

SCIENCE AND TECHNOLOGY CASEWORK SPECIFICATIONS

LSI NewCentury™ Series L55: Flush Door Design

SPECIFIER NOTE: Throughout this specification there are product options and choices to be made. These choices are noted with brackets [] in the border. Since each of these options have a cost impact to the Scope of Work, they must be pre-selected and not listed as an "either-or" description.

1.00 GENERAL

1.01 SCOPE OF WORK

- A. Provide all plastic laminate casework and related accessory items as specified herein. Refer to contract documents for specific details and requirements. Casework includes all storage components, accessory items, closures, fillers, and framing necessary for a complete installation, as identified by manufacturers product/model number, or reference thereto.
- B. All casework within science, laboratory, computer, and technology areas shall be Flush Inset door/drawer design, as further described herein.
- C. Sinks, traps, stops, and tailpieces. Set epoxy resin sinks and/or troughs according to manufacturers recommendations. Provide stainless steel sinks loose, for installation by Division 15.
- D. Mechanical fixtures. Faucets, specialty fittings, gas/air/vacuum fixtures, and the like, according to product number designation, furnish loose for installation by Division 15. Cutouts by Casework Contractor.
- E. Electrical fixtures, plug strips, computer accessories as indicated by product number designation. Furnish loose, for installation by Division 16. Cutouts by Casework Contractor. Verify manufacturers product descriptions, as some may be factory pre-wired.
- F. Fume hoods, according to product designation. Furnish designated mechanical and/or electrical fixtures loose, for installation by Division 15 and 16, unless specified otherwise herein, or by specific product description.
- G. Specialty product systems as indicated by product designation within contract documents shall include, but not limited to: Steel framed island assemblies, steel framed technology clusters, adjustable and relocatable casework, environmental study centers, computer modules, multi-media centers.
- H. General Conditions: The General Conditions, Supplementary General Conditions, Special Conditions, and General Requirements apply to all work in this Division.
- I. Provide coordination with Mechanical and Electrical contractors for their respective installation of devices furnished within this Scope of Work.

1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. General millwork and custom cabinetry unless specified herein or so noted within contract documents as included within this section.
- B. Rubber, vinyl or other finished toe base.
- C. Blocking within walls.
- D. Fixture installation/services connections: Setting and installation of equipment and mechanical/electrical fixtures, and related utility run connections, are provided under other sections of the Project Specification governing that utility.

1.03 SUBMITTALS

- A. Submit in accordance with General, Supplementary, and Special Conditions.
- B. Submit shop drawings for approval in the form of one vellum and two bonds. Show materials, dimensions, cabinet-cut details, and sink locations.
- C. Samples of colors shall be submitted upon award of contract for selection and coordination with other suppliers. Architect may request and retain samples and catalog cuts as required for accessory and special items.

1.04 QUALIFICATIONS

- A. Drawings and specifications are based upon casework as manufactured by LSI Corporation of America, Inc., 2100 Xenium Lane, Minneapolis, Minnesota, 55441. Construction and design shall be LSI NewCentury™ L55 Laboratory System.
- B. Casework of other nationally recognized casework manufacturers may be considered for approval provided a written statement of specification compliance, with request to bid, is received ten (10) days prior to opening of bids. Casework must conform to design, quality of materials, design intent, workmanship and exact performance function of casework components and details specified and implied by manufacturer's reference, and as shown on plans, regardless of that manufacturer's "product standards".
- C. Manufacturers requesting approval shall submit evidence of at least five years experience and installations for similar type of project. Manufacturers shall also show evidence of financial stability, plant facilities, catalogs, and specifications. Full-sized samples, catalogs, and specifications shall be submitted with written request along with detailed list of compliance and deviations from these documents for approval. Samples may be impounded by Owner and retained until completion of job for verification and compliance with specifications.
- D. In addition to the above requirements, manufacturers listed herein, or requesting approval, shall submit proof of ability to provide Certificate of Compliance in AWI, Architectural Woodwork Institute Quality Certification Program, including QCP labels on finished goods.

[SPECIFIER SELECT]

[] 1. This project is to be QCP registered. Compliance labels and Certificate shall be provided.

