



**WOOD CASEWORK SPECIFICATION
COLLEGEDALE COLLEGIATE LABORATORY CASEWORK
22-1_1108**

Product Line

Collegedale

- 1 Concept - Partial Overlay
- 2 Collegiate - Lipped

ALC

- 3 Gold - Partial Overlay
- 4 Gold - Flush Overlay
- 5 Platinum - Partial Overlay
- 6 Platinum - Flush Overlay

Species

- 1 Plain Sliced Red Oak
- 2 Rotary Cut Maple
- 3 Plain Sliced Sap Maple
- 4 Steamed Beech
- 5 Bamboo
- 6 Other

Special Requirements

- 1 None
- 2 FSC[®]
- 3 NAF
- 4 FSC[®] and NAF
- 5 LEED[™] Credit MR 6: Rapidly Renewable Materials
- 6 LEED[™] Credit MR 7: Certified Wood
- 7 LEED[™] Credit IEQ 4.1: Low-Emitting Materials, Adhesives and Sealants
- 8 LEED[™] Credit IEQ 4.4: Low-Emitting Materials, Composite Wood
- 9 Other

PART 1 GENERAL

Summary: The subsequent specifications are designed to describe, to the provider of the laboratory casework system, the standards and expectations that the owner and architect allow for a quality and functional installation of the laboratory casework.

1.1 SECTION INCLUDES

- A. **Laboratory Furniture:** Provide and install all wood and metal laboratory casework, benches and fume hoods; which includes, but is not limited to wood casework, metal casework, countertops, reagent shelves, fume hoods, tables, standards, slotted studs, filler panels, scribes, knee space panels, accessories, casework in environmental rooms, utility space framing, utility space closure panels between base cabinets and at exposed ends of utility spaces, laboratory sinks, cup sinks, cup drains, strainers, overflows and sink outlets and miscellaneous items of equipment as listed in the specifications or as shown on drawings. Work includes all laboratory furniture depicted on drawings or listed in these specifications unless otherwise noted as "Not in Contract" (NIC) within the drawings, equipment schedule or said specifications.
- B. **Plumbing Fixtures:** Furnish, deliver and install the fixtures at service outlets that are either listed in these specifications, depicted in drawings or identified in the equipment schedule as being affixed to laboratory casework. Installation is to be "hand tight" only, final connection is by others.
- C. **Electrical Service Fixtures:** Furnish, deliver and install the electrical service fixtures that are either listed in these specifications, depicted in drawings or identified in the equipment schedule as being affixed to laboratory casework. Installation is to be "hand tight" only, final connection is by others.
- D. **Plumbing and Electrical Service Fixtures on Fume Hoods:** All service connections on fume hoods are to be made at the factory. Fume hoods are to be pre-piped to a single outlet above or below the fume hood on each side independently, depending on the location of the plumbing rough in. Wiring and electrical conduit for electrical devices included with the fume hood assembly are to be pre-wired to a single junction box located at the top of the fume hood. Final connection for all services from the fume hood is to be made by others. Bulbs for the light fixture are to be provided and installed by owner as an item of maintenance.
- E. **Sink Bowls and Cup-sinks Integral with Countertops:** Furnish, deliver and install all sinks bowls, cup-sinks and tail pieces (if shown or specified) at locations that are listed in these specifications, depicted in drawings, or identified in the equipment schedule. Sinks and cup-sinks are to be installed within the countertop with final connection to the drain piping system by others.
- F. **Section 12 36 00 Fume Hoods in entirety**
- G. **Section 12 31 00 Metal Casework in entirety**

1.2 RELATED SECTIONS

- A. **Division __ LEED Requirements**
- B. **Division 06 Section 41 00, "Architectural Woodwork"**
- C. **Division 11 Section 53 00, "Laboratory Equipment"**
- D. **Division 12 Section 36 00, "Countertops"**
- E. **Division 13 Section 21 00, "Controlled Environment Rooms"**
- F. **Division 22 Section 40 00, "Plumbing Fixtures"**
- G. **Related Work to be Performed by Others:**
 - 1. Final installation of all plumbing, service and electrical fixtures attached to casework or countertop (excluding piping and wiring within fume hoods).
 - 2. Final connection to service lines of all plumbing, service and electrical fixtures attached to laboratory casework or furniture.

1.3 REFERENCES

- A. Architectural Woodwork Institute. *Architectural Woodwork Quality Standards Illustrated, Eighth Edition, Version 1.0*. Virginia: 2003.
- B. Hardwood Plywood Veneer Association. *American National Standard for Hardwood and Decorative Plywood, Version ANSI/HPVA HP-1-2004*.
- C. Scientific Equipment Furniture Association. *Recommended Practices for Wood Laboratory Grade Furniture, Casework, Shelving and Tables, SEFA 8W-2007*.

