SECTION 11 53 13
LABORATORY FUME HOODS

PART 1 - GENERAL

1.1 DESCRIPTION

This section includes chemical (general purpose) hoods in designs and configurations specified hereunder.

1.2 DEFINITIONS

A. CHEMICAL OR GENERAL-PURPOSE HOODS

1. BYPASS HOOD: A hood that contains openings above the sash and below the airfoil, which redistribute the air to reduce fluctuations in face velocity and turbulence within the hood, when the sash is re-positioned.

1.3 RELATED WORK

A. Section 22 11 00, FACILITY WATER DISTRIBUTION: Plumbing Connections.

B. Section 22 13 00, FACILITY SANITARY SEWERAGE: Plumbing Connections.

C. Section 23 05 11, COMMON WORK RESULTS FOR HVAC.

D. Section 23 05 12, GENERAL MOTOR REQUIREMENTS FOR HVAC and STEAM GENERATION: Integral Blowers on Hoods.

E. Section 23 09 23, DIRECT-DIGITAL CONTROL SYSTEM FOR HVAC: Face Velocity Sensor Controller.

F. Section 23 34 00, HVAC FANS.

G. Section 23 36 00, AIR TERMINAL UNITS: Airflow Control Valves.

H. Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS: Electrical Connections.

I. Section 26 27 26, WIRING DEVICES: Electrical Devices.

J. Section 26 29 11, LOW-VOLTAGE MOTOR STARTERS: Motor Starters.

1.4 PERFORMANCE REQUIREMENTS

A. Average Face Velocity for general chemical laboratory fume hoods: 0.51 m/s (100 fpm) with sash located at the average sash stop of 18 inches.

B. Containment: Furnish and install laboratory fume hoods that are tested according to ASHRAE 110 at a release rate of 4.0 L/min. (0.1 CFM)

1. Face Velocity Variation: Allowable VA variation threshold is not more than +-10% of average face velocity.
2. Sash Position:
   a. For Vertical Sash units, test with sash fully open, and at typical sash stop height of 18”.
3. As-Manufactured (AM) Rating: AM 0.05 (0.05 ppm).
4. As-Installed (AI) Rating: AI 0.05 (0.05 ppm).

D. Average Static-Pressure Loss: Not more than 93 Pa (3/8-inch wg) at 0.51-m/s (100-fpm) face velocity when tested according to SEFA 1.2.

1.5 QUALITY CONTROL

A. Mechanical, electrical and associated systems shall be safe, reliable, efficient, durable, easily and safely operable, maintainable, and accessible.

B. Standard Products: Material and equipment shall be the standard products of the selected manufacturer, and they should be regularly engaged in the manufacture of such products for at least 3 years.

C. All items furnished shall be free from defects that would adversely affect the performance, maintainability and appearance of individual components and overall assembly.

D. Standard Products: Material and equipment shall be the standard products of a manufacturer regularly engaged in the manufacture of the products for at least 3 years. The design, model and size of each item shall have been in satisfactory and efficient operation on at least three installations for approximately three years. However, digital electronics devices, software and systems such as controls, instruments, computer work station, shall be the current generation of technology and basic design that has a proven satisfactory service record of at least three years. See other specification sections for any exceptions.

E. Electrical Components and Devices: UL listed and labeled for intended use.

1.6 SUBMITTALS

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Manufacturer's Literature and Data: Include the following:

1. Illustrations and descriptions of laboratory fume hoods and factory-installed devices for fume hoods.
2. Catalog or model numbers for each item incorporated into the work.
3. Static-pressure losses and exhaust volumes for fume hoods.
4. Results of testing according to ASHRAE 110.

C. Shop Drawings: Show details of fabrication, installation, adjoining construction, coordination with mechanical and electrical work, anchorage, and other work required for complete installation.

D. Field Test Reports: Indicate dates and times of tests and certify test results.

E. Factory Test Reports: Provide manufacturer's QC checklist or other reports that indicate comprehensive factory testing has been performed, and the results of these tests have been certified.

