REQUIREMENTS
SUPERSTRUCTURE
Superstructure shall be double wall type.

Outer wall shall be 18 gauge cold rolled steel (ASTM A366M) finished per UL 1805. Powder coat finish to a minimum thickness 1.2 mil. Color selected from manufacturer’s standard color chart by architect/engineer.

Inner wall and baffles shall be galvanized steel covered with a minimum 3/16” thick chemically resistant white liner. The interior wall shall be securely held in place with stainless steel threaded fastenings with corrosion protection.

Flush mounted removable access panels shall be provided on inside walls of liner for maintenance of valves and remote control stem attachments. Inside panels shall be held in place using stainless steel threaded fasteners.

Electrical access shall be through the front of the hood.

Area surrounding sash opening shall be rounded to create an aerodynamic configuration with side posts maximum width 4.5 inches. Side posts shall incorporate an airfoil design. A multi-vector airfoil bypass and dynamic turning vane shall be mounted behind the sash.

Hood depth dimensions and vortex chamber shall be mathematically sized to support a Bi-Stable vortex.

A multi-vector airfoil bypass and dynamic turning vane shall be mounted behind the sash at the front edge of the work surface. Bypass airfoil and turning vane shall be coated steel with a chemical resistant finish. Airfoil shall be permanently attached via spring loaded pins to hood allowing airfoil to swing up for clearing of spill trough and for cord access. Fume hood shall incorporate a trough to collect spills underneath the multi-vector bypass airfoil.

Provide a steel safety bar with urethane powder coating across the full width of the bottom air flow positioned to prevent users from directly blocking the air foil with their body. The safety bar shall be located approximately 4 inches from the front edge of the bottom air foil and should not be removable without special tools.
SASH

Combination horizontal/vertical sash with 1/4 inch laminated safety glass.

Maximum sash opening shall be 27-1/2". An additional 7” high, clear glass viewing panel integrated as part of the sash lintel shall maintain a clear vision height of 34” above countertop. Clear fixed viewing panel and horizontal sash panels shall have stainless steel or plastic trim on all exposed edges to protect operators from injury and prevent glass edges from chipping.

Sash frame shall be metal construction with chemical resistant finish.

Vertical sash movement shall allow hood loading and horizontal movement to provide a safety body shield when needed. No more than 1/8” air gap between sash and sash pocket. Horizontal sliding sashes shall be mounted on two tracks supported from top rail by rollers.

All glass panels shall have finger pulls on each horizontal panel and shall have plastic edge guard on all vertical edges of each horizontal panel. Bottom edge of vertical sash frame shall have full length finger pull with dynamic turning vane airfoil design.

Single front counterweight system shall include weights stainless steel cables (with minimum safety factor of 10, and not exposed to exhaust vapors) and sash guides, steel pulleys with cable retaining device. Counterweight system shall be balanced to provide smooth operation of the sash at any point along the full width of the bottom sash pull.

Sash height limiting hardware shall be provided, mounted on exterior of the hood, to prevent raising the vertical sash unintentionally above setpoint.

WORK SURFACE

Modified epoxy resin 1- thick surface, dished at least 1/4” to contain spills, color: black.

BI-STABLE VORTEX BAFFLE CONTROL

The bi-stable vortex control system shall be factory installed and wired on the Vortex II fume hood.

The vortex control system shall include:

- Dedicated VFV vortex pressure transducer controller
- VFV electronic actuator

The baffle control system shall correct for fume hood loading, downdrafts, sash movements and activity in front of the hood to maximize fume hood containment.

Fume hood manufacturer’s representative shall setup and calibrate baffle control system upon completion of installation.

SAFETY MONITOR AND ALARM SYSTEM

Reference fume hood services, fixtures and accessories.

LAB CRAFTERS REQUIREMENTS

SUPERSTRUCTURE

Superstructure shall be double wall construction cold rolled steel that will house and conceal structural interior steel walls and service mechanisms. Inner steel wall, outer steel shell and inner liner shall be factory assembled as a rigid, self-supporting component. Fume hood front section shall be removable to facilitate the hood’s access into its final location.

Overall depth of fume hood superstructure shall be 39 inches.
Exterior shell to be 18 gauge reagent resistant polyurethane coated steel, color: selected from manufacturer's standard color chart by Architect/Engineer.

Inner liner and baffles shall be galvanized steel wall covered with 1/4” thick chemically resistant fiberglass reinforced polyester with smooth finish, color: white. Liner shall be held in place with concealed fasteners.

Flush mounted removable access panels shall be provided on inside walls of liner and on outside side panels to allow ease of maintenance on valves and baffle actuator.

Hood front to include posts, tracks, sash with weight, pulleys, cable, foil, pre-piped plumbing fixtures and pre-wired electrical fixtures. Hood front with sash and pre-wired electrical components, , are to be removable from hood body as a complete assembled one piece unit without disconnecting electrical components.