- E. The following performance details are project requirements and must be met by all Bidders, whether named herein, or approved by Addendum. Deviations will not be allowed.
 - 1. Design: Door/drawer shall set flush between extended cabinet end panels for increased lateral door strength, safety, and security. Door/drawer and all leading cabinet body, shelf and divider edges shall be 3 mm PVC/ABS as specified herein. Overlay door designs and edgings other than specified are not acceptable.
 - 2. ADA, Americans with Disabilities Act Requirements: The special requirements specified herein shall be met, where specifically indicated on architectural plans as "ADA", or by General Note. Shall be in compliance with Federal Register Volume 56, No. 144, Rules and Regulations.
 - 3. Lamination System: Doors, finished end panels, and other decorative exterior laminate surfaces shall be laminated exterior with .028 inch (.71 mm) high-pressure plastic laminate, and interior with .020 inch (.51 mm) high-pressure cabinet liner. Lamination with hybrid P.V.A. Type III water resistant adhesive.
 - 4. Structural Cabinet Body: Cabinet backs shall be minimum 1/2 inch (12.7 mm) thick, inset from rear of body, and fully bound (dadoed) four sides. Provide 3/4 inch (19.1 mm)

thick stiffeners fastened to back/body as specified herein. Back perimeter shall be toenailed with mechanical fasteners for tight interior fitment and direct connection of back panel to body, and sealed with full-perimeter high-strength hot-melt adhesive.

5. Interior Structure: All cabinets over 36 inches (914 mm) wide shall be furnished with a mechanically fastened vertical divider to reduce horizontal member/ shelf deflection. Wall cabinets shall have a clear inside nominal depth of 12 inches (305 mm) unless detailed otherwise.
 6. Shelf Loading: Shelves shall meet the loading/deflection standards of the National Particleboard Association.
 7. Structural Drawer Body: Drawer body shall be doweled with 1/2 inch (12.7 mm) typical bottom, recessed, fully bound (dadoed) and joint-glued all four sides. Provide under body stiffeners as specified herein.
 8. Drawer Suspension: Standard drawer slides shall be self-closing design, epoxy powder coated, with positive instop, outstop, and out-keeper. Dynamic (operational) load rating shall be minimum 100 lbs. (45 kg). Minimum 150 lb. (68 kg) static load rating.
 9. Structural Cabinet Support: Cabinet sub-base shall be of a separate and continuous ladder-type platform design leveled and floor mounted prior to cabinets body placement. Material shall be exterior grade plywood. No cabinet sides-to-floor will be allowed.
- F. Architect/Owners opinion and decision shall be final in the evaluation of manufacturer's products for approval to bid or award of contract.
- G. Guarantee: All materials produced by the Casework Manufacturer shall be guaranteed for a period of five years from manufacturer's defects and workmanship. Other materials and equipment shall carry the Guarantee of the product manufacturer.

2.00 PRODUCTS

2.01 MATERIALS

A. Laminated Plastics/Finishes:

[SPECIFIER SELECT]

- [] 1. High-pressure plastic laminate, .028 inch (.71 mm) in thickness, for exterior surfaces shall meet NEMA LD3-2000 VGS standards including thickness.
- a. Provide at all open and glass door cabinet interior surfaces.
 - b. Provide at underside of wall cabinet bottoms.
- [] 1. Chemical Resistant Cabinet Surfacing: Provide Wilsonart Chemsurf at all exterior cabinet faces and exposed end panels.
- a. Provide standard-grade VGS laminate at all open and glass door interior surfaces, and underside of wall cabinets.
2. Exterior Color Selection Available:
- a. Standard finish from casework manufacturer's standard stock colors consisting of wood grain patterns and solid colors. Minimum of 200 selections available.
 - b. Total of five different colors available per project.
 - c. Direction of wood grain shall be vertical on door, end panels, fascia panels, and exposed backs; horizontal on drawer faces, aprons, and top rails.

