

SECTION 11610 – TRUVIEW GLASS-WALLED FUME HOODS AND RELATED PRODUCTS

PART 1: DESCRIPTION OF WORK

1.0 SUMMARY AND SCOPE

- A. Section Includes:
Based on **Kewaunee Scientific Corporation's TruView Series** fume hood design, furnish and install all fume hoods, work tops, and understructures. Furnishing and installing all filler panels, knee space panels and scribes as shown on drawings.
- B. Accessorization:
Furnishing and delivering all service outlets and accessories as listed in these specifications, equipment schedules or as shown on drawings. Furnishing and delivering all service outlets, electrical receptacles and switches, as listed in these specifications, equipment schedules or as shown on drawings. Plumbing fixtures mounted on the fume hood superstructures shall be preplumbed per section 2.01.I. Electrical fixtures shall be prewired per section 2.01.J and be UL 3101 listed. Final plumbing and electrical connections are the responsibility of those contractors fulfilling requirements of Divisions 15 and 16.
- C. Removal of all debris, dirt and rubbish accumulated as a result of the installation of the fume hoods to an on-site container provided by others, leaving the premises clean and orderly.
- D. Related Divisions:
 - 1. Division 12: Laboratory Casework.
 - 2. Division 15: Plumbing and Exhaust Ducting
 - 3. Division 16: Electrical Fittings and Connections
- E. Related Publications:
 - 1. ASHRAE Standard 110.1985 Method of Testing Performance of Laboratory Fume Hoods.
 - 2. NSF STD#49 - Photometric Method of Testing.
 - 3. NIH03-112C National Institute of Health Specification.
 - 4. UL 3101 - Underwriters Laboratories.
 - 5. ASTM D552 - Bending Test.
 - 6. NFPA-45 - National Fire Protection Association
 - 7. ASTM C 1036

1.01 BASIS OF WORK

- A. It is the intent of this specification to use **Kewaunee Scientific Corporation, Statesville North Carolina**, as the standard of construction for laboratory fume hoods. The construction standards of the **Kewaunee TruView** product line shall provide the basis for quality and functional installation.
- B. Supply all equipment in accordance with this specification. The offering of a product differing in materials and construction from this specification requires written approval. This approval must be obtained seven (7) days before the proposal deadline. Procedures for obtaining approval for an alternate manufacturer are defined in section 1.04.B in this specification.
- C. General Contractors should secure a list of approved fume hood manufacturers from the architect as a protection against non-conformance to these specifications.
- D. The owner / architect reserves the right to reject qualified or alternate proposals and to award based on product value where such action assures the owner greater integrity of product.

- E. Submittals:
1. **Manufacturer's Data:** Submit manufacturer's data and installation instructions for the **TruView** fume hood. Provide data indicating compliance with ASHRAE Standard 110.1995 per section 1.02.c.
 2. **Samples:** Samples if called for will be reviewed for color, texture, and pattern only. Submit the following:
 - a. Tempered glass hood interior lining, 6 by 6 inches.
 - b. Hood enclosure, 6 by 6 inches, of color selected.
 - c. Operational sign(s).
 - d. Shop Drawings:
Submit shop drawings for **TruView** fume hoods showing plans, elevations, ends, cross-sections, service run spaces, location and type of service fittings.
 - 1) Coordinate shop drawings with other work involved.
 - 2) Provide roughing-in drawings for mechanical and electrical services when required.
 - 3) Provide face opening, air volume, and static pressure drop data.
 3. **Non-Specified Manufacturer's Samples:**
A sample from each non-specified manufacturer will be required and reviewed per specification. This sample shall be delivered, at no cost to the architect or owner to a destination set forth by the architect or owner. The sample must then be tested per section 1.02.C by an independent test agency hired by the submitting company and approved by the owner/architect. A passing test and owner/architect approval of the prototype must be written and approved seven (7) days before quotation deadline as a condition of acceptance for any quotation participant.

1.02 STANDARD FUME HOOD PERFORMANCE REQUIREMENTS

- A. **TruView** transparent fume hoods shall be of flush-sill airfoil design to insure maximum operating efficiency. Foil sections at the front facias of the hood shall minimize eddying of air currents at the hood face and the tempered glass rear baffle system and **dynamic barrier** bypass shall minimize turbulence in the upper portion of the hood interior.
- B. **TruView Bypass:**(Choose one) :
1. All bypass air shall pass through a horizontal perforated 304 stainless steel grille located between the interior top front liner panel and the operating plane of the top sash member.
 2. Laboratory air shall always be the source of bypass air. The front soffet panel, if used, shall be louvered to permit this air flow.

or

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The fume hoods shall be of the variable air volume type in which the exhaust air volume varies proportionally to the hood opening when used with a hood face velocity controller system (provided by others). The air bypass shall be RESTRICTED PER THE VAV Manufacturer's recommendation.