The superstructure perimeter surrounding the sash opening shall have an airfoil design for optimal airflow entry and containment at hood face. Hood post shall have airfoil design and not exceed 4-1/2 inches in width.

A multi-vector bottom airfoil mounted behind the sash and above the work surface shall be steel with a chemically resistant coating and shall have multi-channel slots. For ADA compliant fume hoods, a 2 inch deep trough below the airfoil is included to collect spills. The slotted airfoil shall be capable of swinging up to pass line cords underneath and to clear spillage from trough.

Provide a 316 stainless steel safety bar across the full width of the bottom air flow that is positioned to prevent users from directly blocking the air foil with their body. The safety bar shall be located approximately 4 inches from the front edge of the bottom air foil and be attached with tamper proof fasteners.

Combination horizontal/vertical sash with laminated safety glass.

Overall vertical sash viewing height shall be 34 inches with a 7 inch high clear fixed panel along the top of the opening. Overall vertical sash opening height shall be 27 1/2”.

Vertical sash shall be narrow 1-1/2” design and have built in horizontal sliding sashes that ride on rollers supported from the top rail in two tracks. Bottom edge of vertical sash shall have full length stainless steel pull with turning vane design. Clear fixed viewing panel and horizontal sash panels shall have stainless steel or plastic trim on all exposed edges to protect operators from injury and prevent glass edges from chipping.

Sash frame shall be aerodynamic radius design, reinforced to support added weight and shall have a mechanism to allow it to move below the counter top. Sash frame shall be steel construction with chemically resistant coating.

Counterweight system shall include single weight, non-coated military spec 1/8-inch stainless steel cables and sash guides, ball bearing type nylon pulleys with cable retaining device. System shall be designed to prevent sash drop in the event of cable failure. Counterweight system shall be balanced to provide smooth operation of the sash at any point along the full width of the bottom pull and prevent sash creep at any position. Sash assembly shall be enclosed in the front 12 inches of the hood assembly and shall be easily removed with less than ten fasteners for service and transport into the lab.

Modified epoxy resin 1- thick surface, dished at least 1/4” to contain spills, color: black.

The vortex control system shall be factory installed and wired on the Air Sentry™ fume hood.
The vortex control system shall include:

- One (1) Controller/Monitor with Vortex Sensor
- One (1) Baffle Actuator

The vortex sensor component shall be surface mounted in the fume hood sidewall and shall detect pressure difference between a stable and unstable vortex which is the direct indication of the fume hood performance.

The baffle controller shall be mounted on the fume hood post and shall control the electric servo motor that actuates automatic back wall baffles to maintain a stable vortex in the fume hood.

The electric servo actuator motor shall be 24VAC, 0-10 VDC input, 90 degree angle of rotation, current limited.

SAFETY MONITOR AND ALARM SYSTEM
Reference fume hood services, fixtures and accessories.

HAMILTON REQUIREMENTS

SUPERSTRUCTURE
Rigid, self supporting assembly of double wall construction, maximum 4-7/8" thick. Wall consists of a sheet steel exterior shell and a corrosion resistant inner liner, and houses and conceals steel framing members, attaching brackets and remote operating service fixture mechanisms and services.

Exterior shell to be high quality, cold rolled, mild steel meeting requirements of ASTM A366; gauges U.S. Standard and galvanized. Finish with electrostatically applied reagent resistant urethane powder coat, minimum thickness 1.2 mils. Panels must be attached to a full frame construction, minimum 14 gauge galvanized members. Panels and brackets attached to eliminate screw heads and metallic bracketry from hood interior.

Overall depth of fume hood superstructure, not including directed airflow chamber, shall be 37-1/4 inches.

Inner liner shall be poly-resin reinforced polyester panel; smooth finish and white color in final appearance. Flexural strength: 14,000 psi. Flame spread: 15 or less per U.L. 723 and ASTM E84-80. All interior seams to be sealed and caulked.

Access to fixture valves concealed in wall provided by exterior removable access panels, gasketed access panels on the inside liner walls, or through removable front posts. Gaskets: White 70 durometer PVC for interior access panels. Gasket interior access panels to eliminate air leakage and to retain liquids inside hood.

Baffles providing controlled air vectors into and through the fume hood shall be fabricated of the same material as the liner. Supports, and brackets to be non-metallic. Provide minimal exhaust slots full height on vertical sides of the baffle. High performance 2-piece baffle will be used. Baffle shall incorporate exhaust slots located to purge the upper and lower area of the hood. Baffle to be non-adjustable, but removable for periodic cleaning and retrieval of debris.

Access opening perimeter shall have air foil or streamlined shape with all right angle corners radiused or angled.