3. Plastic Laminate Balancing Sheet: White high-pressure cabinet-liner, .020 inch (.051 mm) in thickness shall meet NEMA LD3-2000 CLS standards. Use for balancing exterior surface laminates.
 4. Countertop High-Pressure Plastic Laminate:
 - a. High-pressure plastic laminate, textured finish .048 inch (1.22 mm) Standard Grade thickness, .042 inch (1.07 mm) postforming grade, or .036 inch (.91 mm) chemical resistant as detailed. Color as selected from manufacturer's stock standard patterns and solid colors.
 - b. Heavy gauge neutral colored backing sheet for balanced construction.
 5. Pressure Fused Laminate/Interior Surfacing:
 - a. Melamine resin impregnated, 85 gram PSM average, thermofused to core under pressure.
 - b. Shall meet NEMA LD3-2000 VGL standards and NEMA LD3-2000 CLS standards, except thickness.
 - c. White pressure fused laminate for cabinet interiors behind door and drawers, interiors of all open cabinets unless otherwise specified, and underside of wall cabinet unless otherwise specified.
 - d. Shall be balanced at all concealed surfaces with same thermofused melamine. Unsurfaced coreboard or simple backers not allowed.
 - [] e. Chemical resistant cabinet body interior horizontal surfaces: Provide Wilsonart Chemsurf at all cabinet interior horizontal surfaces, including cabinet bottom and both surfaces of adjustable shelves and horizontal fixed dividers.
- B. High Performance Core:
1. Shall be particleboard, minimum 47 lb. (21.3 kg) density, of balanced 3-ply construction with moisture content not to exceed 8%. Particleboard shall conform to ANSI A208.1-1999, Grade M-3.
 2. Cabinet components shall be of the following minimum core thicknesses:
 - a. 1/2 inch (12.7 mm): cabinet backs, drawer body, and drawer bottoms.
 - b. 3/4 inch (19.1 mm): door and drawer face, base, wall, and tall cabinet tops and bottoms, cabinet sides, drawer spreaders, cabinet back rear hangstrips, structural dividers, exposed cabinet backs, and shelves in cabinets.
- C. Edging types. Provide the following in accordance with Paragraph 2.01.D, "Edging Locations":
1. 3 mm thick PVC/ABS. Solid, high-impact, purified, color-thru, acid resistant, pre-lamination primed edging, machine-applied with hot melt adhesives, automatically trimmed, inside/outside length-radiused for uniform appearance, buffed and corner-radiused for consistent design.
 2. FlatEdge PVC/ABS. .020 inch (.51 mm). Solid, high-impact, purified, color-thru, acid resistant PVC/ABS edging machine-applied with hot melt adhesives, automatically trimmed face, back and corners for uniform appearance.
- D. Edging Locations. Provide the above specified edging types at the following locations, of the following colors:

1. Door/Drawer-Front edging shall be 3 mm PVC/ABS selected from 30 standard LSI colors, color matched to LSI standard laminates.
 2. Front-facing edge of cabinet end panel, top, bottom, door/drawer front spacer rail, interior dividers, and shelf shall be 3 mm PVC/ABS selected from 30 standard LSI colors.
 3. Top of drawer body shall be FlatEdge PVC/ABS, White.
 - [] 4. Adjustable shelf rear edge shall be 3 mm PVC/ABS, and both ends FlatEdge PVC/ABS.
- E. Glass: Provide at cabinet doors, framed or unframed, hinged or sliding, according to product number designation.
1. 1/4 inch (6.35 mm) float glass at all locations, except lower half of glazed tall cabinet doors shall be safety glass.
 - [] 1. 1/4 inch (6.35 mm) laminated safety glass at all locations.
 - [] 1. 1/4 inch (6.35 mm) tempered safety glass at all locations.

2.02 HARDWARE

- A. Hinges: Heavy duty, five knuckle 2 3/4 inch (69.9 mm) institutional type hinge shall meet ANSI/BHMA A156.9 Grade 1 requirements. Mill ground, hospital tip, Teflon coated tight pin feature with all edges eased. Hinge shall be flush-door type. Door shall be routed for hinge plate, to maintain nominal 3/32 inch (2.38 mm) reveal between edge of door and inside face of end panel.
- [] 1. CRS .095 inch (2.4 mm) thick. Each hinge shall have minimum nine screws, #7, 5/8 inch (15.9 mm) FHMS to assure positive door attachment. Finish shall be LH-301 ChromeCoat Powder Finish, LH-302 Black, LH-303 White, LH-304 Dove Grey, LH-305 Haze, or LH-306 light Beige epoxy coated.
 - [] 1. Type 304 stainless steel .090 (2.0 mm) thick. Brush and low sheen polish exposed surfaces. Each hinge shall have minimum eight screws, #7, 5/8 (15.9 mm) FHMS to assure positive door attachment.
 2. One pair per door to 48 inch (1219 mm) height. One and one-half pair over 48 inches (1219 mm) in height. Hinge shall accommodate 13/16 inch (20.6 mm) thick laminated door and allow 180 degree swing.
- B. Pulls:
1. LSI Signature Series LH-331 semi-recessed design, 5 1/4 inches x 1 3/4 inches (133 mm x 44.5 mm), in Dove Grey, Black, White, Haze, and Light Beige. Pull design shall be in compliance with the Americans with Disabilities Act, Federal Register Volume 56, no. 144, Rules and Regulations. Similar pulls by Baer Supply #ME 497608 or Haefele #151.35 may be acceptable pending Architectural approval.
- C. Sliding Door Hardware:
1. Frameless 1/4 inch (6.4 mm) glass sliding doors: LH-370 double track rolling door assembly.
 2. Framed 13/16 inch (20.6 mm) thick stile and rail sliding doors: LH-372 top mounted track with dual roller hangers. Vertical adjustment for accurate alignment.
- D. Drawer Slides:
1. Standard Drawers: LSI Lab Series Slide, LH-375, self-closing design, epoxy powder coated to match drawer body color, with positive in-stop, out-stop, and out-keeper to