- C. **Containment**
1. **Purpose:**
The purpose of this specification is to prequalify the performance of the bidder's laboratory fume hood before award of contract. At their option, the owner or their

representative may require the same tests to be performed and the same performance be achieved before acceptance of the hood after award of contract. The owner or their representative shall witness the tests. Failure to meet the performance specified shall be cause for rejection of the bidder.

2. Test Method:
The hood shall be tested per the American Society of Heating, Refrigerating, and Air Conditioning Engineers (ASHRAE) Standard 110-1995.
3. Location of Tests and Test Facility:
All tests referenced herein shall be performed in the bidder's fume hood test facility. At the owner's option, test may be adopted for field-testing (testing in the owner's facility after installation is complete.).

The Manufacturer's test facility shall meet the following requirements:

- a. The test facility shall have sufficient area so that a minimum of 5 feet of clear space is available in front of and on both sides of the hood for viewing tests.
- b. The facility's ventilation system shall have adequate heating and air conditioning so that room air temperatures can be maintained within the desired ranges.
- c. Room air currents in the test area shall be less than 20 FPM.
- d. The hood exhaust system shall be properly calibrated so that the desired exhaust air volumes can be easily attained.

4. Instrumentation, Equipment, and Test Personnel:
Qualified personnel to perform the tests shall be supplied by the bidder.

Instrumentation and equipment required shall be supplied by the bidder at his expense. Required instrumentation shall include but not be limited to the following items:

- a. Thermal anemometer capable of measuring air velocities from 10 to 600 ft./minute.
- b. A room-temperature smoke generator.
- c. Titanium Tetrachloride swabs.
- d. Miran or ITI tracer gas sensing equipment per ANSI/ASHRAE 110-1995.
- e. Flowmeter - 150 ml/minute capacity.
- f. Flowmeter - 15 L/minute capacity.
- g. Two size 3 tanks of sulfur hexafluoride with a two-stage regulator or other tracer gas suitable for detector to be used.
- h. Three-way gas valve.
- i. Mannequin, 5' 7" in height, or reasonable human proportions with arms.
- i. ASHRAE 110-1995 tracer gas ejector.

5. ASHRAE Standard 110-1995 Test:
Hood shall be tested with a face velocity of 80 FPM at 18" open vertically and at 100 FPM right, left and center 100% open. The hood shall have a performance rating of 4.0 AM 0.01 or better wherein:

4.0 = tracer gas release in liters/minute
AM = as manufactured
0.01 = level of control of tracer gas in parts per million (ppm).

1.03 QUALITY ASSURANCE

- A. The laboratory fume hood manufacturer shall provide fume hood work tops and casework all **manufactured or shipped from the same geographic location** to assure proper staging, shipment and single source responsibility.
- B. General Performance: Provide certification that the **TruView** fume hoods meet the performance requirements described in section 1.02.C.

PART 2 – PRODUCTS

2.0 MANUFACTURERS

- A. The basis of this specification is the **Supreme Air TruView** fume hood as manufactured by **Kewaunee Scientific**, 2700 Front Street, Statesville, North Carolina.
- B. All laboratory equipment covered by the specification **shall be the product of one manufacturer and be fabricated at one geographic location** to assure shipping continuity and single-source responsibility. All quotations from a manufacturer other than Kewaunee Scientific shall contain a review of the following capabilities:
1. List of shop facilities
 2. List of engineering and manufacturing personnel
 3. Proof of financial ability to fulfill the contract
 4. List of a minimum of ten installations over the last five years of comparable scope
 5. Proof of project management and installation capabilities
- C. The selected manufacturer must warrant for a period of one-year starting (date of acceptance or occupancy, whichever comes first) that all products sold under the contract referenced above shall be free from defects in material and workmanship. Purchaser shall notify the manufacturer's representative immediately of any defective product. The manufacturer shall have a reasonable opportunity to inspect the goods. The purchaser shall return no product until receipt by purchaser of written shipping instructions from the manufacturer.

2.01 MATERIALS AND CONSTRUCTION

- A. **TruView Superstructure:**
A freestanding rigid structure of formed steel shall be provided to support ¼ inch ASTM C-1036 tempered glass panels and baffle system. To allow for maintenance and replacements, these glass panels shall be removable without disassembly of the frame structure.
- B. **Fume Hood Airfoil:**
A streamlined airfoil shall be integral at the bottom of the hood opening on the **TruView** fume hood. This foil shall be flush with work top. This formation will effectively direct an air stream

across the work surface to prevent back flow of air. The foil shall be of 14-gauge steel to resist denting and flexing.

- C. **Fume Hood Grille:**
The top front panel shall be of 18 gauge cold rolled furniture grade steel. It shall contain a grille that is sight-tight to create an effective barrier against flying debris from inside the hood.