Bottom horizontal air foil shall be a triple vaned design to minimize reverse flows and eddy currents at the work surface. Bottom air foil shall be steel with urethane powder coating to increase acid and abrasion resistance. Air foil and sill to be no more than ½” above the height of the work surface. The air foil shall provide a nominal two inch bypass when sash is in the closed position with area between vanes sufficient in size to pass through electrical plugs. Air foil shall not be removable without use of special tools.
Provide a steel safety bar with urethane powder coating across the full width of the bottom air flow positioned to prevent users from directly blocking the air foil with their body. The safety bar shall be located approximately 4 inches from the front edge of the bottom air foil and should not be removable without special tools.

**FASTENINGS**
Exterior structural members attachments: Sheet metal screws, zinc plated, blunt nose. No sharp edges on the screw points.

Interior fastening devices concealed. Exposed screws not acceptable. (Screw head “caps” not acceptable).
Exterior side access panel member fastening devices to be exposed corrosion resistant, non-metallic material, creating a positive mechanical latch. Latch must be flush type. Exposed screws or velco type fasteners – not acceptable.

**WORK SURFACE**
Modified epoxy resin 1-1/4” thick surface, dished at least 1/2” to contain spills, color: black.

**SASH**
Combination vertical and horizontal sash shall have a 27.5 inch high access opening along with a fixed top viewing panel to provide a 35” high overall sight line. Sash frame on bottom and sides shall be no more than 1.5” wide, corrosion resistant steel with chemical resistant powder coating. Sash frame shall ride in extruded PVC sash guides. Bottom edge of sash frame shall be formed to minimize air flow turbulence into the hood. Horizontal sliding panels shall be 7/32” thick laminated safety glass, top hung on nylon tired stainless steel ball bearing wheels and provided with finger pulls. Horizontal sash panels shall be mounted to prevent easy removal. Fixed top viewing panel shall be minimum 3/8” thick laminated safety glass. Exposed glass edges of viewing panels and sash panes shall have stainless steel or black plastic trim to protect operators from injury and prevent glass edges from chipping.

Sash counter balance system with sprocket and chain drive with single weight shall be self-leveling, prevent sash tilting, and permit ease of operation at any point along full width pull. Maximum 7 pounds pull required to raise or lower sash throughout its full length of opening. Life cycle test sash and weight. Open and close sash against rubber bumper stops.

Sash chain and pulley assembly: Chain to be ANSI #35 steel, single strand with an average tensile strength of 2,400 pounds, maximum working load of 480 pounds. Pulley assembly for sash chain shall be finished bored steel drive sprockets and keyed drive, 1/2” dia. Front connector shaft. Rear idler sprockets; double sealed ball bearings type, lubricated. All sprockets steel with zinc dichromate finish.

Auto-Sash mechanism shall be designed to promote usage of sash as an upper body and face shield. Sash operating position shall be based on the combination sash fully lowered with horizontal panels opened to the desired configuration of the user. Combination sash shall have the capability to be raised to full 27.5” vertical opening for loading, unloading and setup of large apparatus. A lock-open lever shall be provided. When lock-open is not engaged, the combination sash shall lower automatically to a nominal 18” position when released. Auto-sash function shall be life cycle tested and not incorporate the need for motor drives.

A integrated visual sash alarm light, separate from the safety monitor and alarm specified below, shall annunciate when the sash is raised above 1 inch from the fully closed position.

An integrated audible sash alarm, separate from the safety monitor and alarm specified below, shall annunciate when the sash position is raised above the 18 inch open position.

**DIRECTED AIRFLOW CHAMBER**
Airflow chamber shall assist fume hood containment by directing room air between the operator and the hood from above sash opening. Chamber will be low resistance, 18 gauge steel with integral distribution media and polycarbonate honeycomb flow straightener at outlet. Blower shall be integral part of the chamber with
dual forward curved wheels. Motor shall be shaded pole, low horsepower rated for a 30,000 hour duty cycle.

Housing to be powder-coat finished and vibration isolated. The blower shall activate automatically when the combination sash is raised above the 18 inch open position.

SAFETY MONITOR AND ALARM SYSTEM
Reference fume hood services, fixtures and accessories.

KEWAUNEE REQUIREMENTS

Fume Hood Superstructure Frame:
A structure of steel support members shall be provided to support exterior panels and interior liner and baffle panels. To allow for maintenance and replacements, the baffle panels shall be removable without disassembly of the frame structure and outer steel panels. Likewise, the exterior steel panels shall be removable without disassembly of the frame structure and inner liner panels.

Fume Hood Dimensions:
Double wall end panel thickness shall not exceed 4.5". Interior clear working height shall be not less than 38" at any location in the interior of the hood on bench hoods. Interior depth from the back of the sash to the front of the rear baffle shall not be less than 24". The sash opening shall be not less than 28" in height above the worksurface on bench hoods.

Fume Hood Interior Walls:
Double wall ends, not more than 4.5" wide, with sash track flush with front vertical facia, shall be provided to maximize interior working area. The area between the double wall ends shall be closed to house the remote control valves. The front vertical facia shall be in a plane 45° from the hood face and end walls. This facia shall contain space for the required service controls and electrical devices.