- maintain drawer in 80% open position. Captive nylon rollers, front and rear. Minimum 100 lb. (45 kg) dynamic load rating at 50,000 cycles.
2. File Drawers: Full extension, 3-part progressive opening slide, minimum 100 lb. (45 kg), zinc plated or epoxy coated at manufacturer's option.
 3. Provide body mounted molded rails for hanging file system for legal or letter size as indicated by manufacturer's model number. Cutting or machining of drawer body/face not allowed.
 4. Paper Storage Drawers: Full extension, 3-part progressive opening slide, minimum 100 lb. (45 kg), zinc plated or epoxy coated at manufacturer's option.
 5. Student Island Assembly Drawers: Full extension, 3-part progressive opening slide, minimum 100 lb (45 kg), zinc plated or epoxy coated at manufacturer's option.
- E. Catches: Catch shall provide opening resistance in compliance with the Americans with Disabilities Act.
1. Provide one top-mounted magnetic catch for base and wall cabinet door. Provide two at each tall cabinet door. Catch housing shall be molded in White. LH-340ADA.
 2. LH-345 Roller catch for mobile cabinets.
- F. Adjustable Shelf Supports: Shall be LH-354.1 twin pin design with anti tip-up shelf restraints for both 3/4 inch (19.1 mm) and 1 inch (25.4 mm) shelves. Design shall include slot for ability to mechanically attach shelf to clip. Load rating shall be minimum 300 lbs. (136 kg) each support without failure, reference 1.04.D. Cabinet interior sides shall be flush, without shelf system permanent projection. Color, Clear.
- G. Wardrobe Rod: Shall be 1 1/16 inch (27 mm) rod, LH-362, supported by LH-363 flanges.
- H. Coat Hooks:
1. Single coat hooks, wall mount - LH-365 Satin Aluminum.
 2. Double coat hooks, wall mount - LH-366 Satin Aluminum.
- I. Molded Trays:
1. High-impact Polyethylene with label holders, chemical resistant Polyolefin, or ABS as indicated by product designation.
 2. Trays shall glide on molded, twin pin side rails, adjustable 1 1/4 inch (32 mm) on center. Color, Clear.
- J. Molded Personal Pencil Drawer: High-impact 100 Polystyrene with in-stop, out-stop, and self-closing features. Provide under top mounted 100 lb. (45 kg) self-closing slides. Twelve compartment drawer body, and slides, Black. Provide where indicated on plans as "molded pencil drawer".
- K. Label Holders: Provide, where designated, steel with anochrome finish to hold a nominal 1 inch x 2 inch (25.4 mm x 50.8 mm) card.
- L. Locks: Where indicated, shall be keyed and master keyed according to schedule. Dull chrome finish.
- [] 1. Hinged doors and drawers: disc tumbler National Lock No. M4-7054.
- [] 1. Best 5L Series security deadbolt lock with construction core. Keying and core change-out by Owner/Best Lock Corporation.
- [] 1. 5-pin tumbler deadbolt lock, standard series, for National or Corbin style key way.

M. Wheel Casters:

1. LH-386 swivel casters for standard mobile cabinets shall be plate type caster with ball bearing swivel. Size shall be 4 inch (101.6 mm) diameter wheel, with 1 1/4 inch (31.8 mm) wide tread for carpet or hard cover floor. Wheel brakes on front two casters. Minimum 300 lb. (136 kg) load rating per caster.

N. Cable Trays: Unless otherwise specified, cable trays shall be 6 inches high x 4 inches deep (152 mm x 102 mm) returned vertically 3 inches (76 mm). Cable trays shall be 16 gauge (1.52 mm) steel with hemmed return, or High-Impact Styrene with reinforced exit-ends, Black. When so designated by architectural detail, or product number designation, cable trays shall include integral seven plug grounded duplex electrical strip with surge protector, and 6-foot (1829 mm) three wire cord/socket.

