

LABORATORY FUME HOODS

GENERAL

SUMMARY

- A. Section includes: Laboratory fume hoods and component fitting, fixtures, accessories.
 - 1. Pipe chase covers, filler panels, knee space panels, and scribes as indicated or required.
 - 2. Sinks, cup sinks and drains, utility services outlet accessory fittings, and sink outlets with tail pieces.
 - 3. Fume hood vent connections and ductwork from fume hoods to fans and from fans to the atmosphere, including wiring for fans and switches.
 - 4. Electrical receptacles and switches mounted on the fume hoods.
- B. Related sections:
 - 1. Laboratory Casework.
 - 2. Mechanical.
 - 3. Electrical.

REFERENCE STANDARDS

- A. ASTM:
 - 1. A 240-92b - Specification for Heat-Resisting Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels.
 - 2. A 366-91 - Specification for Steel, Sheets, Carbon, Cold-Rolled, Commercial Quality.

SYSTEM DESCRIPTION

- A. Design Requirements: Design hoods to be fume resistant, to collect, retain, and dispose of hazardous fumes with complete safety, minimum purging of air from room supply, and minimize turbulence within hood chamber.
- B. Performance requirements: Fume hood shall contain and remove fumes generated within the hood. Face velocity range shall be between 100 and 125 FPM. Hood shall operate efficiently at any setting within these ranges.
 - 1. Hood design shall exhaust light or heavy gasses efficiently when used for ordinary laboratory work in a room free from cross drafts and without high thermal loads or the other special conditions. No dead air pockets or reverse flows of air will be permitted along the sides, bottom, or front of the hood.
 - 2. Concentration of flammable constituents in air should not exceed 10 percent of its lower flammability limit.

SUBMITTALS

- A. Product data: submit complete manufacturer's descriptive literature and specifications.
 - 1. Materials List: Submit complete lists of materials proposed for use, giving the manufacturer's name, catalog number, and catalog cut for each item where applicable.
- B. Shop Drawings: Submit Shop Drawings which comprehensively describe the fabrication and installation of fume hoods. Drawings submitted shall include not less than the following:

1. Dimensioned plans, elevations, ends, cross-sections, service run-spaces, location and type of fixtures and service fittings, together with indication of associated service supply connections required, with each unit identified in a manner facilitating reference to the Contract Drawings.
2. Typical and special fabrication and installation detailed, including provisions for the connection to the mechanical and electrical services.
3. Materials and finishes.
4. Details and location of anchorages and fitting to floors, walls, and base.
5. Layout of units with relation to surrounding walls, doors, windows, lighting and air conditioning fixtures, connections of hood-to-hood exhaust system, location of access doors, cut-off valves, junction boxes.
6. Shop Drawings with other trades whose work affects installation or performance of fume hood.
7. Coordinated rough-in drawings for mechanical and electrical services.

C. Samples:

1. Submit samples of finish materials for review by Architect of the color, texture, and pattern upon request.

D. Quality Control Submittals:

1. Design Data: Submit design data for fume hood air ventilation.
2. Test Reports: When and as directed by the Architect, submit certified laboratory test reports confirming physical characteristics of materials used in the performance of the work of this Section.
3. Provide ANSI/ASHRAE 110-1995
4. Manufacturer's instructions: Submit manufacturer's current recommended installation instructions, including relevant limitations, safety and environmental cautions, and application rates.

E. Contract Closeout Submittals:

1. Operation and Maintenance Data: Submit complete operating and maintenance data covering safe and proper operation of the fume

PRODUCTS

MANUFACTURERS

- A. Design is based on the use of products manufactured by Genie Scientific, Inc., in Fountain Valley, CA (714)545-1470 or (800)545-8816.
- B. Materials shall be the products of one manufacturer and shall be either the ones upon which the design is based or the products of a manufacturer accepted in advance.

MATERIALS

- A. Sheet Steel: Cold-rolled, galvanized or double-annealed, and patent leveled mild steel conforming to ASTM A 366. Gauges shall be U.S. Standard or comparable.
- B. Stainless Steel: AISI Type 304 in accordance with ASTM A 240 with No. 4 brushed finish.
- C. Safety glass: Two sheets of clear float glass, complying with ASTM C1036 requirements for Type 1, Class 1, Quality q3 glass, permanently laminated to clear polyvinyl butyral interlayer, with overall thickness of 7/16 inch.