1.4 DEFINITIONS

- A. "Concealed Portions of Casework" are surfaces that are not visible after installation; bottoms of cabinets less than 30 inches above finished floor; tops of cabinets 72 inches or more above finished floor (and not visible from an upper level); stretchers, blocking and/or components concealed by drawers; corners created by tall, wall, or base cabinets that are non-accessible.
- B. "Eased" is a process of providing a slight radius on door and drawer fronts of a cabinet.
- C. "Exposed surfaces" are surfaces that are visible when: drawer fronts and doors are closed; cabinets and shelving are open or behind clear glass doors; bottoms of cabinets are seen 48 inches or more above the finished floor; tops of cabinets are seen below 72 inches above finished floor, or are visible from an upper floor or raised area after installation.
- D. "False Fronts" are nonfunctional fronts attached to particular units that mimic drawer box fronts to create an uninterrupted visual image of an elevation.
- E. "Flush Inset" occurs when doors and drawer faces are inset within the side members of the cabinet in the same plane.
- F. "FSC" is the term used for Forest Stewardship Council, which is a recognized certifier for the LEED credit for certified wood.
- G. "Partial Overlay" is the reveal between cabinets created by the hinge at the edge of the cabinet. This reveal will be used for all exterior reveals on the project.
- H. "Laboratory Casework Contractor/Manufacturer" is defined as the manufacturer and/or manufacturer's representative that is to provide and install the laboratory casework, equipment, and accessories listed under the specifications, laboratory equipment schedule and/or illustrated on drawings.
- I. "NAF" is the term used for "no added urea formaldehyde". This is a factor to be considered when trying to gain credit under LEED IEQ 4.4 Low Emitting Materials, Composite Wood and the California CARB requirements.
- J. "Reveal" is the measurement between individual door and drawer components on the face of a cabinet and between doors and drawers from cabinet to cabinet.
- K. "Semi-exposed surfaces" are surfaces that are visible when: opaque doors are open or drawers are extended; bottoms of cabinets are more than 30 inches and less than 42 inches above finished floor.
- L. "Service Fixtures" are laboratory gas, air, and vacuum cocks; hot, cold and reagent water faucets; remote control valves, electrical receptacles (with necessary flush mounting hardware), fluorescent and/or incandescent light fixtures, light switches and/or motor switches for fume hoods and other items which serve as an operational part of the equipment.
- M. "Service Lines" are the necessary piping and drain lines for laboratory gas, air and vacuum as well as hot, cold and reagent grade water that convey the respective services from building rough-ins through floors or walls through equipment to the previously defined service fixtures. Also included are conduits, junction boxes, conduit fittings, wire disconnect switches and fuse or circuit breakers necessary to conduct electrical services from building rough-ins through floors or walls through equipment to service fixtures.

1.5 SYSTEM DESCRIPTION

A. Cabinet and Casework Area Design:

1. Lipped with 1/4" reveals between cabinet doors and drawers and 1/2" reveal at cabinet edge.
2. Veneer grain on doors is vertical and horizontal on drawers.
3. Doors and drawer fronts are to be slightly eased at all edges.
4. Solid hardwood or roll edgebanding is allowed.
5. All shelving for open shelves will be edgebanded on all four sides.

1.6 SUBMITTALS

Refer to 01 33 00, "Submittal Procedures," for administrative requirements, procedures, etc.

- A. **Product Data and Details:** Drawings should include data and details for construction of the laboratory casework as well as information regarding the name, quantity, type and construction of materials (such as hardware, gauges, etc.) that will be used to complete the project.
- B. **Shop Drawings:** The laboratory casework manufacturer shall furnish shop drawings illustrating the layout and placement of all laboratory casework and fume hoods as well as any products listed under section 1.1 "Work Included."
1. The casework manufacturer is responsible for identifying any deviation in dimension, material, detail, or other aspect of the project that is not concurrent with the contract documents. Any deviation not made apparent will be deemed as "not reviewed", and will have to be altered even if not recognized during the approval phase.
 2. Field Measurements: In instances in which casework is indicated to fit to other construction, dimensions are to be verified by field measurements before fabrication and reflected on shop drawings.
 3. The manufacturer or purchaser of any equipment prior to approval by the architect or owner's representative will be undertaken at the manufacturer's risk.
- C. **Samples:** Laboratory casework provider shall submit, preceding the construction of the specified mock-up, the following samples for approval by the owner's representative.
1. One (1) 24" (600mm) wide, full-height base cabinet. Construction to consist of one (1) drawer, one (1) door, one (1) cupboard with adjustable half/full depth shelf and related hardware (pulls, hinges, drawer slides, etc.), complete with finish.
 2. One 36" (900mm) wide x 36" (900mm) high wall cabinet: Construction to consist of two adjustable shelves as well as related hardware and doors, complete with finish.
 3. Stain and Finish Samples
 - a. A minimum of six (6) standard manufacturer's samples, constructed of the same material from which the casework will be constructed, stained and clearly identified, should be submitted to the architect for color selection.
 - b. Stain and finish samples will be retained by the architect or owner's representative.
- D. **Quality Assurance/Control**
1. Design Data/Test Reports: Manufacturer shall submit test data and design criteria which are in compliance with the project specifications. Testing of safety devices and performance criteria shall be performed by a third party validator.
 2. Certificates: All certifications required in the specifications should be submitted with the original submittal package under separate cover. Certificates must be provided with the signature of a qualified individual of the supplier.
 3. Manufacturer's Instructions: Provide manufacturer's instructions for installation and maintenance of all products provided and installed within this section. Instructions should be in bound form, tabbed and organized by section number.