- E. **Fume Hood Baffles:**
A stable, non-adjustable baffle made from either ¼" tempered glass or Kemglass shall be placed against the rear wall of single-sided units or in the middle of dual sided units. Three fixed horizontal slots shall be provided to aid in distributing the flow of air into and through the hood. The baffle shall be spaced out 2-1/4" from the back liner, or dead center in two-sided units. The baffle shall be removable for cleaning.

- F. **Fume Hood Duct Collar:**
30" X10" rectangular duct collar (two such collars on the 8 foot models).

- G. **Fume Hood Lighting:**
One (single-sided) or two (dual-sided) two-tube T-12 (T-8) fluorescent light fixtures (bulbs not included) of the size given below shall be provided at the top of the hood to give maximum light in the hood working area.

Hood Size, Ft.	Nominal Fixture Length, Ft.
5	4
6	4
8	3 (2 Fixtures)

The light fixtures shall be isolated from the hood interior by a 1/4" - thick tempered glass panel sealed from the hood cavity. Fixture shall be UL labeled.

- H. **Fume Hood Vertical Rising Sashes:**
An inward-slanting vertical sash system on both fascia of the hood at an 85° angle to the worktop. The sashes are of frameless design, with 1/4" tempered glass.

- I. **Fume Hood Plumbing Services:**
Plumbing services shall consist of remote control valves as selected located within the fume hood base cabinet. Interior fitting for gases and water shall be nylon panel flanges and angle serrated hose connectors, color coded mounted to the rear interior hood corner posts. Interior fittings for distilled water shall consist of a bronze tin lined, white color-coded, panel flange and angle serrated hose connector. Interior fittings for steam shall consist of a cast bronze flange and angle serrated hose connector with a chemical resistant metallic bronze finish. Water goosenecks shall be cast bronze with a chemical resistant metallic bronze finish. All plumbing outlets interior to the hood shall be factory installed and piped between the stub-out and the outlet. Valves in the base cabinet shall be field-plumbed to the hood stub-outs. Stub-outs shall have a single-point connection for each outlet provided and carried to a point 1" below the worktop rear corner depending on the rough-in locations shown in the drawings.

- J. **Fume Hood Electrical Services:**
The hood electricals shall be field-wired by others. Electrical outlets and switches shall be located on the base cabinets. The duplex receptacles shall be 20 Amp, 125 volt AC, and 3-wire polarized grounded with ground fault interruption. The receptacles shall be of specification grade, side wired only, to insure a positive connection. The light switch shall be 20 Amp., 125 volt AC, and 3-wire polarized grounded. Field wiring shall terminate in one 4" X 4" service junction box located on the fume hood roof.

- K. **Hood Epoxy Resin Work Surface:**
Hood work surface 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 with a 6" wide safety ledge across the front

edge. Top shall be manufactured at the same manufacturing location as the fume hood to assure proper cutout alignment and coordinated shipping. A cup drain flush with the recessed worksurface shall be provided. The worksurface and cup drain shall be available in either black or gray.

L. Fume Hood Finish:

After the metal component parts have been completely welded together and before finishing, they shall be given a five-stage metal preparation water treatment consisting of:

- 1) A caustic rinse
- 2) A water rinse
- 3) Iron phosphate treatment
- 4) A water rinse
- 5) A deionized water rinse

After this treatment, the steel shall be dried at 325 degrees Fahrenheit. The steel surfaces shall be coated with a corrosion-resistant powder coat finish 0.0023" inches thick which then shall be fused in an oven at a temperature of 375 degrees Fahrenheit for 20 minutes.

Any liquid-based paint system is unacceptable due to VOCs and other environmental issues.

N. Fume Hood Paint Finish Chemical Resistivity

All painted surfaces shall pass SEFA 8.1 Methods A or B

Test Method A: Volatile chemicals tested by placing a saturated cotton ball with the reagent in the mouth of a 1-oz. bottle and inverting the bottle on the surface of the panel.

Test Method B: Five drops of non-volatile chemicals of each reagent placed on sample, covered with watch glass, convex side down.

Each Chemical is left for one hour, then washed off with water, cleaned with detergent and naphtha and rinsed with deionized water, dried and evaluated after 24 hours at $73 \pm 3^{\circ}\text{F}$ and $50 \pm 5\%$ relative humidity.

RATING SCALE:	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, Erosion of Coating. Obvious & Significant Deterioration.

