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LOC/HIGH PERFORMANCE FUME HOOD SPECIFICATION
SECTION 115300

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:
1. Laboratory fume hoods.

1.02 FUME HOOD GENERAL DESIGN REQUIREMENTS

A. Fume hoods shall function as ventilated, enclosed workspaces, designed to capture, confine and exhaust fumes, vapors and particulate matter produced or generated within the enclosure.

B. Design fume hoods for consistent and safe air flow through the hood face. Negative variations of face velocity shall not exceed 20% of the average face velocity at any designated measuring point as defined in this section.

C. Average illumination of work area with white liner: Minimum 80 foot-candles. Work area shall be defined as the area inside the superstructure from side to side and from face of baffle to the inside face of the sash, and from the working surface to a height of 28 inches.

D. Fume hood shall be designed to minimize static pressure loss with adequate slot area. Maximum average static pressure loss readings taken three diameters above the hood outlet from four points, 90 degrees apart, shall not exceed the following maximums with sash in full open position:

Face Velocity	Measured S.P.L. (W.G.)
52 F.P.M.	.19 inches

E. Fume hoods shall be available in standard widths of 4, 5, 6 & 8-feet. Each size will have this depth available: 35.25”.

F. Noise Criteria: Test data of octave band analysis verifying hood is capable of a 50 NC value when connected to a 50 NC HVAC source. Reading taken 3' in front of an open sash at the 18” operational height at 100 fpm face velocity.

1.03 LINER SURFACE FINISH PERFORMANCE REQUIREMENTS

A. Test procedure:
1. Test No. 1 – Spills and Splashes:
1.1 Suspend in a vertical plane a 42” (horizontal) by 12” (vertical) panel divided into 3/4” wide vertical columns, each column numbered 1 through 49.

1.2 Apply five drops of each reagent listed with an eye dropper.
1.3 Apply liquid reagents at top of panel and allow to flow down full panel height. (CAUTION! Flush away any reagent drops.)

2. Test No. 2 – Fumes and Gases:
2.1 Divide 24" x 12" panel into 2" squares, each square numbered 1 through 49.
2.2 Place 25 milliliters of reagent into 100 milliliters beakers and position panel over beaker tops in the proper sequence. Note: Beaker pouring lip permits atmospheric oxygen to enter and participate in the reaction of the reagent fumes.
3. After 24 hours remove panel, flush with water, clean with naphtha and detergent, rinse, wipe dry and evaluate.

B. Evaluation ratings: Change in surface finish and function shall be described by the following ratings:
1. No Effect: No detectable change in surface material.
2. Excellent: Slight detectable change in color or gloss, but no change to the function or life of the work surface material.
3. Good: Clearly discernible change in color or gloss, but no significant impairment of work surface function or life.
4. Fair: Objectionable change in appearance due to surface discoloration or etch, possibly resulting in deterioration of function over an extended period.
5. Failure: Pitting, cratering or erosion of work surface material; obvious and significant deterioration.

C. Test Results: Fume Hood Liner

REAGENT LIST Concentrations by Weight	Test No. 1 Rating Spills	Test No. 2 Fumes
1. Sodium Hydroxide Flake	---	No Effect
2. Sodium Hydroxide, 40%	Excellent	No Effect
3. Sodium Hydroxide, 20%	Excellent	No Effect
4. Sodium Hydroxide, 10%	Excellent	No Effect
5. Ammonium Hydroxide, 28%	No Effect	No Effect
6. Eldorado - Plus (Solution)	No Effect	No Effect
7. Chloroform	Excellent	No Effect
8. LpH SE (Solution)	No Effect	No Effect
9. Trichloroethylene	Excellent	No Effect
10. Monochlorobenzene	Excellent	No Effect
11. Tincture of Iodine	Excellent	Excellent
12. Methyl Alcohol	No Effect	No Effect
13. Ethyl Alcohol	No Effect	No Effect
14. Butyl Alcohol	No Effect	No Effect
15. Phenol, 85%	Excellent	No Effect
16. Cresol	Excellent	No Effect
17. Sodium Sulfide, Saturated	Good	No Effect