1.7 QUALITY ASSURANCE

- A. **Qualification of Bidder/Manufacturer:** The following list of information should be provided to the Architect at least ten (10) days prior to the bid opening:
1. List of manufacturing facilities.
 2. A list of ten (10) installations of comparable stature completed within the past 5 years.
 3. Construction details depicting the materials, sizes and methods of construction.
 4. Independent laboratory test reports that include information on cabinet, fume hood and table top finish and performance that have been conducted within the last two years.
- B. **Regulatory Requirements:**
1. Reference Standard: The ensuing specifications are based on the design of *Collegedale Collegiate Wood Casework*, ANSI/HPVA HP-1 1994, LEED 2.2, Forest Stewardship Council, SEFA 8W, WI, AWI.
 2. Source Limitations: All casework, including countertops, sinks, service fittings and accessories, should be obtained from a single manufacturer to ensure consistency.
- C. **Mock-Ups:**
1. Area mockups shall be as indicated on the shop drawings. Mockup areas must be priced for disassembly and reassembly, and used within the project.

1.8 DELIVERY, STORAGE AND HANDLING

- A. **Packaging, Shipping, Handling and Unloading:**
1. Packaging: Products should have packaging adequate enough to protect finished surfaces from soiling or damage during shipping, delivery and installation.
 2. Delivery: Casework delivery should only take place after painting, utility rough-ins and related activities are completed that could otherwise damage, soil or deteriorate casework in installation areas.
 3. Handling: Care, such as the use of proper moving equipment, experienced movers, etc., should be used at all times to avoid damaging the casework. Until installation takes place, any wrapping, insulation or other method of protection applied to products from the factory should be left in place to avoid accidental damage.
- B. **Acceptance at Site:** Casework will not be delivered or installed until the conditions specified under Part 3, Installation section of this document have been met.
- C. **Storage:** Casework should be stored in the area of installation. If, prior to installation, it is necessary for casework to be temporarily stored in an area other than the installation area, the environmental conditions shall meet the environmental requirements specified under the Project Site Conditions article of this section.
- D. **Waste Management and Disposal:** The supplier of the laboratory casework is responsible for removing any waste or refuse resulting from the installation of, or work pertaining to, laboratory casework; thereby leaving the project site clean and free of debris. Trash container/s to be provided by others.

1.9 PROJECT SITE CONDITIONS

- A. Building must be enclosed (windows and doors sealed and weather-tight).
- B. An operational HVAC system that maintains temperature and humidity at occupancy levels must be in place.
- C. Ceiling, overhead ductwork and lighting must be installed.
- D. Site must be free of any further construction such as "wet work".
- E. Required blocking and reinforcements must be installed accurately and the project must be ready for casework installation.

1.10 WARRANTY

- A. Furnish a written warranty that Work performed under this Section shall remain free from defects as to materials and workmanship for a period of three (3) years from date of acceptance. Defects in materials and workmanship that may develop within this time are to be replaced without cost or expense to the Owner. Defects include, but are not limited to:
1. Ruptured, cracked, or stained coating.
 2. Discoloration or lack of finish integrity.
 3. Cracking or peeling of finish.
 4. De-lamination of components or edgebanding.
 5. Slippage, shift, or failure of attachment to wall, floor, or ceiling.
 6. Weld or structural failure (visible weld marks).
 7. Warping or unloaded deflection of components.
 8. Failure of hardware.