TEST RESULTS

Chemical Spot Tests:

<u>#</u>	<u>CHEMICAL</u>	<u>Test Method</u>	<u>Time In Minutes</u>	<u>Rating Scale</u>
1	Amyl Acetone	A	60	Level 0
2	Ethyl Acetate	A	60	Level 0
3	Acetic Acid 98%	B	60	Level 0
4	Acetone	A	60	Level 1
5	Acid Dichromate 5%	B	60	Level 0
6	Butyl Alcohol	A	60	Level 1
7	Ethyl Alcohol	A	60	Level 1
8	Methyl Alcohol	A	60	Level 1
9	Ammonium Hydroxide, 28%	B	60	Level 0
10	Benzene	A	60	Level 0
11	Carbon Tetrachloride	A	60	Level 0
12	Chloroform	A	60	Level 0
13	Chromic Acid 60%	B	60	Level 0
14	Cresol	A	60	Level 0
15	Dichlor Acetic Acid	A	60	Level 0
16	Dimethylformamide	A	60	Level 0
17	Dioxane	A	60	Level 0
18	Ethyl Ether	A	60	Level 0
19	Formaldehyde 37%	A	60	Level 0
20	Formic Acid 90%	B	60	Level 0
21	Furfural	A	60	Level 0
22	Gasoline	A	60	Level 0
23	Hydrochloric Acid, 37%	B	60	Level 0
24	Hydrofluoric Acid 48%	B	60	Level 2
25	Hydrogen Peroxide 28%	B	60	Level 0
26	Tincture of Iodine	B	60	Level 2
27	Methyl Ethyl Ketone	A	60	Level 1
28	Methylene Chloride	A	60	Level 0
29	Mono Chlorobenzene	A	60	Level 0
30	Napthalene	A	60	Level 0
31	Nitric Acid, 20%	B	60	Level 2
32	Nitric Acid, 30%	B	60	Level 2
33	Nitric Acid, 70%	B	60	Level 2
34	Phenol 90%	A	60	Level 0
35	Phosphoric Acid, 85%	B	60	Level 1
36	Silver Nitrate, Saturated	B	60	Level 0
37	Sodium Hydroxide, 10%	B	60	Level 0
38	Sodium Hydroxide, 20%	B	60	Level 0
39	Sodium Hydroxide, 40%	B	60	Level 0
40	Sodium Hydroxide, Flake	B	60	Level 0
41	Sodium Sulfide, Saturated	B	60	Level 0
42	Sulfuric Acid, 25%	B	60	Level 2
43	Sulfuric Acid, 85%	B	60	Level 3
44	Sulfuric Acid, 96%	B	60	Level 3
45	Sulfuric 85% & Nitric Acid 70%	B	60	Level 3
46	Toluene	A	60	Level 1
47	Trichlorethylene	A	60	Level 0
48	Xylene	A	60	Level 1
49	Zinc Chloride, Saturated	B	60	Level 0

- O. Fume Hood Dimensions
End panel thickness shall not exceed 2". Interior clear working height shall be not less than 41-3/4". Interior depth from the back of the sash to the front of the rear baffle shall be not less than 25-1/4". The sash opening shall be not less than 27" in height above the worksurface.
- P. Fume Hood Liners (choose one or two):
1. KMER Epoxy Resin Lining:
KMER epoxy resin liner shall be the manufacturing standard for liners in this specification. To assure proper punching and coordination with remaining pieces of assembled fume hood superstructure, this liner material must be manufactured at the same geographic location and the fume hood superstructure. Interior liner panels shall be 1/4" thick epoxy resin sheets of a neutral color. Interior liner panels shall be fastened using stainless steel screws with plastic covered heads.

Flame spread of material as measured by ASTM E84 shall be 6.2 or less.

Fiberglass reinforced plastics or polyesters shall not be acceptable substitute liner materials for epoxy resin.

2. 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.
3. Tempered Glass
All tempered glass panels shall be 1/4 inch ASTM C-1036 tempered glass.

- Q. Liner Tests - Chemical Spot Tests - 24 Hours
1. Chemical spot test shall be made by applying 10 drops (approximately 1/2 cc) of each reagent to the surface to be tested. Each reagent (except those marked **) shall be covered with a 1-1/2" diameter watch glass, convex side down to confine the reagent. Spot tests of volatile solvents marked ** shall be tested as follows: A 1" or larger ball of cotton shall be saturated with the solvent and placed on the surfaces to be tested. The cotton ball shall then be covered by an inverted 2-ounce, wide mouth bottle to retard evaporation. All spot tests shall be conducted in such a manner that the test surface is kept wet throughout the entire 24-hour test period and at a temperature of 77° F. ± 3° F.

At the end of the test period, the reagents shall be flushed from the surfaces with water and the surface scrubbed with a soft bristle brush under running water, rinsed, and dried. Volatile solvent test areas shall be cleaned with a cotton swab soaked in the solvent used on the test area. Spots where dyes have dried shall be cleaned with a cotton swab soaked in alcohol to remove the surface dye. The test panel shall then be evaluated immediately after drying.