- D. Interior lining: lining shall be flame retardant and self- extinguishing.
 - 1. **Type FR-** Trespa: Manufacturer's standard 1/4-inch thick chemically- and reagent-resistant Trespa liner meeting ASTM E 84 and UL Classifications Flame Spread rating of 10... Color shall be white.
 - 2. **Type SS -** Stainless Steel: Manufacturer's standard AISI specifications type 304 or 316 stainless steel liner with no. 4 brushed finish. Provide spot welded or covered construction. Ship with peel-off protective coating in place.

- E. ALARMS: Each fume hood system shall have some type of monitor for indicating face
 - a. velocity or exhaust flow verification. The monitor can be a simple pressure gauge
 - b. connected to a pilot tube in the exhaust duct or one of many types of electronic devices.
 - d. Regardless of the monitor installed, it should provide clear indication to the hood user whether the exhaust flow or face velocity is within design parameters.
 - e. Note: A ribbon taped to the bottom of the sash is not acceptable.

- F. Accessory Materials:
 - 1. Screws:
 - a. Exterior: Sheet metal type zinc plated.
 - b. Interior (or wherever exposed to fumes in hood): Capped sheet metal type zinc plated
- G. Sash : Chain Driven

- H. Finish: After fabrication of sheet steel parts, but before final assembly, component parts shall be powder coated.

FUME HOODS

- A. General: Design is based on the use of Genie Scientific, Inc. products:
 - 1. **GENIE400:** 48 inches wide by 33 inches deep by 54.5 inches high with an exhaust duct collar size of 10 inches.
 - 2. **GENIE500:** 60 inches wide by 33 inches deep by 54.5 inches high with an exhaust duct collar size of 10 inches.
 - 3. **GENIE600:** 72 inches wide by 33 inches deep by 54.5 inches high with an exhaust duct collar size of 12 inches.
 - 4. **GENIE800:** 96 inches wide by 33 inches deep by 54.5 inches high with two exhaust ducts with a collar size of 10 inches each.

- B. **Type A – CONVENTIONAL, AIR FOIL TYPE**
 - 1. General: Fume hoods shall be air foil design with foil sections at top, bottom, and sides of the hood opening to ensure maximum operating efficiency and minimum eddying of air currents. Hoods shall be by-pass type to provide a relatively constant exhaust air volume through the hood regardless of sash position.
 - 2. The auxiliary air design shall provide for 70 percent of the air used by the hoods, both auxiliary air and room air, to be drawn through the face of the hood with sash open. Hoods shall provide efficient fume removal when operating with 70 percent of the exhaust air requirement being auxiliary air and 30 percent being room air, when auxiliary air is supplied at temperatures ranging from 50 degrees F. The flow of auxiliary air shall be entrained in the flow of air entering the hood with a capture efficiency of at least 90 percent.