PART 2 PRODUCTS

2.1 MANUFACTURERS

The intent of this specification is to define a level of craftsmanship necessary to provide, for the owner and architect, a well-designed and quality system of laboratory casework. Only materials and/or products that are in accordance with the requirements will be acceptable. Bidders who propose to provide any product which deviates from the standards listed herein must describe, in writing, the instances in which the equipment differs from the specifications, and must obtain, from the architect, written approval to bid an alternate a minimum of 10 days prior to the bid date. Any bid that fails to be expressed as an alternate will be interpreted as an offer to design, construct and provide products based on the specifications outlined in this text.

- A. **Approved Manufacturers of Wood Casework:** All casework shall be the product of one of the below manufacturers or approved equals. Other suppliers will be considered only with the provisions that the products are submitted for approval within the dates specified within the pre-approval process and remain in compliance with the standards of material, construction, finish and performance identified in these specifications.
1. ALC-Collegedale (<http://www.alc-collegedale.com>)
 2. Fisher Hamilton (<http://www.hamiltonlab.com>)
 3. Leonard Peterson, Inc. (<http://www.lpco.com>)

2.2 MATERIALS

- A. **Laboratory Casework:**
1. Solid Lumber Used:
 - a. All hardwoods shall be carefully and thoroughly air-dried, and then kiln dried to a moisture content of 6-9% before use.
 - b. All exterior wood casework surfaces exposed to view after installation, exposed exterior ends, tops and bottoms of open cases or cases having glazed doors shall be rotary sliced maple. Provide "FAS" firsts and seconds.
 - c. All interior parts fabricated of hardwood shall be rotary sliced maple, Grade 2.
 2. Exposed Veneer:
 - a. Veneer used for exterior surfaces exposed to view after installation, and the exposed interior ends, tops and bottoms of open cases shall be constructed of Grade B, rotary sliced whole piece maple or engineered veneer of similar characteristics, book matched of at least 1/45 inch thick veneer.

3. Semi-Exposed Veneer:
 - a. Veneer faces used for semi-exposed areas shall be constructed of sap maple component faces or engineered veneer of similar characteristics, grade 2 or better, either plain sliced or rotary sliced, any match.
 - b. Interior shelves shall be banded with 1/8" rotary sliced whole piece maple hardwood on front edge.
4. Unexposed Veneer: Veneer of any species, Grade 2 or better.
5. Plywood Core Construction for Casework Body, Interior Shelving: All 3/4" plywood panels shall be hardwood plywood constructed as 7-ply combination core with composite crossbands. 1" panels shall be constructed as 9-ply hardwood plywood with composite crossbands. Exterior panels must be produced from domestic sources with outer layer balanced and equal to 1/5 +/- of core thickness. Inner plies must be similar in thickness for improved balance. Semi-exposed to unexposed panels shall be of similar construction with outer layer 1/5 +/- or panel thickness. The finished panel will have a thickness tolerance plus or minus .5mm. Plywood used for shelving shall be 9-ply 1" thick.
6. Core Construction for Doors and Drawers:

[Choose One]

Standard: All 3/4" plywood panels shall be constructed as 7-ply combination core with composite crossbands hardwood plywood with 3mm edgebanding, milled to a lipped profile.

Optional: All 3/4" plywood panels shall be 3-ply hardwood plywood with interior ply of M2 particleboard, with 3/4" wide hardwood lipped insert.
7. Hardware and Trims:
 - a. Door and Drawer Pulls: Shall be modern design, offer a comfortable hand-grip and be securely fastened to doors and drawers with screws. All pulls shall be aluminum wire type with 4 inch centers and without escutcheons. Two pulls shall be required on all drawers over 24 inches wide. Use of plastic pulls (molded or extruded), or a design not compatible for usage by the handicapped will not be acceptable.
 - b. Flush Pulls: For sliding doors, pulls shall be satin finish chrome, providing a recessed finger grip. Finger holes or slots machined into doors will not be acceptable.
 - c. Hinges: Shall be five (5) knuckle 2.75" grade 1 type 304 stainless steel for all hinged doors. Two hinges for doors less than 4 ft. in height and three hinges on doors over 4 ft. in height.
 - d. Locks:
 - i. Casework drawers and hinged doors: Shall be provided when indicated by the specified product number, shown on the drawings or called for in the casework schedule. Exposed surface of locks shall be dull chrome. All locks, for the purpose of coordinating keying systems, shall be National five (5) tumbler. These can be furnished with master keys, however grand master keying is not provided unless specified prior to bid time.
 - ii. Framed Glass Doors: Locks shall be plunge type sliding showcase locks which are to be of the same make as those selected above.
 - iii. Sliding Glass Doors: Locks shall be ratchet type sliding showcase locks which are to be of the same make as those selected above.
 - e. Door Catches:
 - i. Roller Catches: Shall be used on all hinged doors. Catches shall have a spring-loaded dual polyethylene roller and are provided with a steel strike plate. Double doors without locks shall have a catch on each door. Tall cases shall have latching devices located on upper and lower part of each door. On cabinets equipped with locks, the left-hand door shall have an astragal and the right hand door shall have roller type catch.
 - ii. Elbow Catches: Catches and strike plates shall be used on left hand doors of double door cases where locks are used, and shall be steel, cadmium plated.
 - f. Drawer Slides: Drawer slides for standard drawers shall be Grade 1, 100 pound ball bearing full extension as manufactured by ALC-Collegedale Model #7032. Slides for file drawers, heavy-duty paper storage drawers and any drawers over 36 inches in width shall be Grade 1, 150 pound full extension ALC-Collegedale Model #9677.