F. Operating Instructions: Comply with requirements in Section 01 00 00, GENERAL REQUIREMENTS.

1.7 APPLICABLE PUBLICATIONS

A. The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only.

B. American National Standards Institute / American Society of Heating, Refrigerating and Air-Conditioning Engineers (ANSI/ASHRAE):
110-1995.....Method of Testing Performance of Laboratory Fume Hoods

C. Scientific Equipment and Furniture Association (SEFA):
1-2005.....Recommended Practices for Laboratory Fume Hoods
2-1999.....Recommended Practices for Installation

D. National Fire Protection Association (NFPA):
45-2011.....Standard on Fire Protection for Laboratories using Chemicals

PART 2 – PRODUCTS

2.1 FUME HOODS, GENERAL

A. Furnish and install laboratory fume hoods that comply with recommendations in SEFA 1

B. Confirm factory-installed service fixtures and electrical devices in locations shown on drawings.

C. Ductwork: All ductwork shall be stainless steel. Refer to Section 23 31 00 HVAC DUCTS and CASINGS.

D. Face Velocity Controller (VAV Fume hoods): Provide fume hood exhaust controllers to control a damper in the hood discharge to maintain the velocity through the open face of the hood regardless of sash position. Refer to Section 23 09 23 DIRECT-DIGITAL CONTROL SYSTEM FOR HVAC.

E. Water Service Fixtures: Remote controlled, with integral vacuum breaker and as follows:
1. Turret and 152.4 mm (6 inch) swivel gooseneck outlet.
2. Epoxy-coated brass.
3. Refer to Section 22 11 00 FACILITY WATER DISTRIBUTION.

G. Service-Fixture Color-Coding: Color-code service fixtures as follows:

Service	Color

Water	Dark Green

H. Lighting Fixtures:
   1. Vapor proof Fixtures: 120-V 2-tube fluorescent.
I. Receptacles and Switches: Include junction box and cover plate. Refer to Section 26 27 26 WIRING DEVICES.
   1. Ground Fault Interrupter (GFI) Duplex Receptacles: Integral unit with 2-pole, 3-wire, 120-V, 20-A receptacle.
   2. Lighting Fixture Switches: Toggle, single pole, 120-277 V, 20 A.
   3. Motor Starter Switches: Double-pole switch with pilot light and thermal-overload protection. Refer to Section 26 29 11 LOW-VOLTAGE MOTOR STARTERS.
J. Airflow Monitor: With audible alarm and warning light. Provide digital type unit with alarm contacts to allow connection to the DDC control system to facilitate remote monitoring. Refer to Section 23 09 23, DIRECT-DIGITAL CONTROL SYSTEM FOR HVAC

2.2 BYPASS FUME HOODS

A. Airflow Systems: Bypass. For hoods served by variable air volume exhaust systems, a factory installed bypass block shall be installed to restrict the bypass and allow reduction of the exhaust air volume as the sash is lowered while maintaining a constant face velocity.
B. Liners: Stainless Steel Type 304, N0. 4 finish
C. Work Surfaces: Epoxy resin.
D. Sinks: Epoxy resin.
   1. Laboratory Sinks: Equip with DN 40 (NPS 1-1/2) sink outlet, sink stopper, beehive overflow, and P trap.
E. Lighting Fixtures: Vapor proof.
F. Blowers: Remote; sized to create exhaust air volume that produces average face velocity indicated with sashes fully open. Blowers shall be constructed with chemical chemical-resistant coating. Refer to Section 23 34 00 HVAC FANS.
G. Sashes: Vertical type; fully tempered safety glass.
   1. Accessories: Sash stops, commonly installed 18”.
H. Bases: Cabinet.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install laboratory fume hoods to comply with SEFA 2.

3.2 TESTS

A. Field test installed laboratory fume hoods according to ASHRAE 110 to verify compliance with performance requirements for containment.

1. For units that fail testing, make adjustments and corrections to installation, or replace fume hoods, and repeat tests until fume hoods comply with requirements.

3.3 PROTECTING AND CLEANING

A. Protect equipment from dirt, water, and chemical or mechanical injury during the remainder of the construction period.

B. At the completion of work, clean equipment as required to produce ready-for-use condition.

3.4 INSTRUCTIONS

Instruct personnel and transmit operating instructions in accordance with requirements in Section 01 00 00, GENERAL REQUIREMENTS. Training must be provided by Manufacturer or Installer.

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