3. Model: Genie Scientific, Inc.:
 - a. Model GENIE400
 - b. Model GENIE500
 - c. Model GENIE600
 - d. Model GENIE800

C. Base Cabinets:

1. Provide manufacturer's standard tops, cup sinks, and troughs to match similar adjacent units as specified.

FABRICATION

- A. Framework: Heavy-gauge steel members, reinforced, braced, and assembled to ensure strength and rigidity and Trespa lined for additional integrity.
- B. Body Construction: Fabricate exterior of minimum 18-gauge sheet steel with component parts screwed together to allow removal of end panels, front-end fascia pieces, top fascia and airfoil strips, and to allow access to plumbing lines and service fittings. Apply manufacturer's standard acid- and alkali-resistant, baked-on finish to interior and exterior surfaces of component parts prior to final assembly.
- C. Air Foil: Provide a streamlined appearance similar to the sides installed at the bottom of the hood opening. This foil shall be mounted with approximately a 1-inch open space between the foil and the top front edge of the working surface to direct an air stream across the hood work top to prevent any back flow of air at this point. The air foil shall extend back under the sash, so that the sash closes on top of the foil, and thus does not close the approximately 1-inch opening.
- D. Automatic Air Bypass: Furnish at the top of the sash opening. Air bypass shall limit the maximum air velocity through the face of the hood, and provide a relatively constant volume of air through the hood (regardless of sash position) when hood exhaust fan is in operation. The hood air bypass shall not be dependent on mechanical or electrical linkage, and shall be completely positive in operation. Valves shall be connected to panel flanges and angle serrated hose connectors located on the end panels within the hood. Interior fittings for gases and water shall be integral panel flanges and angle serrated hose connectors.
- E. Working Surface: Provide a working surface (counter) of 1 inch-thick Trespa, stainless steel or epoxy with ½-inch-high raised edge across front of hood, bonded to working surface to make a watertight retaining ledge.
 1. Punch hood side panels to receive remote controls and service fittings at side of hood, as indicated. Furnish removable plug buttons for holes reserved for future fittings.
- F. Rear Baffle: Provide removable baffle at rear of hood with adjustable openings at top to allow adjusted flow of air through hood to compensate for type of gas, apparatus, or heat source used.
- G. Fabricate unit of same material as hood lining to be easily removable for cleaning behind baffle.
- H. Interior Access: panels provide easy access to hood side wall chase piping and service fittings.
- I. Plenum Chamber: Adequate volume for hood dimensions, extending full width of hoods to equalize incoming air flow, of same materials as hood lining. Provide stainless steel collar of proper dimension for connection to exhaust duct assembly.

- J. Sash: Vertical and horizontal safety glass protects the operator while providing excellent visibility.
 - a. Vertical: sash counter weight system to be chain driven with frame and finger bottom pull on sash window
 - b. Horizontal: sash heavy duty upper troy system or bottom steel rail and wheel system for smooth operation and easy access.
- K. Lights: Provide each hood with a two-tube fluorescent light fitting of longest practicable length. Shield light fitting from hood interior by ¼ -inch-thick safety glass panel, sealed airtight into hood. Set units so that fluorescent tubes are easily replaceable from outside hood. Fittings shall carry UL label.
- L. Provide fittings complete with rapid-start fluorescent tubes.
 - a. Filler Panel: Metal, as applicable to match adjoining surfaces. Provide where required to close openings between fume hood base cabinet and superstructure and adjacent building wall or ceiling construction.
 - b. Holes: Provide holes for passage of piping and conduit and for fittings furnished
 - c. Hood services shall consist of a cup drain and plumbing and electrical services as specified. Plumbing services shall be composed of remote controlled front loaded valves located within the end panels. The four arm handles shall be furnished with color coded services indexes. Angle serrated hose connectors located on the end panels within the hood interior fittings for gases and water shall be integral panel flanges and angle serrated hose. Also provide two 120 V convenience outlets and a fluorescent light switch.
 - d. Sound Control: Fume hoods shall be constructed in such a manner as a manner as to provide a zero increase in sound pressure level over mechanical exhaust system.

SOURCE QUALITY CONTROL

- A. ASHRAE 110-1995 AS MANUFACTURED
 - a. Fume hood reports performance of hood evaluation testing in accordance with ASHRAE 110-1995 "Method of Testing Performance of Laboratory Fume Hood" at Genie's manufacturing facility test lab.
 - b. The purpose is to perform as-manufactured fume hood tracer gas containment testing as identified in ASHRAE 110-1995. The testing consists of flow visualization smoke testing, average face velocity measurements and tracer gas containment testing.
- B. U.L. TESTED
 - a. Hoods are tested and comply with the applicable requirements in UL 1805 Laboratory hoods and cabinets and therefore such products manufactured by Genie are eligible to bear U.L. markings.
 - b. All electrical components are U.L. listed

EXECUTION

INSTALLATION

- A. General: Install fume hoods plumb, level, aligned, rigid and securely anchored to building and adjacent laboratory casework, in proper location, in accordance with manufacturer's instructions and approved shop (layout) drawings. Install closures neatly. Securely attach access panels, but provide for easy removal and secure reattachment.

ADJUSTING

- A. Moving Parts: Carefully check and adjust moving parts to ensure smooth and accurate sash operation with one hand and with uniform contact of rubber bumpers.