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- g. Leg Shoes: Shall be provided on all table legs, unless otherwise specified, to conceal leveling device. Shoes shall be 2 and 1/2 inches high and constructed of pliable, ABS plastic. Use of a leg shoe which does not conceal leveling device will not be acceptable.
 - h. Tote Trays: Shall be tan color vacuum-formed plastic type with full top rim in standard sizes. Each tote tray is equipped with plated steel label holder.
 - i. Coat Rods: Shall be ALC-Collegedale #770 chrome plated 1 inch diameter steel with ALC-Collegedale #764 rod flanges (or approved equivalent).
 - j. Support Struts: Shall consist of two 16 gauge channel uprights fastened top and bottom by two adjustable "U" shaped spreaders, each 1/8" by 1-1/2" by length required. Struts can be furnished to support fume hood superstructures or other abnormal loads when required. Support struts shall be finished with a black, enamel paint.
 - k. Shelf Support Clips: Shall be plastic twin pin seismic type or metal "L" type as dictated by seismic requirements, for mounting on interior of cabinets. Shelves are adjustable on 32 mm centers.
 - l. Tempered Hardboard: Wood-fiber and resin combination formed with heat and pressure into a hard, smooth surface.
- B. Special Materials:**
- 1. Fiberglass Reinforced Polyester: Reinforced polyester panels for laboratory use specifically designed to be corrosion and flame resistant lining for fume hoods and certain acid storage units. Exposed surface shall be smooth in appearance and white in color. Material has a flexural strength of 19,500 PSI and water absorption of 0.2%.
 - 2. Glass:
 - a. Glass for framed and unframed doors shall be 1/4" thick clear laminated safety glass, complying with ASTM C1172, Kind LT, Condition A, Type 1, Class 1.
 - b. Glass used in fume hood sashes or other equipment used in hazardous areas shall be 7/32 inch thick laminated safety type. Fluorescent light shielding in fume hoods shall be tempered glass offering greater resistance to heat and impact.
- C. Special Units:**
- 1. Acid Storage Base Cabinet: Cabinet exterior is to match type of wood, stain, color and finish of adjacent cabinetry but is to be lined with corrosion resistant material equal to the fiberglass reinforced polyester described in the "Special Materials" section of this document. Venting, if required, is to be accomplished through the use of a PVC vent pipe through the back of the cabinet.
 - 2. Flammable Cabinet: Cabinet exterior is to match type of wood, stain, color and finish of adjacent cabinetry but is subject to the following differences:
 - a. Inset Overlay: Doors are set within the members of the frame to allow for the creation of a near airtight seal when closed. Reveals reflect panel width and are 1 inch around the entire face of the cabinet.
 - b. NFPA 30 Compliant/UL listed: Cabinet is constructed to limit the internal temperature at the center of the cabinet and 1 inch from the top of the cabinet to no more than 325 degrees Fahrenheit when subjected to a 10 minute test that simulates fire exposure. All joints and seams are designed to remain tight and the door shall remain securely closed for the duration of exposure to flame/heat of the same duration of the test.
 - c. Exposed Plywood: Properties pertaining to plywood used for exterior surfaces and doors remain consistent with the properties already specified under the Exposed Plywood section of Laboratory Casework with the following exception: The plywood used for exterior surfaces and doors must be constructed from 1 inch plywood as opposed to a 3/4 inch thick material.
 - d. Hardware and Trim:
 - i. Door Pull & Catch: Door pulls and catches shall be part of an integrated 3 point latching system that offers a comfortable hand-grip and is securely fastened to doors with zinc screws.
 - ii. Hinges: Full-length piano style hinge.
 - e. Cabinet Construction: Cabinet end panels, top, bottom and back shall be 1 inch, 9-ply rotary sliced whole piece maple plywood meeting the same veneer quality requirements as indicated in Section 2.2 A.2. with 1/8" hardwood edgebanding. The entire structure including end panels, top,

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bottom and back shall be of rabbet joint construction with each joint secured from two directions with countersunk screws affixed to hardwood blocking from the interior of the cabinet. The unit will be equipped with gasketing and a keyed astragal to totally seal the interior of the cabinet from the outside. All base units shall have a removable drip tray recessed within the blocking capable of retaining a 2 inch depth of spilled liquid.