Fume Hood Airfoil:
A 12 gauge painted steel, convergence z-cross section airfoil shall be mounted flush to the bottom of the hood opening. It shall provide no open space between it and the top front edge of the worksurface. The foil shall assure a flow of air rearward within 1/2" above the worksurface at all hood operating face velocities. A midriff safety bar shall be incorporated along the front of the airfoil extending the entire width of the fume hood opening.

Provide a powder coated steel safety bar across the full width of the bottom in front of the air foil positioned to prevent users from directly blocking the air foil with their body. The safety bar shall be located approximately 4 inches from the front edge of the bottom air foil and should not be removable without special tools.

Fume Hood Top Panel:
Fume hood top panel shall incorporate an type dynamic barrier bypass providing a clean air stream behind the sash plane.

Fume Hood Baffles:
The fume hood baffles shall be constructed of the same material as the hood lining. They shall consist of multiple sections with vertical slots and a continuous horizontal slot at the worksurface. Each baffle panel shall be easily removable from the interior, without requiring liner disassembly.

Fume Hood Duct Collar:
Each fume hood up to six feet in length shall contain one (1) 12” polyethylene bell-mouthed duct collar in the hood roof for exhausting the hood. Fume hoods over six feet in length shall contain two (2).

Fume Hood Lighting:
The light fixture shall be isolated from the hood interior by a 1/4" thick tempered glass panel sealed from the hood cavity. Fixture shall be UL listed.
Fume Hood Sash:
A combination (type A) sash shall be provided. The sash shall have horizontal sliding panels in a vertical rising steel frame. The horizontal glass panels shall be top hung and made of ¼” laminated safety glass. The sash shall be counterbalanced with a single weight to prevent tilting and binding during operation. The sash shall be connected to the counterweight system with two, 1/2” wide steel-reinforced polyurethane notched belts that engage a sprocketed shaft drive and be so configured that when lifted higher than 18”, the sash will return to the 18” operating position automatically. The sash shall provide a minimum of a 35-1/2” viewing height, with a maximum opening of 27.5” and shall incorporate a mechanism for latching it in the full-open position for hood set-up.

Hood Worksurface
Hood worksurface shall be 1-1/4” thick molded epoxy resin made in the form of a watertight pan, not less than 3/8” deep to contain spillage.

Access Opening:
The interior end liner panels shall be furnished opening that provides access to the service piping and valves to facilitate installation and maintenance. The openings shall be filled with a removable gasketed panel made from fume hood liner material.

KEMGLASS Reinforced Polyester Lining:
Interior liner panels shall be 1/4” thick fiberglass reinforced polyester sheet. Interior liner panels shall be fastened using stainless steel screws with plastic covered heads. The material shall have an ASTM E84 Class A flame spread rating (25 or less).

SAFETY MONITOR AND ALARM SYSTEM

PERFORMANCE REQUIREMENTS
The fume hoods specified must meet the following performance requirements which is an owner modified version of the ASHRAE 110-1995 standard, Method of Testing Performance of Laboratory Fume Hoods. This test has already been successfully completed by Mott, Hamilton, Flow Safe, Kewaunee and Labcrafters and so is not required for these three manufacturers unless there have been significant changes to the hood design since it was tested.

The manufacturers will furnish the specified fume hoods in sizes scheduled on the drawings, the test facility, and ventilation equipment necessary to perform the specified tests. An owner designated, independent, third party testing firm will perform the testing at the manufacturer’s site according to the following specifications. The test report will be prepared and submitted by the testing firm. All costs associated with the performance testing are to be included in the project bid.

TEST FACILITY:
The manufacturer’s test facility shall be sufficient size to provide similar conditions the fume hood will experience in normal as-used operating conditions. Provide make-up air and general exhaust system controls so that space pressure can be fluctuated between +0.015 inches w.c. to –0.015 inches w.c.

TESTING EQUIPMENT:
Hot wire thermal anemometer probe equal to TSI Velocicalc 8384 and recently calibrated (within one year) by a certified facility or by ISA Certified Level III Technologist.

- 30 second smoke bombs or titanium tetrachloride smoke sticks. **Caution:** Titanium tetrachloride is hazardous and skin contact or inhalation must be avoided.

- Smoke machine, Comet 4 Colt or equal theatrical smoke generator.

- Tracer gas: Industrial grade 3, sulfur hexa-flouride gas supplied from a cylinder.
• Ejector system: Tracer gas ejector will be the same as outlined in ANSI/ASHRAE 110-1995 standard.

• Critical orifice: Sized to provide tracer gas at eight liters per minute at an upstream pressure of 30 psig.

• Detection instruments: Foxboro Miran IA, Foxboro Miran Sapphire, or equal. Calibration of analyzer must be performed at time of testing. Analyzer will be calibrated to 0 to 0.15 PPM full-scale range versus analyzer output.