CLEANING AND PROTECTION

- A. Repair or remove and replace defective work as directed by the Architect upon completion of installation.
- B. Clean shop-finished surfaces, touch-up as required, and remove or refinish damaged or soiled areas.
 - 1. Clean surfaces, including both sides of glass.
- C. Protect materials and installed laboratory furniture from damage by work of other trades.

END OF SECTION

LABORATORY CASEWORK

GENERAL

SUMMARY

- A. Section Includes
 - 1. Steel casework
 - 2. Table frames
 - 3. Work surfaces
 - 4. Sinks and outlets
 - 5. Service fittings
 - 6. Accessory equipment

- B. Related Sections:
 - 1. Laboratory Fume Hoods are a part of the work of this section.

CASEWORK DESIGN REQUIREMENTS

- A. Flush overlay construction:
Surfaces of doors and drawers shall overlay the cabinet ends, top or bottom rails. Horizontal and vertical case shell members (panels, top rails and bottoms) shall be concealed behind drawer and door fronts. Reveals shall be a uniform 1/8" horizontally between drawer and door fronts and 5/32" vertically between adjacent drawer and door.

- B. Slimline styling: Front width of end panels 3/4"

- C. Self-supporting units: Completely welded shell assembly without applied panels at ends, backs or bottoms, so that cases can be used interchangeably or as a single, stand-alone unit.

- D. Interior of case unit: Easily cleanable, flush interior. Base cabinets that are 30" and wider, with double swinging doors.

- E. Drawers: Sized on a modular basis for interchange to meet varying storage needs, and designed to be easily removable in field without the use of special tools.

- F. Case openings: Rabbeted-like joints all four sides of case opening for hinged doors and two sides for sliding doors in order to provide structural integrity.

- G. Framed glazed doors: Identical in construction, hardware and installation to solid panel doors. Design frame glazed doors to be removable for glass replacement.

CASEWORK PERFORMANCE REQUIREMENTS

- A. Structural performance requirements: Casework components shall withstand the following minimum loads without damage to the component or the casework operation:
 - 1. Steel base unit load capacity: 500 lbs. per lineal foot.
 - 2. Suspended units: 300 lbs. per lineal foot
 - 3. Drawers in a cabinet: 150 lbs. per drawer
 - 4. Utility tables (4 legged): 300 lbs. per lineal foot
 - 5. Hanging wall cases: 200 lbs. per lineal foot, not to exceed 600 lbs
 - 6. Load capacity for shelves of base units, wall cases and tall cases: 150 lbs.

- B. Metal Finish Performance Requirements:
1. Abrasion resistance: Maximum weight loss of 5.5 mg. per cycle when tested on a Taber Abrasion Tester #E40101 with 1000 gm wheel pressure and Calibrase #CS10 wheel.
 2. Hardness: Surface hardness equivalent to 4H or 5H pencil.
 3. Humidity Resistance: Withstand 1000 hour exposure in saturated humidity at 100 degrees F.
 4. Moisture Resistance:
 - a. No visible effect to surface finish after boiling water trickled over test panel inclined at 45 degrees for five minutes.
 - b. No visible effect to surface finish following 100 hour continuous application of a water soaked cellulose sponge, maintained in a wet condition throughout the test period.
 5. Adhesion: Score finish surface of test panel with razor blade into 100 squares, 1/16", cutting completely through the finish but with minimum penetration of the substrate, and brush away particles with soft brush. Minimum 95 squares shall maintain their finish.
6. Salt Spray: Withstand minimum 200 hour salt spray test.

SUBMITTALS

- A. Shop Drawings: Provide 1/2" = 1'-0" scale elevations of individual and battery of casework units, larger scale details and sections as required. Indicate relation of units to surrounding walls, windows, doors and other building components. Provide 1/4" = 1'-0" rough-in plan drawings for coordination with trades. Rough-in shall show free area.
- 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.
- C. Product Samples Upon Request: Submit for approval:
1. Top Sample
 2. Finish Sample (3" x 5" Painted Steel)

QUALITY ASSURANCE

- A. Single Source Responsibility: Casework, work surfaces, laboratory fume hoods, 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:
3. Five years or more experience in manufacture of laboratory casework and equipment of type specified.
 4. Ten installations of equal or larger size and requirements.
- C. Installer's qualifications: Factory trained and/or certified by the manufacturer.
- C. Cabinet identification: Cabinets are identified on drawings by manufacturer's catalog numbers. Unless otherwise modified on drawings or in specifications, catalog description constitutes specific requirements for each type of cabinet.