- f. Doors: Doors shall be fabricated using 1 inch solid plywood core. All four showing edges shall be edge banded with 1/8 inch hardwood. Piano hinges will be attached via zinc screws to the interior of the cabinet.

2.3 FABRICATION

- A. **Open-Leg Tables:** Legs shall be 1 piece rotary sliced whole piece maple hardwood construction, 2-1/4 inches square with all corners eased slightly. Legs shall be secured to the apron frame by a heavy duty corner bolt and a 16 gauge metal corner brace. Corner braces shall be locked into apron rails by accurately located grooves and shall be securely fastened with screws. All apron rails shall be 3/4 inch thick solid rotary sliced whole piece maple hardwood. Leg stretchers, where required, shall be 3/4 inch by 3 inches utilizing an 8mm dowel with a countersunk #10 screw assembled into the legs and secured with a 4 inch long thru-bolt. Tables shall be provided with either non-scarring floor levelers or leg boots as indicated in architectural drawings.
- B. **Base Cabinets (Hinged Door and Drawer):**
 1. Cabinet end panels shall be 3/4 inch rotary sliced whole piece maple plywood with 1/8 inch by 3/4 inch rotary sliced whole piece maple hardwood face.
 2. Cabinet backs shall be 1/4 inch thick tempered hardboard. Cupboard, sink and fume hood units shall be provided with removable back panels allowing access to plumbing chase. Back panels in cupboards shall be removable without the use of hand tools or fasteners; sink and fume hood base cabinets shall be provided with 12 inch high removable back attached with 5/8 inch screws and washers. *Backs are not provided for drawer bank cabinets.*
 3. Cabinet backs exposed to view shall be 3/4" rotary sliced whole piece maple hardwood plywood.
 4. Cabinet bottoms shall be 3/4" plywood.
 5. Casework toe space shall be 3/4" hardwood plywood, 3-1/2 inches deep x 4 inches high.
 6. Web Frame Components:
 - a. Top Horizontal: Front rail 2-1/4 inches x 1 inch solid maple hardwood exposed for grade. Side and rear rails 2-1/4 inches x 1 inch hardwood, any species.
 - b. Intermediate Horizontal: Front rail 2-1/4 inches x 1 inch solid maple hardwood exposed for grade. Rear rail 2-1/4 inches x 1 inch solid hardwood, any species. Required with security panels.
 7. Doors and Drawer Fronts: Doors and drawer fronts shall be fabricated using 3/4 inch rotary sliced whole piece maple as specified. All four showing edges shall be edge banded with solid 1/8 inch rotary sliced whole piece maple hardwood.
 8. Drawer Boxes: Shall be fabricated of 1/2" solid birch, 9/16" Baltic birch or maple plywood with dovetail joints all four corners as required for environmental purposes. Drawer bottoms shall be 1/4" tempered hardboard, birch or maple hardwood plywood, set into 1/4 inch grooves on all four sides (hot melt glue on drawer bottoms is optional). Drawer heads shall be replaceable in case of damage. Drawer heads shall be attached to the drawer boxes with wood screws.
- C. **Tall Sliding Door Cases:**
 1. Cases shall be designed and integrally constructed for full enclosure. All exposed woods shall be rotary sliced whole piece maple. All end panels shall be 3/4 inch thick rotary sliced whole piece maple plywood with a 1/8 inch by 3/4 inch rotary sliced whole piece maple edgebanding. Tops for open or glazed door cases shall be 1 inch thick rotary sliced whole piece maple plywood, doweled into end panels, secured with glue and countersunk screws. The top in solid door cases shall be 1 inch thick rotary sliced whole piece maple plywood with 3/8 inch by 2 inch rotary sliced whole piece maple hardwood faces applied to conceal the overhead sliding-door suspension system. Double extruded aluminum track shall be attached to the case top for the sliding door suspension system.