• Recorder with an accuracy better than plus or minus 0.05% of full scale, and be indicating recording at real time.

• Three dimensional mannequin, overall height 67 inches, clothed in smock.

• Cross flow fan consisting of a blower, plenum chamber and filters at outlet to produce steady flow. Blower speed shall be adjustable through a variac to produce variable flow rates from the cross flow fan.

• Ten cardboard boxes each measuring 12 inches high x 9 inches wide x 8 inches deep used for fume hood loading during tracer gas containment tests.

PRELIMINARY TEST AND DATA:

Provide a sketch of test room indicating room layout, hood and door locations, location of significant equipment including hood(s), test equipment and air supply system.

Face velocity measurements:

Face velocity shall be determined by averaging a minimum of 12 readings at the hood face. Take readings at center of grid made up of sections of equal area across the top, center and bottom of the full sash opening. Each reading is recorded after a minimum 10 second duration at each point.

Sash operation:

Check sash operation by moving sash through its full travel. Verify that sash operation is smooth and easy, and that vertical rising sash holds at any height without creeping up or down.

Exhaust airflow variations:

Monitor exhaust airflow with various vertical and horizontal sash positions from fully open to completely closed. Airflow must not vary more than 5% between any positions.

Fume hood static pressure drop:

The fume hood static pressure will be measured per ANSI/ASHRAE 41.3-1989 standard of pressure measurement, in the center of the exit plane 6 inches above the top plane of the collar. Static pressure shall not exceed 0.15 inches w.c. at 50 FPM sash face velocity through the fully open sash.

Local Smoke Test:

Move smoke stick in a pattern smoke inside the fume hood along both inside walls and work surface in a line 6 inches behind and parallel to the hood face, and along the top of the face opening. Swab an 8 inch diameter circle on the back of the hood. All smoke should be carried to the back of the hood and exhausted.

Test the operation of the bottom air bypass airfoil by running smoke under the airfoil.

If visible smoke flows out of the front of the fume hood, the hood fails the test.
Large Volume Smoke Test:
Using the smoke machine, generate a pattern smoke inside the fume hood along both inside walls and work surface in a line 6 inches behind and parallel to the hood face, and along the top of the face opening. All smoke should be carried to the back of the hood and exhausted.

Test the operation of the bottom air bypass airfoil by running smoke under the airfoil.

If visible smoke flows out of the front of the fume hood, the hood fails the test.

TRACER GAS CONTAINMENT TESTING:
Containment tests shall be performed statically and dynamically using an owner modified ANSI/ASHRAE 110-1995 method of testing performance of laboratory fume hoods as specified below.

All containment testing shall be performed with the fume hood loaded with 12 inch long x 9 inch wide x 8 inch deep boxes. The boxes shall be arranged to sit on the 9x8 side. The configuration shall be five 9 inch wide boxes across and two rows high, centered in the fume hood. Spacing between the boxes will be approximately 2 inches. The back of the boxes shall be positioned approximately two inches in front of the fume hood baffles. Bottom boxes shall rest on the work surface and not be elevated above work surface.

All static containment testing shall be performed with an induced 75 FPM cross draft. The cross draft plenum fan shall be arranged so the outlet of the plenum is even with one side of the fume hood and positioned 15 inches from the front of the sash. The cross draft velocity shall be measured at a single point behind the head of the mannequin, 18 inches from the closed sash.

Containment testing shall be performed with the gas detector probe in the mannequin positioned at 26 inches above the work surface and also at 18 inches above the work surface.

Fume hood shall at no time exceed a maximum spill above 0.05 PPM at 8.0 liter/minute tracer gas release. Fume hoods exceeding this spillage rate during the test procedure fail the test.

Containment tests shall be conducted at full 27-1/2" vertically open sash at 50 FPM plus or minus 3 fpm average sash face velocity for the mannequin and ejector positions specified below.

The gas ejector shall be installed in test positions per ANSI/ASHRAE 110-1995 guideline. For a typical bench type hood, three positions are required: left, center and right as seen looking into the hood. In the left position the ejector centerline shall be 12 inches from the left inside wall of the hood. In the center position the ejector shall be equal distance from the inside sidewalls. In the right position the ejector centerline shall be 12 inches from the right inside sidewall of the hood. The ejector body shall be positioned 6 inches behind the hood face in all positions.

Position the mannequin facing the front of the hood, centered on the ejector. Fix detector probe in the region of the nose and mouth of the mannequin. Installation shall insure that method of attachment of the probe does not interfere with the flow patterns around the mannequin. Perform tests with the detector probe 9 inches in front of the ejector (3 inches in front of sash) and 26 inches above the work surface. Repeat the containment tests with the detector probe 9 inches in front of the ejector and 18 inches above the work surface.