18. Furfural	Fair	No Effect
19. Dioxane	No Effect	No Effect
20. Zinc Chloride, Saturated	No Effect	No Effect
21. Benzene	Excellent	No Effect
22. Toluene	Excellent	No Effect
23. Xylene	Excellent	No Effect
24. Gasoline	Excellent	No Effect
25. Naphthalene	Excellent	No Effect
26. Methyl Ethyl Ketone	Excellent	No Effect
27. Acetone	Excellent	No Effect
28. Ethyl Acetate	Excellent	No Effect
29. Amyl Acetate	Excellent	No Effect
30. Ethyl Ether	Excellent	No Effect
31. Silver Nitrate, 10%	Good	No Effect
32. Di Methyl Formamide	No Effect	Excellent
33. Formaldehyde, 37%	No Effect	No Effect
34. Formic Acid, 88%	No Effect	No Effect
35. Acetic Acid, Glacial	No Effect	No Effect
36. Dichloro Acetic Acid, 93%	Excellent	Excellent
37. Chromic Acid, Saturated	Good	No Effect
38. Phosphoric Acid, 85%	No Effect	No Effect
39. Sulfuric Acid, 33%	No Effect	No Effect
40. Sulfuric Acid, 77%	Excellent	No Effect
41. Sulfuric Acid, 93%	Good	No Effect
42. Hydrogen Peroxide, 30%	No Effect	No Effect
43. Acid Dichromate	Excellent	No Effect
44. Nitric Acid, 20%	Excellent	No Effect
45. Nitric Acid, 30%	Excellent	No Effect
46. 40 & 47 Equal Parts	Excellent	Good
47. Nitric Acid, 70%	Excellent	Good
48. Hydrochloric Acid, 37%	No Effect	Excellent
49. Hydrofluoric Acid, 48%	No Effect	Failure

1.04 SUBMITTALS

A. Shop Drawings: Indicate equipment locations, large scale plans, elevations, cross sections, rough-in and anchor placement dimensions and tolerances and all required clearances.

B. Product Data: Submit manufacturer's data for each component and item of laboratory equipment specified. Include component dimensions, configurations, construction details, joint details, and attachments, utility and service requirements and locations. Include liner and exterior finish tests by independent third party.

1.05 QUALITY ASSURANCE

A. Single source responsibility: Fume hood casework, work surfaces, and other

laboratory equipment and accessories shall be manufactured or furnished by a single laboratory furniture company.

B. Manufacturer's qualifications: Modern plant with proper tools, dies, fixtures and skilled workmen to produce high quality laboratory casework and equipment, and shall meet the following minimum requirements:
   1. Five years or more experience in manufacture of laboratory casework and equipment of type specified.
   2. Ten installations of equal or larger size and requirements.
   3. UL 1805 Specification:
      Fume Hood must be Underwriters Laboratories subject 1805 classified. The 1805 standard covers electrical and mechanical hazards, investigate 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.

1.06 DELIVERY, STORAGE AND HANDLING

A. Schedule delivery of equipment so that spaces are sufficiently complete that equipment can be installed immediately following delivery.

B. Protect finished surfaces from soiling or damage during handling and installation. Keep covered with polyethylene film or other protective coating.

1.07 PROJECT CONDITIONS

A. Do not deliver or install equipment until the following conditions have been met:
   1. Windows and doors are installed and the building is secure and weather tight.
   2. Ceiling, overhead ductwork and lighting are installed.
   3. All painting is completed and floor tile located below casework is installed.