2. Ratings/Legend:

1 - KMER (Kewaunee Modified Epoxy Resin)	A = No effect or slight change in gloss.
2 - Glass Reinforced Polyester	B = Slight change in gloss or color
3 - Stainless Steel 304	C = Slight etching or severe staining
4 - Stainless Steel 316	D = Swelling, pitting, or severe etching.
5 - Reinforced Phenolic Resin	

RESULTS:	1	2	3	4	5
1. Acetic Acid 98%	A	B	B	B	A
2. Acetone **	A	D	A	A	A
3. Acid Dichromate	A	A	A	A	A
4. Ammonium Hydroxide ** 28%	A	A	B	B	A
5. Amyl Acetate **	A	A	A	A	A
6. Benzene **	A	A	A	A	A
7. Butyl Alcohol **	A	A	A	A	A
8. Carbon Tetrachloride **	A	A	A	A	A
9. Chloroform **	A	D	A	A	A
10. Chromic Acid 60%	B	B	C	C	A
11. Cresol	A	A	A	A	A
12. Dichloroacetic Acid	A	D	B	A	A
13. Dimethylformamide	A	A	A	A	A
14. Dioxane **	A	A	A	A	A
15. Ethyl Acetate **	A	A	A	A	A
16. Ethyl Ether **	A	A	A	A	A
17. Ethyl Alcohol **	A	A	A	A	A
18. Formaldehyde	A	A	A	A	A
19. Formic Acid 90%	A	A	A	A	A
20. Furfural **	B	B	A	A	C
21. Gasoline **	A	A	A	A	A
22. Hydrochloric Acid 37%	A	A	B	B	A
23. Hydrofluoric Acid 48%	B	D	D	D	A
24. Hydrogen Peroxide 30%	A	A	A	A	A
25. Methyl Ethyl Ketone **	A	A	A	A	A
26. Methyl Alcohol **	A	A	A	A	A
27. Methylene Chloride **	A	D	A	A	A
28. Monochlorobenzene **	A	A	A	A	A
29. Naphthalene **	A	A	A	A	A
30. Nitric Acid 20%	B	A	B	A	A
31. Nitric Acid 30%	B	A	B	A	A
32. Nitric Acid 70%	B	D	B	A	A
33. Phenol ** 85%	A	C	A	A	A
34. Phosphoric Acid 85%	A	A	B	A	A
35. Silver Nitrate	B	C	A	A	C
36. Sodium Hydroxide 40%	A	D	A	A	A
37. Sodium Hydroxide 20%	A	D	A	A	A
38. Sodium Hydroxide 10%	A	D	A	A	A
39. Sodium Hydroxide Flake	A	B	A	A	A
40. Sodium Sulfide	A	B	A	A	A
41. Sulfuric Acid 77%	A	A	C	A	A
42. Sulfuric Acid 96%	C	D	C	A	C
43. Sulfuric Acid 33%	A	A	C	A	A
44. Tincture of Iodine	A	C	B	B	A
45. Toluene **	A	A	A	A	A
46. Trichlorethylene **	A	A	A	A	A
47. Xylene **	A	A	A	A	A
48. Zinc Chloride	A	A	B	A	A
49. Nitric 70%/Sulfuric Acid 77%*	B	B	B	A	A

* Equal parts of Nitric Acid 70% and Sulfuric Acid 77%.

** Indicates these solvents tested with cotton and jar method

S. Fume Hood Base Cabinets

1. Standard Steel

- a. Unless otherwise indicated base units under hoods shall be fabricated of cold rolled prime grade roller leveled furniture steel. Gauges of steel used in construction shall be 18 gauge except as follows:
- b. Corner gussets for leveling bolts and apron corner braces, 12 gauge.
- c. Hinge reinforcements, 14 gauge.
- d. Top and intermediate front horizontal rails, apron rails and reinforcement gussets, 16 gauge.
- e. Door assemblies and adjustable shelves, 20 gauge.
- f. Performance of the painted surfaces shall match that of the fume hood outer panels.

2. Special Purpose Cabinets for Use Under Fume Hoods:

a. Acid Storage Cabinets:

Where indicated acid storage cabinets shall use the same gauges of steel and construction features as other base cabinets. In addition, they shall have a one-piece liner insert made of linear low-density polyethylene. The liner insert shall form a one-inch high pan at the bottom to retain spillage. Each door will have a set of louvers at the top and bottom. The door shall be lined with a polyethylene sheet. Each cabinet shall be vented into the fume hood with a 1-1/2" vent pipe. Providing a positive airflow directly into the fume hood exhaust system.

b. Solvent Storage Cabinets:

Solvent storage cabinets shall be UL labeled and specifically designed for the storage of flammable and combustible liquids. Construction shall be based upon the requirements listed by UL, UFC, OSHA, and NFPA No. 30 - 1993. The bottoms, top, sides and doors shall be fabricated of 18" gauge steel and shall be all double panel construction with a 1-1/2" air space between panels. All joints shall be welded, or screwed, to provide a rigid enclosure. The doors shall swing on full-length stainless steel piano hinges and shall be fully insulated. The right hand door shall be equipped with a three point latching device and the left-hand door shall have a full height astragal. The doors are self-closing and synchronized so that both doors will always fully close. The right hand door is equipped with a three-point latching system that automatically engages when the doors close. Each door is equipped with a fusible-link hold-open feature that will ensure the door closes should the temperature outside the cabinet exceed 165 degrees Fahrenheit. Units 24" long have only one door, self-closing, and equipped with a three-point latching system and hold-open feature. A 2" deep liquid tight pan that covers the entire bottom of the cabinet shall be furnished to contain liquid leaks and spills. A full-depth adjustable shelf is also provided. The shelf is perforated to allow air circulation within the cabinet. Two diametrically opposed vents with spark screens are provided in the back of the cabinet as well as a grounding screw. The cabinet shall have interior finish same as exterior. The cabinet shall be labeled: "FLAMMABLE - KEEP FIRE AWAY".