O. Keyboard Tray

1. Articulating keyboard trays, quantity, and location as shown on architectural drawings, shall be adjustable for height, tilt, and backslope and allow 360 degree arm swivel. Slideout tray shall have low profile design for storage. BIFMA 100# rating. Tray size: 20 3/4 inch x 10 1/4 inch (527 mm x 260 mm). Color: Black.
2. Optional mouse tray (where shown) for both right or left-handed use.

2.03 DETAILED REQUIREMENTS FOR CABINET CONSTRUCTION

A. Sub-Base:

1. Cabinet sub-base shall be separate and continuous (no cabinet body sides-to-floor), water resistant exterior grade plywood with concealed fastening to cabinet bottom. Ladder-type construction, of front, back, and intermediates, to form a secure and level platform to which cabinets attach.
2. Sub-base at exposed cabinet end panels shall be recessed 1/4 inch (6.4 mm) from face of finished end, for flush installation of finished base material by other trades.

B. Cabinet Top and Bottom:

1. Solid sub-top shall be furnished for all non-sink base and tall cabinets.
2. At cabinets over 36 inches (914 mm) bottoms and tops shall be mechanically joined by a fixed divider.
3. Exterior exposed wall cabinet bottoms shall be white pressure fused laminate both sides. Assembly devices shall be concealed on bottom side of wall cabinets.

C. Cabinet Ends:

1. Front edge shall be flush with door/drawer face.
2. Holes drilled for adjustable shelves 1 1/4 inch (32 mm) on center.
3. Exposed exterior cabinet ends shall be laminated with high-pressure plastic laminate, balanced with high-pressure cabinet-liner interior surface.

D. Fixed And Adjustable Shelves:

1. Thickness shall be 3/4 inch (19.1 mm).
- [] 2. Half-Depth Shelves: Provide half-depth shelves at all non-sink base cabinets. Drilling for shelf adjustment shall consist of three vertical rows per cabinet side, for positioning half-shelf at the forward, or rear of cabinet body.

E. Cabinet Backs:

1. Cabinet back shall be fully bound (dadoed) into sides, top, and bottom, recessed 7/8 inch (22.2 mm) from cabinet rear. Rear, unexposed, side of back shall be toe-nailed to cabinet body with mechanical fasteners and solidified with a continuous bead of industrial grade hot melt adhesive.
2. Hang rails shall be glued to rear of cabinet back and mechanically fastened to cabinet sides. Provide minimum of two at base, two at wall, and three at tall cabinets.
3. Exposed exterior backs shall be high-pressure plastic laminate balanced with high-pressure cabinet liner.
- [] 4. Removable Backs: Provide removable backs at all base cabinets, except those with fixed horizontal/vertical dividers, and cabinets with four or more stacked drawers. Removable backs shall be split at 1/3 - 2/3 of cabinet widths when cabinet exceeds 24 inches (610 mm) in width.

F. Door And Drawer Fronts:

1. Laminated door and drawer fronts shall be 13/16 inch (20.6 mm) thick for all hinged and sliding doors. Drawer fronts and hinged doors shall inset flush between both cabinet end panels. Maintain a nominal 3/32 inch (2.38 mm) reveal between pairs of doors, between door and drawer front, between door and end panel (route for hinge as required), and between multiple drawer fronts within the cabinet.
2. Stile and Rail doors shall be 13/16 inch (20.6 mm) thick with full 1/4 inch (6.4 mm) glass. Available hinged or sliding. All exposed lite-opening edges shall be trimmed and glazed with extruded glazing bead.
3. Frameless sliding glass doors shall be 1/4 inch (6.4 mm) thick glass with ground and polished edges, fitted with anodized aluminum shoes and nylon rollers.

G. Drawers:

1. Drawer fronts shall be applied to separate drawer body component sub-front.
2. Drawer sides shall be doweled and glued to receive front and back, machine squared and held under pressure, to set.
3. Drawer bottom shall be fully bound (dadoed) into front, sides, and back. Routing, in drawer body for bottom, shall receive glue. Reinforce drawer bottoms with 1/2 inch x 4 inches (12.7 mm x 101.6 mm) front-to-back intermediate underbody stiffeners, mechanically fastened. One at 24 inches (610 mm), two at 36 inches (914 mm), and four at 48 inches (1219 mm).
4. Paper storage drawers shall be fitted with full width hood at back.