Fume hoods shall pass the three position static tracer gas containment test in the manufacturer’s test facility for both detector probe elevations. At no time can a peak spill exceed 0.05 PPM. Fume hoods exceeding this level fail the test.

The mannequin shall be positioned in the center test position with the detector probe 9 inches in front of the ejector and 26 inches above the work surface. The dynamic (SME) and (SPE) containment tests specified below shall be conducted and the results recorded. The tests will be repeated with the mannequin lowered
so the detector probe is 9 inches in front of the ejector and 18 inches above the work surface. Record these results. **At no time can a peak spill exceed 0.05 PPM.** Fume hoods exceeding this level fail the test.

Sash Movement Effect (SME) dynamic containment test:

The ejector shall be located in the center test position and mannequin shall be positioned as specified in the preceding paragraph with the sash fully closed. The block valve shall be opened releasing 8 liters per minute SF6 gas. At thirty seconds, the sash shall be fully opened vertically in a smooth motion at a velocity between 1.0 ft/s and 1.5 ft/s. At sixty seconds, the sash shall be fully lowered in a smooth motion at a velocity between 1.0 ft/s and 1.5 ft/s. The cycle shall be repeated at thirty second intervals for the duration of the five minute. The sash movement effect (SME) is the maximum peak tracer gas concentration determined in the test. The sash movement performance rating of the hood shall be recorded as SME-AM yyy, where yyy equals peak sash movement effect concentration in PPM. **At no time can a peak spill exceed 0.05 PPM.**

Space Pressure Effect (SPE) dynamic containment test:

The ejector shall be located in the center test position and mannequin shall be positioned as specified in the preceding paragraph with the sash at 27-1/2” full vertical opening. The block valve shall be opened releasing 8 liters per minute SF6 gas. The test chamber room shall be set for –0.05 inches w.c. pressure with the test room door closed. At thirty seconds, the test chamber door shall be abruptly opened in less than one second. At sixty seconds the test chamber door shall be abruptly shut in less than one second. The cycle shall be repeated at thirty second intervals for the duration of the five minute test. The space pressure effect (SPE) is the maximum peak tracer gas concentration determined in the test. The space effect rating of the hood shall be recorded as SPE-AM yyy, where yyy equals peak space effect concentration in PPM. **At no time can a peak spill exceed 0.05 PPM.**

**SUMMARY OF REQUIRED CONDITIONS FOR CONTAINMENT TESTING**

Note:  1) All tests shall be conducted with a 27.5 inch high fully open sash.

2) All conditions shall include loading fume hoods with boxes.

3) A 75 FPM cross draft shall be induced across the fume hood face for all static tests (conditions 1 through 6)

<table>
<thead>
<tr>
<th>Condition No.</th>
<th>Gas Sensor Height Above Work Surface</th>
<th>Mannequin Ejector Position</th>
<th>Test Type Static/Dynamic</th>
<th>Sash Face Velocity (FPM)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>26 inches</td>
<td>Center</td>
<td>Static</td>
<td>50</td>
</tr>
<tr>
<td>2</td>
<td>26 inches</td>
<td>Left</td>
<td>Static</td>
<td>50</td>
</tr>
<tr>
<td>3</td>
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<td>Static</td>
<td>50</td>
</tr>
<tr>
<td>4</td>
<td>18 inches</td>
<td>Center</td>
<td>Static</td>
<td>50</td>
</tr>
<tr>
<td>5</td>
<td>18 inches</td>
<td>Left</td>
<td>Static</td>
<td>50</td>
</tr>
<tr>
<td>6</td>
<td>18 inches</td>
<td>Right</td>
<td>Static</td>
<td>50</td>
</tr>
<tr>
<td>7</td>
<td>26 inches</td>
<td>Center</td>
<td>Dynamic (SME)</td>
<td>50</td>
</tr>
<tr>
<td>8</td>
<td>26 inches</td>
<td>Center</td>
<td>Dynamic (SPE)</td>
<td>50</td>
</tr>
<tr>
<td>9</td>
<td>18 inches</td>
<td>Center</td>
<td>Dynamic (SME)</td>
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</tr>
<tr>
<td>10</td>
<td>18 inches</td>
<td>Center</td>
<td>Dynamic (SPE)</td>
<td>50</td>
</tr>
</tbody>
</table>

**TEST REPORT:**

Provide three copies of final test report in a bound manual. Provide a cover page identifying the project title, location and UWSA and UW-Madison project numbers. Performance test technician and witnesses shall sign and date the report.

For each fume hood type tested, the test report shall include the following:

- copy of the room layout sketch
- preliminary test data information and observations of smoke testing results.
graphical results of concentrations for the duration of each test condition along with peak value of concentration for the duration of each test described in the summary above.

recorded data from the analyzer results for each test condition.

The summary of containment test conditions specified above identifies the different parameters for each test condition. The report format shall reference each test condition specified above.