T. Fans

1. General

a. Fans shall be clockwise rotation, single width, single inlet, centrifugal type, with Vertical upblast discharge.

b. The centrifugal fan assembly shall consist of fan impeller wheel, housing, electric motor, bearings, V-belt driven shaft, stainless steel weather cover and accessories. All components shall be attached to a common base which shall include provisions for fastening it to a foundation. The assembly shall be completely assembled, ready for mounting and wiring to power source.

2. Fan Materials and Construction

a. Fan Wheels:

Fan wheels shall be one of two (2) types and shall be dynamically balanced. Plastic or fiberglass wheels are not acceptable. Types are as follows:

1) Forward Inclined Blade Wheels - The wheel shall consist of die formed identical blades, machine riveted to a die punched rim and back plate to form a rigid wheel assembly.

2) Backward Inclined Blade Wheels - The wheel shall consist of flat, die formed identical blades, machine riveted to the die punched back plate and arc welded to the front rim to form a rigid wheel assembly.

b. Fan Shaft:

Shafts shall be turned, ground and polished carbon steel alloy and shall be sized to provide maximum horsepower for the size of fan involved.

c. Fan Housings:

Housings shall be constructed of carbon steel or aluminum sheet and have a nominal 16 gauge thickness. Housings shall be welded construction and shall be reinforced to minimize vibration. The discharge direction shall be reinforced to minimize vibration. The discharge direction shall be up-blast with clockwise rotation as designated by the AMCA standard method of designation for rotation and discharge.

d. Weather Covers:

Weather covers shall be constructed of #24 gauge stainless steel No. 2B finish.

e. Fan Bearings:

Fans shall be equipped with precision anti-friction bearings, pre-lubricated and sealed. Bearings shall be the self-aligning type and shall be mounted in suitable pillow blocks with provision for attachment to the fan frame assembly.

f. Fan Sheaves:

Fans shall be equipped with high quality cast iron adjustable pitch type motor sheaves and shall be sized to provide the CFM and static pressure range a shown in the manufacturer's catalog ratings. Fan shaft sheaves shall be similar, non-adjustable.

- g. Fan Motors:
 Fan motors shall conform to NEMA MG-1 and shall be capable of continuous operation when driving the fan at rated conditions. Motors shall be UL listed.
- 1) Motors shall be in one of the following electrical voltages as standard:
 - 115/230 Volt, 60 Hz, Single Phase
 - 230/460 Volt, 60 Hz, Three Phase
 - 2) Motors shall be one of the three (3) types:
 - ODP (open, drip proof)
 - TEFC (totally enclosed, fan cooled)
 - EP (explosion proof)
 with the following characteristics:

Motor Type	Insulation	Base *	Bearing *
ODP	Class A	Resilient-Rigid	Sleeve-Ball
TEFC	Class A or B	Resilient-Rigid	Sleeve-Ball
EP**	Class A or B	Resilient-Rigid	Sleeve-Ball

* - Depending on horsepower requirements

** - Class 1, Group D, E, F and G; and Class 2, Group E, F and G

3. Fan Finish

- a. Fan Housing and Motor Support Frame Finish:
 - 1) After the component parts have been completely welded together and before finishing, they shall be given a pre-paint treatment to provide excellent adhesion of the finish system to the metal and to aid in the prevention of corrosion. Physical and chemical cleaning of the metal shall be accomplished by washing with an alkaline cleaner, followed by a spray treatment with a complex metallic phosphate solution to provide a uniform fine grained crystalline phosphate surface that shall provide both an excellent bond for the finish and enhance the protection provided by the finish against humidity and corrosive chemicals.
 - 2) After the phosphate treatment, the metal shall be dried and all metal surfaces shall be coated with a corrosion-resistant paint finish. The coating shall then be cured by baking at elevated temperatures to provide maximum properties of corrosion and wear resistance. The finish shall meet the Performance Requirements specified in Section 5.02 d. 2. d.
 - 3) KEM-FP Corrosion Resistant Finish (Optional):
 Fan housing and other components within the exhaust air stream shall, after the units have been completely welded together and before finishing, be given a pre-paint treatment to provide excellent adhesion of the finish system to the metal and to aid in the prevention of corrosion. Immediately following the pre-finish treatment, the surfaces shall be pre-heated to required pre-heat temperature and then all surfaces shall be given a single coating (5-6 mil thick) of fluoropolymer resin coating and post baked at 550 degrees F. temperature for 12 minutes. The completed finish shall

meet the performance test requirements specified under Performance Test Results in Section 5.01 D. 3. e.