DELIVERY, STORAGE AND HANDLING

- A. Schedule delivery of casework and equipment so that spaces are sufficiently complete that material can be installed immediately following delivery.
- B. Protect finished surfaces from soiling or damage during handling and installation.

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 is installed.

PRODUCTS

MANUFACTURER

- A. Design, materials, construction and finish of casework specified is the minimum acceptable standard of quality for flush overlay laboratory casework. The basis of this specification is Genie Scientific Inc., 17424 Mt. Cliffwood Circ., Fountain Valley, Ca 92708 product.

CASEWORK MATERIALS

- A. Sheet Steel: Mild, cold rolled and leveled unfinished steel.
- B. Minimum gauges:
 - 1. 18 gauge: Interior drawer fronts, scribing strips, enclosures, and drawer bodies.
 - 2. 18 gauge: Case tops, ends, bottoms, bases, backs, uprights, top front rails, filler panels, shelves, security panels, sloping tops, and access panels.
 - 3. 18 gauge: Drawer suspensions, vertical posts, top rear gussets, intermediate horizontal rails, table legs and frames, leg rails and stretchers.
 - 4. 14 gauge: Table leg corner brackets and gussets for leveling screws.
- C. Glass for glazed swinging and sliding doors: 1/8" (3mm) framed doors, 7/32" (6mm) unframed doors, thick, clear float glass.

CASEWORK FABRICATION

- A. Base Units and Cases:
 - 1. Base units and 24", 30" and 36" high wall cases: End panels and back reinforced with internal reinforcing front and rear posts. Base units shall be 22" overall in depth.
 - 2. 29, 32.5" and 35" high cases: Formed end panels with front and rear reinforcing post channels; back shall be formed steel panel.
 - 3. Posts: Front post with full height reinforcing upright. Shelf adjustment holes in front and rear posts shall be perfectly aligned for level setting, adjustable to 1/2" o.c.
 - 4. Secure intersection of case members with spot and are welds.
 - 5. Bottoms: Base units and 24", 30", 35" and 47" high cases shall have one piece bottom with front edge formed into front rail, rabbeted as required for swinging doors and drawers.
 - 6. Top rail for base units interlock with end panels, flush with front of unit.
 - 7. Horizontal intermediate rails: Recessed behind doors and drawer fronts.

8. Base for base units: 4" high (4-3/16" with leveling gusset) x 3" deep with formed steel base and 14 gauge die formed steel gussets at corners. Provide ½" diameter leveling screw with integral bottom flange of minimum 0.97 sq. in. area at each corner.
9. Tops of wall cases: One piece, with front edge formed into front rail.

B. Drawers:

1. Drawer Fronts: ¾"thick double wall construction with sound deadening
2. Drawer Bodies: one piece construction with coved sides
3. Drawer Suspension: self-closing 16gauge steel, nylon ball bearing roller
4. Provide drawer with resilient bumpers.
5. Provide security panels for drawers with keyed different locks (as required).

C. Doors: ¾"thick double wall construction with sound deadening, stainless steel hinges with screws to internal 14 gauge reinforcement plate

D. Shelves:

1. Form front and back edges down and back 1". Form ends down 1".
2. Reinforce shelves over 36" long with welded hat channel reinforcement the full width of shelf.

E. Base Molding: 4" high, to be furnished and installed by flooring contractor

F. Hardware:

1. 4" c-to-c aluminum pulls or specified
2. stainless steel five knuckle institutional hinged
3. friction catches, nylon roller

TABLE FRAMES

- A. Table Frames: To be specified
- B. Table Drawers: To be Specified
- C. Legs: 2" x 2" tube, 14 gauge steel with adjustable leveling feet

METAL FINISH

- A. Cold rolled steel coated with epoxy polyester hybrid powder, baked at 400° F, end result 3 mil thick finish

END OF SECTION