The summary of test conditions shall be conducted for each type and size of hood scheduled on the drawings.

**PART 3 - EXECUTION**

**INSTALLATION**
Assemble hood components into complete installation. Components include: work surface, pre-piped and pre-wired superstructure.

Coordinate with base cabinet and casework installation. Coordinate fume hood installation with HVAC, plumbing and electrical services.

Install hoods plumb, level, rigid and securely anchored in accordance with manufacturer recommendations.

Secure work surfaces to casework and equipment components with material and procedures recommended by the manufacturer.

Set base cabinet vents the connect to fume hood.

Accessory installation: Install accessories and fittings in accordance with manufacturer's recommendations.

**ADJUSTMENTS AND CALIBRATION**
Repair or remove and replace defective work, as directed by the Owner’s Representative upon completion of installation.

Adjust sash fixtures, accessories and other moving or operating parts to function smoothly.

Calibration of the fume hood monitor and alarm system shall be by the fume hood installer knowledgeable in the operation of these components. Calibration shall take place either in conjunction with, or after the fume hood ventilation systems have been adjusted by the Division 23 testing and balancing firm. Alarm calibration shall include zeroing the monitor, calibration of reading through measurement, and setting high/low alarm set points.

Test each monitor and alarm to insure its proper operation.

Submit a calibration and test report at the completion of the work to document

**CLEANING**
Clean finished surfaces, touch up as required and remove or refinish damaged or soiled areas, as acceptable to Architect/Engineer. Clean sashes and work surfaces free of smudges, dust and debris.

Vacuum clean the upper side of the fume hood to prevent debris from entering the work zone. This area shall be inspected and the manufacturer and installer required to provide clean up.

Protection: Advise Contractor of procedures and precautions for protection of materials and installed fume hoods from damage by work of other trades.
PROTECTION OF FINISHED WORK
Provide all necessary protective measures to prevent damage to equipment from exposure to other construction activity.

Advise Contractor of procedures and precautions for protection of material and installed fume hoods from damage by work of other trades.

FIELD INSTALLED TESTING
After the fume hoods are installed and balanced and the HVAC system is balanced, the manufacturer must provide standard ASHRAE 110 testing of every fume hood.

AGENCY TRAINING
All training provided for agency shall comply with the format, general content requirements and submission guidelines specified under Section 01 91 01 or 01 91 02.

INSTRUCTIONAL SIGNAGE
Instructional signage templates are provided on the following three pages of the specification. Each manufacturer shall provide their respective operating instruction sign on their fume hoods. Both manufacturers shall also provide the safety instruction signs on their fume hoods.

Signage shall have solid red background with white lettering.
MOTT MANUFACTURING RFV3 Fume Hood Operating Instructions

Read before using this laboratory fume hood

This laboratory fume hood is designed for operator protection and energy conservation. Your cooperation in observing fume hood rules is for your protection as well as the protection of your neighbors. Call safety/environmental health for training or further assistance.

This fume hood has been tested as manufactured for 50 FPM face velocity through a full open sash.

Proper sash operation is very important for maintaining optimum containment with this fume hood

• When using hazardous materials inside the fume hood, completely lower the vertical sash and work through the horizontal sash openings or with the vertical sash at 18 inches.

• If the vertical sash must be raised for setup purposes, first close the horizontal sash panels.

• Raising the vertical sash above 18 inches will activate the supportive flow to enhanced containment. Contact your supervisor if the fan does not work or if an audible alarm activates when sash is above 18 inches.

• The fume hood monitor’s continuous audible and visual alarm will activate under a low air velocity condition when the sash is raised. Lowering the sash should automatically silence the fume hood monitor’s alarms.

• For extended setup procedures, the vertical sash can be locked in the full open position and the fume hood monitor’s “mute” can be pressed to silence the continuous audible alarm.

• Contact your supervisor if the audible alarms or sash position light are activated when the vertical sash is down.

Fume Hood Product No.
Flow Safe Vortex II Fume Hood Operating Instructions

Read before using this laboratory fume hood

This laboratory fume hood is designed for operator protection and energy conservation. Your cooperation in observing fume hood rules is for your protection as well as the protection of your neighbors. Call safety/environmental health for training or further assistance.

Proper sash operation is very important for maintaining optimum containment with this fume hood

- When using hazardous materials inside the fume hood, completely lower the vertical sash and work through the horizontal sash openings.
- If the vertical sash must be raised for setup purposes, first close the horizontal sash panels.
- When the vertical sash is raised, an audible and visual alarm will activate. This is a reminder that the sash is above the operating position.
- The audible warning may be silenced by pressing the “mute” button, or by lowering the vertical sash.
- Contact your supervisor if the audible or visual warning stays in alarm when the vertical sash is down.
- The rear baffle inside the fume hood at the back moves in response to changes in airflow patterns. This is normal operation and is designed to maintain stable containment. Make sure apparatus in the fume hood does not block or restrict the baffle movement.