PART 2 PRODUCTS

2.01 MANUFACTURER

A. Acceptable manufacturer to be BMC/Metal Arc. The hood shall conform to the following model below.
   1. LOC Scientific, Trilogy Fume Hood

2.02 FUME HOOD MATERIALS

A. Steel: High quality, cold rolled, mild steel meeting requirements of ASTM A366; gauges U.S. Standard.

B. Stainless steel: Type 304; gauges U.S. Standard.

C. Ceiling closure panels: Minimum 18 gauge; finish to match hood exterior.

D. Safety glass: 7/32" thick laminated safety glass.

E. Sash cables: Stainless steel, uncoated, 1/8" diameter military spec. quality. (MIL-W-83420D-3)

F. Sash guides: Corrosion resistant poly-vinyl chloride.

G. Pulley assembly for sash cable: 2" diameter, nylon race, ball bearing type, with cable retaining device and sash leveling mechanism.

H. Sash pull: Full width extruded aluminum with chemical resistant powder coating.

I. Gaskets: Ridged black PVC for interior access panels. Gasket shall retain access panels with integral clips for easy removal and replacement of panel.

J. Fastenings:
1. Exterior structural members attachments: 1/4-20 machine screws and lock nuts, zinc plated.
2. Interior fastening devices concealed. All fasteners exposed to the hood interior shall be non-metallic.
3. Exterior side access panel member fastening devices to be concealed. Mechanical latch, exposed screws or velcro type fasteners – not acceptable.

K. Instruction plate: Corrosion resistant or plastic plate attached to the fume hood exterior with condensed information covering recommended locations for apparatus and accessories, baffle settings and use of sash.

2.03 FUME HOOD CONSTRUCTION

A. Superstructure: Rigid, self supporting assembly of double wall construction, maximum 5" thick.
1. Wall consists of a sheet steel outer shell and a corrosion resistant inner liner, and houses and conceals steel framing members, attaching brackets and remote operating service fixture mechanisms and services. Panels must be attached to a full frame construction, minimum 16 gauge painted members.
2. Access to fixture valves concealed in wall provided by exterior removable access panels and gasketed access panels on the inside liner walls.

B. Exhaust outlet: Round, 18 gauge stainless steel.

C. Access opening perimeter: Air foil or streamlined shape with all right angle

corners radiused. Bottom horizontal foil shall be double tiered and provide nominal one inch bypass when sash is in the closed position. Bottom foil shall not be removable without use of special tools. Bottom foil shall provide access area sufficient in size to pass thru electrical plugs. Bottom foil: Steel with powder coated finish.

D. Fume hood sash: (Combination) Vertical and horizontal sash access with a 35" high sight line. Sash shall be top hung on nylon tired ball bearing wheels. Sash side frame must be inset into sash guides providing a full width unobstructed view of the interior. Exposed side frames - not acceptable. Upper and lower sash frame components to be extruded aluminum. Lower frame radiused to minimize turbulence and have integral guides for horizontal sliding panels. Area above the 27 1/2" vertical sash opening shall be glazed with laminated safety glass. All glass to have finished edge treatment. Horizontal panels provided with finger pulls.

E. Counter balance system: Single weight, pulley, cable, counter balance system which prevents sash tilting and permits one finger operation at any point along full width pull. Maximum 7 pounds pull required to raise or lower sash throughout its full length of travel. Design system to hold sash at any position without creep and to prevent sash drop in the event of cable failure.

F. Sash lock: Keyed sash lock to prevent the sash from opening above 18" without being unlocked. Sash shall be able to be locked at any position, even above 18", and reset when lowered below 18".

F. Airfoil: The airfoil will be flush to the worksurface with ample room for electrical cords to fit between the airfoil and sash handle. Sill to be aerodynamically radiused on front edge and have a secondary containment trough.

G. Fume hood liner: Resin-chem: Reinforced polyester panel; smooth finish and white color in final appearance. Flexural strength: 19,500 psi. Flame spread: 19 or less per ASTM E84. Baffle must be same material as liner. Metallic baffles, brackets or supports on hood interior – not acceptable. Liner and baffle material must meet 1.03 performance test.