- b. Impeller Wheel Finish:
 - 1) Standard:
Special KEM-FP Corrosion Resistant - After the wheels have been completely assembled and before finishing, they shall be given a pre-paint treatment to provide excellent adhesion of the finish system to the metal and to aid in the prevention of corrosion. Immediately following the pre-finish treatment, the surfaces shall be pre-heated to the required pre-heat temperature and then all surfaces shall be given a single coating (5-6 mil thick) of fluoropolymer resin coating and post baked at 550 degrees F. temperature for 12 minutes. The completed finish shall meet the performance test requirements specified under Performance Requirements in Section 5.02 D. 2. e.
 - 2) Perchloric:
For perchloric acid use, all parts within the air stream shall be coated with a special corrosion resistant fluoropolymer finish.

- 4. Fan Performance Requirements
 - a. Airflow AMCA Certification:
Fan performance shall be in accordance with test codes adopted by AMCA.

 - b. Conditions:
The fan ratings shall be based on 70 degrees F. inlet air at a barometric pressure of 29.92 inches. The fans shall provide the rated CFM and static pressure shown in the fan chart ratings contained in the manufacturer's catalog.

 - c. Performance Test - Finish:
 - 1) Terms and Equipment:
Terms and equipment defined as required for the paint system finish and performance specification evaluation.
Specified Chemicals - This list is composed of reagents commonly used in the laboratories that purchase laboratory furniture.
Watch Glass - Round, convex glass pieces designed for laboratory reagent testing. One size per panel is recommended for uniformity.
Convex - Curved or rounded like the exterior of a sphere or circle, the curved side of a watch glass.
Saturate - To load to capacity or fill completely.
Cotton Balls - Approximately one cubic inch balls of cotton fiber, not sterilized, each weighing approximately 0.32 grams.
 - 2) Performance Test Ratings:
The terms referred to in Performance Test Results follows:
"Excellent" - indicates that the test leaves no visible effect on the finish film other than an increase in gloss.
"Good" - indicates that the testing leaves no effect other than slight discoloration, slight decrease in gloss or * temporary slight softening of the finish film with no loss of adhesion and film protection.
* Temporary slight softening may exist upon reagent removal, but should be termed as failure only if the softened condition exists at the end of the one hour recovery period.

"Failures" - are indicated as objectionable discoloration or decrease in gloss, swelling, blistering, softening, or bared metal.

- 3) Performance Test (Chemical Spot Test):
- a) The test panel should be a suitable sized production piece.
 - b) Prepare the test panel with labeled spaces for each of the specified chemicals. Two by two inch test spaces should be used.
 - c) Chemical spot tests should be made by applying ten (10) drops (approximately 1/2 cc) of each reagent to the test surface. Each reagent should be covered with a watch glass, convex side down, in the center of the puddle to hold the reagent in place. Volatile solvents should be applied by using saturated one inch cotton balls, which are in turn, covered by inverted two ounce wide mouth bottles to retard evaporation.
 - d) All spot tests should be performed in such a manner that the tested surfaces remain wet throughout the entire test period, at a temperature of 77° F. plus or minus 3° F. At the end of the test period, the test surface should be flushed with cold water and lightly scrubbed with a soft bristle brush and soapy water, then rinsed and dried before examination and evaluation. Test results are to be determined at the end of a one hour recovery period. Performance test ratings are to be determined as indicated in D.2.b. (The test approximates the actual condition of a reagent bottle setting in a puddle of the reagent on a surface).

4) Resistivity of Housing and Motor Support Frame Finish Shall Equal:

Reagents*	Time in Minutes	Test Ratings
Acetic Acid, 98%	60	Good
Sulfuric Acid, 25%	60	Excellent
Sulfuric Acid, 85%	60	Good
Hydrochloric Acid, 37%	60	Excellent
Nitric Acid, 25%	60	Excellent
Phosphoric Acid, 75%	60	Excellent
Perchloric Acid, 70	60	Excellent
Methylene Chloride	60	Excellent
Sodium Hydroxide, 25%	60	Excellent
Sodium Hydroxide, 10%	60	Excellent
Ammonium Hydroxide, 28%	60	Excellent
Hydrogen Peroxide, 5%	60	Excellent
Ether	60	Excellent
Ethyl Alcohol **	60	Excellent
Ethyl Acetate **	60	Excellent
Xylene **	60	Excellent
Acetone **	60	Excellent
Formaldehyde, 37%	60	Excellent
Carbon Tetrachloride **	60	Excellent
Methyl Ethyl Ketone **	60	Excellent

* Where concentrations are indicated, percentages are by weight.