Fume Hood Product No.  
Lab Crafters Air Sentry Fume Hood Operating Instructions
Read before using this laboratory fume hood

This laboratory fume hood is designed for operator protection and energy conservation. Your cooperation in observing fume hood rules is for your protection as well as the protection of your neighbors. Call safety/environmental health for training or further assistance.

Proper sash operation is very important for maintaining optimum containment with this fume hood

- When using hazardous materials inside the fume hood, completely lower the vertical sash and work through the horizontal sash openings.
- If the vertical sash must be raised for setup purposes, first close the horizontal sash panels.
- When the vertical sash is raised, an audible and visual alarm will activate. This is a reminder that the sash is above the operating position.
- The audible warning may be silenced by pressing the “mute” button, or by lowering the vertical sash.
- Contact your supervisor if the audible or visual warning stays in alarm when the vertical sash is down.
- The rear baffle inside the fume hood at the back moves in response to changes in airflow patterns. This is normal operation and is designed to maintain stable containment. Make sure apparatus in the fume hood does not block or restrict the baffle movement.

Fume Hood Product No.
Hamilton Pioneer Fume Hood Operating Instructions

Read before using this laboratory fume hood

This laboratory fume hood is designed for operator protection and energy conservation. Your cooperation in observing fume hood rules is for your protection as well as the protection of your neighbors. Call safety/environmental health for training or further assistance.

This fume hood has been tested as manufactured for 50 FPM face velocity through a full open sash.

Proper sash operation is very important for maintaining optimum containment with this fume hood

• When using hazardous materials inside the fume hood, completely lower the vertical sash and work through the horizontal sash openings.

• If the vertical sash must be raised for setup purposes, first close the horizontal sash panels.

• Raising the vertical sash above 18 inches will activate the laminar flow fan above the sash opening to provide enhanced containment. The fume hood’s sash position light and intermittent audible beep will also activate to indicate a setup sash position.

• The fume hood monitor’s continuous audible and visual alarm will activate under a low air velocity condition when the sash is raised. Lowering the sash should automatically silence the fume hood monitor’s alarms.

• For extended setup procedures, the vertical sash can be locked in the full open position and the fume hood monitor’s “mute” can be pressed to silence the continuous audible alarm. Releasing the manual lock will automatically lower the vertical sash to the 18 inch position.

• Contact your supervisor if the audible alarms or sash position light are activated when the vertical sash is down.

Fume Hood Product No.
Safety Instructions

Failure to follow these instructions could result in physical injury or illness.

CAUTION: DO NOT USE THIS HOOD FOR PERCHLORIC ACID PROCEDURES.

- Do not use this fume hood unless you have received proper training. For more information, read the user manual or request training from the owner’s safety representative.

- This fume hood is not intended for use with all chemicals or all chemical processes. Consult the owner’s safety representative to determine appropriate chemicals and processes to be used.

- Place chemicals and other work materials at least six (6) inches inside the sash.

- Wear gloves and other protective clothing if contact with contaminants is a hazard. Avoid putting your head in the fume hood if contamination is present.

- Do not restrict airflow inside the hood or block the inside back wall of the fume hood with large items. Large apparatus should be elevated on blocks to allow free air circulation.

- Remove all materials not needed for the immediate work. The hood must not be used for storage purposes.

- External air movement can affect the fume hood’s containment capability. Avoid rapid movement inside and in front of the fume hood. Do not open the sash rapidly.

- Clean spills immediately.

- Follow good safety practice by careful attention to your behavior, proper use of sashes and reporting flow monitor alarms.

Work smart not fast!
Kewaunee Scientific Supreme Air Fume Hood Operating Instructions
Read before using this laboratory fume hood

This laboratory fume hood is designed for operator protection and energy conservation. Your cooperation in observing fume hood rules is for your protection as well as the protection of your neighbors. Call safety/environmental health for training or further assistance.

This fume hood has been tested as manufactured for 50 FPM face velocity through a full open sash.

Proper sash operation is very important for maintaining optimum containment with this fume hood

• When using hazardous materials inside the fume hood, completely lower the vertical sash and work through the horizontal sash openings or with the vertical sash at 18 inches.

• If the vertical sash must be raised for setup purposes, first close the horizontal sash panels.

• Raising the vertical sash above 18 inches will activate the supportive flow to enhanced containment. Contact your supervisor if the fan does not work or if an audible alarm activates when sash is above 18 inches.

• The fume hood monitor’s continuous audible and visual alarm will activate under a low air velocity condition when the sash is raised. Lowering the sash should automatically silence the fume hood monitor’s alarms.

• For extended setup procedures, the vertical sash can be locked in the full open position and the fume hood monitor’s “mute” can be pressed to silence the continuous audible alarm.

• Contact your supervisor if the audible alarms or sash position light are activated when the vertical sash is down.

Fume Hood Product No.