H. Baffles: Baffles providing controlled air vectors into and through the fume hood must be fabricated of the same material as the liner. High performance baffles must be mathematically calculated to provide proper energy distribution of exhaust currents providing stable performance regardless of sash position. Baffle to be non-adjustable. Baffles with manual or automatic adjustment are not acceptable. All baffles, supports, and brackets to be non-metallic.

I. Sash Position: Sash shall be designed to promote usage as an upper body and face shield. Face velocities and volumes shall be based on an 18" operating opening. Sash shall have the capability to be raised to full 27.5" vertical opening for loading or unloading of large apparatus. A keyed lock shall be provided limiting the sash operation to 18".

J. Service fixtures and fittings: Color coded hose nozzle outlets and valves mounted inside the fume hood and controlled from the exterior with color coded index buttons.
   1. Valves: Needlepoint type with self-centering cone tip and seat of hardened stainless steel. Tip and seat shall be removable and replaceable.
   2. Provide piping for all service fixtures from valve to outlet and from valve to a point 3” above or below the superstructure as indicated by project conditions: Copper for water, air and vacuum and black iron for gas services.
   3. Fixtures exposed to hood interior: Color coded chemically resistant nylon.
   4. Remote control handles: Black nylon four-arm handle with nylon color-coded index buttons.
   5. Services: As shown or specified.

K. Hood light fixture: Two lamp, instant start, UL listed, T8 fluorescent light fixture with sound rated “A” ballast installed on exterior of roof. Provide safety glass panel cemented and sealed to the hood roof.
   1. Interior of fixture: White, high reflecting plastic enamel.
   2. Size of fixture: Largest possible up to 48" for hoods with superstructures up to six feet. Provide two 24" fixtures for hoods with eight foot superstructures.
   3. Include lamps with fixtures. Hoods without lamps – not acceptable.
   4. Illumination: Per performance values, Part 1 of this Section.
   5. Access to light from top front of hood.

L. Electrical services: Three wire grounding type receptacles rated at 120 V.A.C. at 20 amperes. Flush plates: Stainless steel.

M. Wiring: Pre-wire electrical fixtures to junction box located on top of hood.

N. Work surfaces: 1-1/4" thick surface, dished a nominal 3/8” to contain spills.
   1. Molded resin work surfaces for hoods with Resin-Chem liners.

O. Safety Monitor/Alarm System: [Specified's Option]
Where shown or specified provide Safety Monitor/Alarm System which monitors face velocity and provides audible and visual alarm if face velocity drops below safe levels. The technology used in the alarm will be based on thermally compensated thermistor based in the alarm module.
   1. Safety monitor: UL listed, tamper proof, with all alarm circuits, electric components, external tubing, and manifolds furnished complete and factory installed. The monitor shall have a visual display which provides clear indication of airflow conditions.
   2. Calibration is the responsibility of the owner and is required once the hood is stationed and the hood exhaust and room supply systems are balanced. A secondary calibration has been factory set into the alarm's

memory only to determine that the alarm is functional and ready for shipment. **The primary calibration must be completed in the field.**

3. Airflow sensor: Thermally compensated glass-beaded thermistor, factory connected to a side-wall port on the interior of the fume hood.
4. Alarm Signal: Audible and visual signal:
   4.1 Silence pushbutton, which disables the audible alarm, shall be accessible on the front of the safety monitor.
   4.2 When alarm condition is corrected and face velocity and volume return to specified levels, the Safety Monitor will automatically reset and begin routine monitoring.
5. Provide test circuit to verify proper Safety Monitor operation.
6. Electrical rating: Maximum 12 VDC.

2.04 METAL FINISH

A. Metal finish:
   1. Preparation: Spray clean metal with a heated cleaner/phosphate solution, pre-treat with iron phosphate spray, water rinse, and neutral final seal. Immediately dry in heated ovens, gradually cooled, prior to application of finish.
   2. Application: Electrostatic application of epoxy powder coat of selected color and bake in controlled high temperature oven to assure a smooth, hard satin finish. Surfaces shall have a chemical resistant, high-grade laboratory furniture quality finish with a 1.5 mil average thickness.