** Volatile solvents, applied by saturated cotton ball method.

5) Results Impeller Wheel Finish Should Equal or Exceed:

Reagents*	Time in Hours	Test Ratings
Acetone **	168	Excellent
Ammonium Hydroxide, 28%	168	Excellent
Benzene **	168	Excellent
Butyl Alcohol **	168	Excellent
Carbon Tetrachloride **	168	Excellent
Chloroform **	168	Excellent
Chromic Acid, 60%	168	Excellent
Cresol	168	Excellent
Dioxane **	168	Excellent
Ethyl Acetate **	168	Excellent
Ethyl Alcohol **	168	Excellent
Ethyl Ether **	168	Excellent
Formaldehyde	168	Excellent
Formic Acid, 90%	168	Excellent
Furfural	168	Excellent
Gasoline **	168	Excellent
Gentian Violet, 1% Aq.	168	Excellent
Glacial Acetic Acid, 99%	168	Excellent
Hydrochloric Acid, 37%	168	Excellent
Hydrochloric Acid, 20%	168	Excellent
Hydrofluoric Acid, 48%	168	Excellent
Methanol **	168	Excellent
Mono-Chlorobenzene **	168	Excellent
Nitric Acid, 70%	168	Excellent
Nitric Acid, 30%	168	Excellent
Nitric Acid, 20%	168	Excellent
Perchloric Acid, 60%	168	Excellent
Perchloric Acid, 70%	168	Excellent
Phenol, 85%	168	Excellent
Phosphoric Acid, 85%	168	Excellent
Silver Nitrate, 10%	168	Excellent
Sodium Hydroxide, 40%	168	Excellent
Sodium Hydroxide, 10%	168	Excellent
Sodium Hydroxide, Flake	168	Excellent
Sodium Hypochlorite, 5%	168	Excellent
Sulfuric Acid, 96%	168	Excellent
Sulfuric Acid, 77%	168	Excellent
Sulfuric Acid, 33%	168	Excellent
Tincture of Iodine	168	Excellent
Trichlorethylene **	168	Excellent
Toluene **	168	Excellent
Wright's Blood Stain	168	Excellent
Xylene **	168	Excellent
Zinc Chloride, Saturated	168	Excellent

* Where concentrations are indicated, percentages are by weight.

** See spot test for volatile solvents on previous page.

- U. Accessories:
1. Filters and Housings:
Where called for, a filter housing shall be provided above the hoods. The housing shall contain an absolute filter (99.97% efficient for 0.3 micron particles) and a furnace type prefilter. The housing shall form a rigid, self-supporting assembly and have a gasketed front cover to allow replacement of the filters without disturbing the ductwork. The filter housing shall be fabricated of cold rolled steel with a chemical resistant finish.
 2. Low Face Velocity Alarm
TruView hoods shall come equipped with the AirAlert 600 digital velocity alarm to detect low hood face velocities. The alarm system shall sense the actual face velocity of the hood regardless of sash position. The system shall have air velocity sensing thermistor. The monitor shall have a green light activated when the face velocity is above the set point and a red light and audible alarm which are activated when the face velocity is below the set point. The audible alarm can be acknowledged and silenced with mute switch on panel. When the mute is activated, it automatically resets itself when face velocity again rises above calibrated set point. The set point is to be factory set and calibrated at approximately 70 FPM. Field calibration is possible.

PART 3 - EXECUTION – TRUVIEW FUME HOOD AND RELATED PRODUCTS

3.00 SITE EXAMINATION

The owner and/or his representative shall certify building conditions conducive to the installation of a finished goods product, including all critical dimensions.

3.01 INSTALLATION

- A. Preparation:
Prior to beginning installation of fume hood, check and verify that no irregularities exist that would affect quality of execution of work specified.
- B. Coordination:
Coordinate the work of the Section with the schedule and other requirements of other work being performed in the area at the same time both with regard to mechanical and electrical connections to and in the fume hoods and the general construction work.
- C. Performance:
Install fume hoods, plumb, level, rigid, securely anchored to building and adjacent furniture in proper location, in accordance with manufacturer's instructions and the approved shop drawings. Provide filler panels between top of hood and ceiling. Securely attach access panels but provide for easy removal and secure re-attachment. Do not install any damaged units.
- D. Adjust and Clean:
After installations are complete, adjust all moving parts for smooth operation. Remove all packing materials and debris resulting from this work, and turn over the fume hoods to the

Owner clean and polished both inside and out. Repair or remove and replace defective work, as directed by owner and/or his representative upon completion of installation.

E. Protection:

1. Provide reasonable protective measures to prevent casework and equipment from being exposed to other construction activity.
2. Advise owner and/or his representative of procedures and precautions for protection of material, installed laboratory casework and fixtures from damage by work of other trades.

F. Certification:

1. Fume Hood Manufacturer shall field test a random sample of 20% of the installed units using ANSI/ASHRAE 110-1995 to a control level of AI 0.01 ppm or better.
2. Project substantial completion shall be withheld until all required fume hood certification letters, tests, and reports have been submitted to and approved by the Architect.