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2. All doors shall be suspended from an adjustable hanger and glide on nylon roller wheels. A nylon retainer is located on the case bottom. Panel doors shall be fabricated using 3/4 inch thick vertical grain combo core with all four edges edge banded with rotary sliced whole piece maple veneer. Wood framed glazed doors shall have 3/4 inch by 3 inch hardwood rotary sliced whole piece maple framing. Glass shall be set into door frames and secured with an extruded neoprene retainer machined to eliminate movement of the glass panel. All shelves shall be 1 inch rotary sliced whole piece maple plywood with 1/8 inch by 3/4 inch rotary sliced whole piece maple banding on front edge. The center shelf is doweled and glued to the end panels. All other shelves (4) are adjustable on 32mm centers.
 3. Case bottoms shall be 3/4 inch rotary sliced whole piece maple plywood with 1/8 inch x 3/4 inch rotary sliced whole piece maple edgebanding on front edge. Case bottoms shall be doweled and glued securely to end panels. Case interiors shall be flush. Totally enclosed toe space shall be 3 and 1/2 inches deep by 4 inches high for base units. Other sizes and materials are as follows:
 4. End panel: 3/4 inch rotary sliced whole piece maple plywood with 1/8 inch by 3/4 inch rotary sliced whole piece maple edgebanding.
 5. Top face: 3/4 inch by 2 inch solid rotary sliced whole piece maple on sliding door cases.
 6. Bottom: 3/4 inch rotary sliced whole piece maple plywood, exposed to view; 3/4 inch hardwood plywood, semi-exposed or unexposed.
 7. Toe Space Rail: 3/4 inch by 4 inch hardwood plywood.
- D. **Full Height Hinged Door Cases:** General construction features shall be the same as for sliding door cases except for the following: Solid or framed glass doors are to be hung on three institutional type hinges. Hinged doors shall overlap openings on four sides.
- E. **Counter Mounted or Wall Hung Sliding Door Cases:** Construction and materials shall be the same as for full height type cases with the following exceptions: Tops and bottoms shall be minimum of 3/4 inch thick rotary sliced whole piece maple plywood for wall-hung cases 36 inches wide or less; 1 inch rotary sliced whole piece maple hardwood plywood for cases over 36 inches wide. Solid panel doors shall be fabricated using 3/4 inch plywood with core and grain matching adjacent casework. Wood framed glass doors shall have 3/4 inch by 3 inch solid hardwood framing. Solid sliding glass doors shall be 1/4 inch thick float glass with polished edges and ground finger groove. Doors shall set in an aluminum bottom frame containing roller bearings and held in position with an aluminum guide at the top of the case.
- F. **Counter Mounted or Wall Hung Hinged Door Cases:** Construction and materials shall be the same as for sliding door cases with the following exception: Solid panel or glass framed doors on cases less than 48 inches in height shall be hung on two institutional type hinges. Doors on cases 48 inches high and over shall have three institutional type hinges. All doors shall overlap opening on all four sides.
- G. **Countertops:**
1. Phenolic Resin Countertops: Countertops are to be flat, black, 1" thick with beveled, rounded top, front edge and all corners, with 1" thick, 4 inch high applied backsplash/curbs (unless otherwise noted), constructed of the same material and located at the rear of tops and on end returns. Ends of countertop to be square. Backsplash/curbs shall be bonded to top surface to form a square joint. Joints are to be sealed water-tight with a corrosion resistant caulk. Front overhangs should be equal to 1" at cabinet fronts and side overhangs at exposed units shall be 3/4", with a drip groove on the underside 1/2 inch from the edge. Tops should be manufactured of one piece and cut to the maximum lengths possible. Fabricate with factory cutouts for sinks and with butt joints assembled with silicone adhesive. Installation should take place without any field cutting or drilling. Holes and cutouts should be provided as necessary for equipment, service fittings and fixtures. Size of openings should be verified prior to making openings.
 2. Fume Hood Countertops: Countertops in fume hoods shall be molded epoxy resin 1-1/4" thick with a 1/4" dished area for spill control. Finish should be a non-glaring black color.
 3. Plastic Laminate Countertops and Curbs (only if shown): Particleboard core material for plastic laminate surfaced countertops is to be 1" thick, industrial grade, 45 pound density particleboard for dry areas and 1" thick hardwood plywood for wet areas. Fabrication shall be with horizontal grade laminate surface with a backer sheet. Edges shall be edged with 3mm PVC edgebanding.

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4. Epoxy Resin Countertops: Countertops are to be flat, black, 1" thick with beveled, rounded top, front edge and all corners, with 1" thick, 4 inch high applied backsplash/curbs (unless otherwise noted), constructed of the same material and located at the rear of tops and on end returns. Ends of countertop to be square. Backsplash/curbs shall be bonded to top surface to form a square joint. Joints are to be sealed water-tight with a corrosion resistant caulk. Front overhangs should be equal to 1" at cabinet fronts and side overhangs at exposed units shall be 3/4", with a drip groove on the underside 1/2 inch from the edge. Tops should be manufactured of one piece and cut to the maximum lengths possible. Fabricate with factory cutouts for sinks and with butt joints assembled with silicone adhesive. Installation should take place without any field cutting or drilling. Holes and cutouts should be provided as necessary for equipment, service fittings and fixtures. Size of openings should be verified prior to making openings.
5. Stainless Steel Countertops: Where countertops and/or curbs are noted on drawings as being "Stainless Steel," construction shall consist of 16 gauge type 302/304 and/or type 316 stainless steel. Exposed surfaces shall have #4 satin finish.