B. Surface Finish Tests:
Independent, third party performance testing must be submitted validating compliance and adheres to the finish specifications.
   1. Chemical Spot Test:
      1.1 Purpose of Test
      The purpose of the chemical spot test is to evaluate the resistance a finish has to chemical spills.

      Note: Many organic solvents are suspected carcinogens, toxic and/or flammable. Great care should be exercised to protect personnel and the environment from exposure to harmful levels of these materials.

      1.2 Test Procedure
      Obtain one sample panel measuring 14" x 24" (355.6mm x 609.6mm). The received sample to be tested for chemical resistance as described herein.

      Place panel on a flat surface, clean with soap and water and blot dry. Condition the panel for 48-hours at 73+ 3F (23(+ 2(C) and 50+ 5% relative humidity. Test the panel for chemical resistance using forty-nine different chemical reagents by one of the following methods:

Method A – Test volatile chemicals by placing a cotton ball saturated with reagent in the mouth of a one-ounce (29.574cc) bottle and inverting the bottle on the surface of the panel.

Method B – Test volatile chemicals by placing five drops of the reagent on the surface of the panel and covering with a 24mm watch glass, convex side down.

For both of the above methods, leave the reagents on the panel for a period of one hour. Wash off the panel with water, clean with detergent and naphtha, and rinse with deionized water. Dry with a towel and evaluate after 24-hours at 73±3°F (23°±2°C) and 50±5% relative humidity using the following rating system:

Level 0 – No detectable change.
Level 1 – Slight change in color or gloss.
Level 2 – Slight surface etching or severe staining.
Level 3 – Pitting, cratering, swelling, or erosion of coating. Obvious and significant deterioration.

Test No.	Chemical Reagent	Test Method
1.	Acetate, Amyl	A
2.	Acetate, Ethyl	A
3.	Acetic Acid, 98%	B
4.	Acetone	A
5.	Acid Dichromate, 5%	B
6.	Alcohol, Butyl	A
7.	Alcohol, Ethyl	A
8.	Alcohol, Methyl	A
9.	Ammonium Hydroxide, 28%	B
10.	Benzene	A
11.	Carbon Tetrachloride	A
12.	Chloroform	A
13.	Chromic Acid, 60%	B
14.	Cresol	A
15.	Dichlor Acetic Acid	A
16.	Dimethylformanide	A
17.	Dioxane	A
18.	Ethyl Ether	A
19.	Formaldehyde, 37%	A
20.	Formic Acid, 90%	B
21.	Furfural	A
22.	Gasoline	A
23.	Hydrochloric Acid, 37%	B
24.	Hydrochloric Acid, 48%	B
25.	Hydrogen Peroxide, 3%	B
26.	Iodine, Tincture of	B
27.	Methyl Ethyl Ketone	A

28.	Methylene Chloride	A
29.	Mono Chlorobenzene	A
30.	Naphthalene	A
31.	Nitric Acid, 20%	B
32.	Nitric Acid, 30%	B
33.	Nitric Acid, 70%	B
34.	Phenol, 90%	A
35.	Phosphoric Acid, 85%	B
36.	Silver Nitrate, Saturated	B
37.	Sodium Hydroxide, 10%	B
38.	Sodium Hydroxide, 20%	B
39.	Sodium Hydroxide, 40%	B
40.	Sodium Hydroxide, Flake	B
41.	Sodium Hydroxide, Saturated	B
42.	Sulfuric Acid, 33%	B
43.	Sulfuric Acid, 77%	B
44.	Sulfuric Acid, 96%	B
45.	Sulfuric Acid, 77% and Nitric Acid, 70%, equal parts	B
46.	Toluene	A
47.	Trichloroethylene	A
48.	Xylene	A
49.	Zinc Chloride, Saturated	B

1.3 Acceptance Level
Results will vary from manufacturer to manufacturer. Laboratory grade finishes should result in no more than four Level 3 conditions. Suitability for a given application is dependent upon the chemicals used in a given laboratory.

2. Hot Water Test
2.1 Purpose of Test
The purpose of this test is to insure the coating is resistant to hot water.
2.2 Test Procedure
Hot water, 190°F to 205°F (88°C to 96°C), shall be allowed to trickle (with a steady stream and at a rate of not less than 6 ounces (177.44cc) per minute on the surface, which shall be set at an angle of 45-degrees, for a period of five minutes.
2.3 Acceptance Level
After cooling and wiping dry, the finish shall show no visible effect from the hot water.

3. Impact Test
3.1 Purpose of Test
The purpose of this test is to evaluate the ductility of the coating.
3.2 Test Procedure
A one-pound ball approximately 2" (50.8mm) in diameter shall be dropped form a distance of 12" (304.8mm) onto a flat horizontal surface, coated to manufacturer's standard manufacturing method.

3.3 Acceptance Level
There shall be no visible evidence to the naked eye of cracks or checks in the finish due to impact.

4. Paint Adhesion on Steel Test
4.1 Purpose of Test
The paint adhesion test is used to determine the bond of the coating to steel. This does not apply to non-steel products.
4.2 Test Procedure
This test is based on ASTM D2197-86 “Standard Method of Test for Adhesion of Organic Coating”. Two sets of eleven parallel lines 1/16" (1.587mm) apart shall be cut with a razor blade to intersect at right angles thus forming a grid of 100 squares. The cuts shall be made just deep enough to go through the coating, but not into the substrate. They shall then be brushed lightly with a soft brush for one minute. Examine under 100-foot candles of illumination.
4.3 Acceptance Level
Ninety or more of the squares shall show finish intact.

5. Paint Hardness on Steel Test
5.1 Purpose of Test
The paint hardness test is used to determine the resistance of the coatings to scratches.
5.2 Test Procedure
Pencils, regardless of their brand, are valued in this way: 8-H is the hardest, and next 11 order of diminishing hardness are 7-H, 6-H, 5-H, 4-H, 3-H, 2-H, H, F, HB, B (soft), 2-B, 3-B, 4-B, 5-B (which are softest). The pencils shall be sharpened on emery paper to a wide sharp edge. Pencils of increasing hardness shall be pushed across the paint film in a chisel-like manner until one is found that will cut or scratch the film. The pencil used before that one, that is the hardest pencil that will not rupture the film, is then used to express or designate the hardness.
5.3 Acceptance Level
The paint shall have a hardness of 4-H minimum.

2.05 SOURCE QUALITY CONTROL TESTING OF FUME HOODS

A. Evaluation of manufacturer's standard product shall take place in manufacturer's own test facility, with testing personnel, samples, apparatus, instruments, and test materials supplied by the manufacturer at no cost to the Owner.

B. Submit test report consisting of the following test parameters and equipment for each hood width and configuration specified.

C. Hood shall achieve a rating of 4.0 AM 0.05 PPM or better. Tested to ASHRAE-110-1995. Test shall be done with sash open 27.5” vertically at 52 fpm face velocity.

D. Test facility: Sufficient size to provide unobstructed clearance of five feet each side and ten feet in front of fume hood. Provide make-up air to replace room air

exhausted through fume hood and to obtain a negative 0.2" w.g. room pressure. Introduce make-up air in a manner that minimizes drafts in front of hood to less than 20% of the face velocity.

1. Examine facility to verify conformance to the requirements of this Section.
2. Test room shall be isolated from all personnel during test procedure.