H. Sinks:

1. Molded Epoxy Resin Drop-In Sinks: Sinks shall be of epoxy resin modified and compounded with selected materials and designed to provide the same performance requirements as specified for the epoxy resin countertops. Sinks shall be non-glaring black color.
2. Stainless Steel Sinks: As an option to epoxy resin sinks, provide stainless steel sinks constructed of 16 gauge, type 304 stainless steel of equivalent or comparable sizes. Exposed surfaces shall have #4 finish.
3. Sink Sizes: Sizes and model numbers shall be as designated on the drawings.

I. Finishes:

1. Chemical Resistant Wood Finishes: The finishing process described in this section shall result in a highly chemical resistant finish that is tested to meet the SEFA 8W finish standard. The requirement for this finish exceeds the SEFA 8 standard for chemical resistance. Prior to application of the wood finish, case and cabinet surfaces shall be smoothly sanded to remove loose fibers, scratch marks and abrasions in the sequences described below. All dust is to be thoroughly removed from the panel prior to finish application.
2. Finishing Processes Allowed:
 - a. 100 Percent Solids Ultraviolet Cured: The finish utilized shall be a 100% solids mixture formulated for application with automated roll coat technology cured with ultraviolet light.
 - b. Ultraviolet Cured Water Borne Compression Spray: The finish utilized shall be a water borne mixture formulated for use in a modern sealed compression spray UV tunnel cured with ultraviolet light. The topcoat must be increased to the quantity required to meet the chemical resistance in this specification.
 - c. Traditional Compression Spray: Either catalyzed vinyl or water borne.

PART 3 EXECUTION**3.1 INSTALLERS**

- A. **Installer Qualifications:** For installation and maintenance of the field installation, a certified installer, with certification issued by the casework manufacturer, is required for this project.

3.2 EXAMINATION

- A. **Site Verification of Conditions:** Casework will not be delivered or installed until the following conditions have been met:
 1. Building must be enclosed (windows and doors sealed and weather-tight);
 2. An operational HVAC system that maintains temperature and humidity at occupancy levels must be in place. Minimum standards are temperature of 70° F +/-5° F (21° C +/- 3° C) and relative humidity of 50% +/-5% unless specifically called out differently.

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3. Ceiling, overhead ductwork and lighting must be installed. Lighting must be operational to ensure quality control during installation.
4. Site must be free of any further construction such as "wet work".
5. Required blocking and reinforcements must be installed accurately and the project must be ready for casework installation.

3.3 REQUIREMENTS

- A. *NOTE: In the event that any of the specified requirements for installation are not present at the time of requested delivery, the general contractor or owner must provide the casework manufacturer with a letter of deviation that releases the manufacturer from any responsibility or liability from any damage to the products resulting from the unfavorable building conditions.*

3.4 INSTALLATION

A. **Casework Installation:**

1. Casework should be set with components plumb, straight and square, securely anchored to building structure with no distortion. Concealed shims should be used as required. Flooring elevations that exceed 3/4" in any elevation must be reported and addressed by the contractor prior to installation of the casework. Direction from the contractor to install product in areas that exceed this requirement relieves this section from any responsibility of adverse casework affects.
2. Cabinets in continuous runs should be bolted together with joints flush, uniform and tight, with an alignment of adjacent units not to exceed 1/16 of an inch.
3. Wall casework should be secured to solid material; not lath, plastic or gypsum board.
4. Top edge surfaces should be abutted in one true plane. Joints are to be flush and should not exceed 1/8 of an inch between tops units.
5. Casework and hardware shall be adjusted and aligned to allow for accurate connection of contact points and efficient operation of doors and drawers without any warping or binding.

B. **Countertop Installation:**

1. Countertops are to have been fabricated in lengths according to drawings, with ends abutting tightly and sealed with corrosion resistant sealant.
2. Tops will be anchored to base casework in a single true plane with ends abutting at hairline joints with no raised edges at joints.
3. Joints shall be factory prepared having no need for in-field processing of top and edge surfaces.
4. Joints should be dressed smoothly, surface scratches removed and entire surface cleaned thoroughly.

3.5 CLEANING

- A. Ensure all products are unsoiled and match factory finish. Remove or repair damaged or defective units.
- B. Clean all finished surfaces, including drawers and cabinet shelves, and touch up as necessary.
- C. Countertops should be cleaned and free of grease or streaks.

3.6 PROTECTION

- A. Counter tops and ledges should be protected with 1/4 inch ribbed cardboard for the remainder of the construction process.

END OF SECTION