E. Testing equipment:
   1. Properly calibrated hot wire thermal anemometer probes equal to Alnor AVT-55; correlate with computer data acquisition format to provide simultaneous readings at all points.
   2. Pitot tube manometer with graduations no greater than 0.2 inch of water.
   3. Tracer gas: Sulfur hexa-fluoride supplied from a cylinder at a test flow rate of four liters per minute.
   4. Ejector system: Tracer gas ejector equal to ASHRAE-110-1995 specification.
   5. Critical orifice: Sized to provide tracer gas at four liters per minute at an upstream pressure of 30 PSIG.
   6. Detection instruments: Qualitek Model Q200 Leak Meter sulfur hexa-fluoride detector instrument or equal.
   7. Recorder with an accuracy better than plus or minus 0.5% of full scale.
   8. Three dimensional manikin, overall height 67", clothed in a smock.
   9. Titanium tetrachloride glass modules.
   10. One dozen 30-second smoke bombs.

F. Preliminary Test and Data:
   1. Provide sketch of room indicating room layout, location of significant equipment, including test hood and other hoods. Provide sketch of air supply system indicating type of supply fixtures.
   2. Reverse air flows and dead space:
      2.1 Swab strip of titanium tetrachloride along both walls and floor of hood in a line 6" behind and parallel to the hood face, and along the top of the face opening. Swab an 8" diameter circle on the back of the hood. All smoke should be carried to the back of the hood and exhausted.
      2.2 Test the operation of the bottom air bypass air foil by running the cotton swab under the air foil.
      2.3 If visible fumes flow out of the front of the hood, the hood fails the test and receives no rating.
   3. Face velocity measurements: Face velocity shall be determined by averaging minimum of four and maximum of eight readings at the hood face. Take readings at center of a grid made up of sections of equal area across the top half of the face and sections of equal area across the bottom half of the face. Take simultaneous readings at each point with a series of calibrated hot wire anemometers over a one minute period of time. Probes shall be correlated to a computer data acquisition package, which will provide an average of each reading over that one minute period and also an overall average. During the one minute monitoring period, all velocities must automatically update average at a maximum of four

second intervals.

G. Test Procedure:

1. Check sash operation by moving sash through its full travel. Verify that sash operation is smooth and easy, and that vertical rising sash shall hold at any height without creeping up or down. Position sash in the full open position.
2. Take a static pressure reading, using methods assuring an accurate reading, in an area of the ductwork no more than three feet nor less than one foot above the exhaust collar. Static pressure loss shall not exceed values given under Design Requirements in Part 1 of this Section.
3. Install ejector in test positions. 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 center line is 12" from the left inside wall of the hood; center position is equal distance from the inside sidewalls; and the right position is 12" from the right inside wall. The ejector body is 6" in from the hood face in all positions. Location of ejector may require modification for hoods of unusual dimensions.
4. Install manikin positioned in front of the hood, centered on the ejector.
5. Fix detector probe in the region of the nose and mouth of the manikin. Take care that method of attachment of the probe does not interfere with the flow patterns around the manikin. Locate nose of manikin 9" in front of ejector (3" in front of sash).
6. Open tracer gas block valve. Correlate readings with a computer data acquisition package, which is capable of monitoring and visually recording a minimum of one reading per second for a minimal three minute time period at each of the three positions.
7. The control level rating of the hood shall be the maximum of the three average values for the three test positions.
8. Record performance rating of the fume hood as XXAMyyy, where XX equals the release rate in liters per minute (4.0) and AM represents the as manufactured test sequence and yyy equals the control level in parts per million.
9. All data on the above test conditions including instrumentation and equipment, test conditions, preliminary test and data information shall be provided on a report, including a printout of the average face velocities, and a separate graph-type performance curve on all three tracer gas positions.

PART 3 EXECUTION

3.01 INSTALLATION

A. Installation:
   1. Install fume hoods and equipment in accordance with manufacturer's instructions.
   2. Install equipment plumb, square, and straight with no distortion and securely anchored as required.
   3. Secure work surfaces to casework and equipment components with material and procedures recommended by the manufacturer.

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

3.02 ADJUSTING

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

3.03 CLEANING

A. Clean equipment, touch up as required.

3.04 PROTECTION OF FINISHED WORK

A. Provide all necessary protective measures to prevent exposure of equipment from exposure to other construction activity.

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

END OF SECTION