H. Vertical and Horizontal Dividers: One of the following as indicated by product designation:

1. Natural hardboard 1/4 inch (6.4 mm) thick, smooth both faces. Secured in cabinet with molded plastic clips.
 2. Pressure-fused laminate 3/4 inch (19.1 mm) thickness. Sub-dividers secured in cabinet with molded plastic clips or dowels. Structural dividers in cabinets over 36 inches (914 mm) wide secured in cabinet with mechanical fasteners.
- I. Door/Drawer Front Rail: Provide minimum 3/4 inch x 6 inch (19.1 mm x 152 mm) x full width cabinet body rails immediately behind all door/drawer and multiple drawer horizontal joints to maintain exact body dimensions, close off reveal, and be locator for lock strikes.

- J. ADA, Americans with Disabilities Act Requirements: The following special requirements shall be met, where specifically indicated on architectural plans as "ADA", or by General

Note. Shall be in compliance with Federal Register Volume 56, No. 144, Rules and Regulations:

1. Countertop Height: With or without cabinet below, not to exceed a height of 34 inches (864 mm) A.F.F., (Above Finished Floor), at a surface depth of 24 inches (610 mm).
2. Kneespace Clearance: Shall be minimum 29 inches (737 mm) A.F.F., and 30 inches (762 mm) clear span width.
3. 12 inch (305 mm) deep shelving, adjustable or fixed: Not to exceed a range from 9 inches (229 mm) A.F.F. to 54 inches (1372 mm) A.F.F.
4. Wardrobe Cabinets: Shall be furnished with rod/shelf adjustable to 48 inches (1219 mm) A.F.F. at a maximum 21 inch (533 mm) shelf depth.
5. Sink Cabinet Clearances: In addition to above, upper kneespace frontal depth shall be no less than 8 inches (203 mm), and lower toe frontal depth shall be no less than 11 inches (279 mm), at a point 9 inches (229 mm) A.F.F., and as further described in Volume 56, Section 4.19.

K. Workmanship:

1. All exposed vertical exterior cabinet surfaces shall be .028 inch (.71 mm) high-pressure laminate, color as selected from casework manufacturer's standards, over 200 colors/wood grains available. Laminate surface/balancing liner to core under controlled conditions, by approved and regulated laminating methods to assure a premium lamination. Natural-setting hybrid P.V.A. Type III water resistant adhesives that cure through chemical reaction, containing no health or environmentally hazardous ingredients, are required. Methods requiring heat are not allowed; "contact" methods of laminating are not allowed.
2. Cabinet parts shall be accurately machined and bored for premium grade quality joinery construction utilizing automatic machinery to insure consistent sizing of modular components. End panels shall be doweled to receive bottom and top.
3. Back panel shall be fully bound (dadoed) into, and recessed 7/8 inch (22.2 mm) from the back of cabinet sides, top, and bottom to insure rigidity and a fully closed cabinet. Cabinet back shall be mechanically fastened from rear of body for tight interior fit and sealed with full-perimeter high-strength hot-melt adhesive.
4. Drawer bottom shall be fully bound (dadoed) and glued into and recessed 1/2 inch (12.7 mm) up from the bottom of sides, back, and sub-front. Sides of drawer shall be doweled to receive drawer back and sub-front.
5. 3/4 inch (19.1 mm) thick hang rails shall be mechanically fastened to end panels of all wall, base, and tall cabinets for extra rigidity and to facilitate installation.
6. All cases shall be square, plumb, and true.
7. Case body and drawer workmanship and quality of construction shall be further evidenced by manufacturer being certified in the AWI Quality Certification Program.
8. Provide removable back panels and closure panels for plumbing access at all sink cabinets, and where shown on drawings.

L. Mobile Cabinet Design And Construction:

1. All mobile cabinets shall be designed with a structurally layered base, to which plate-type casters are bolted.
2. No exposed fasteners.

3. Unit top shall be edged with 3 mm PVC/ABS as selected, and overhang case front, back, and sides to function as a bumper system.

2.04 STEEL FABRICATIONS, ASSEMBLIES, AND SUPPORT DEVICES

Provide, of the size and configuration as detailed, or as indicated by product number. Exposed welds to be ground smooth. Finish shall be Black Powder Coat.

- A. Heavyweight Table System: Shall be constructed of 2 inch x 2 inch (50.8 mm x 50.8 mm) 12 gauge (2.66 mm) steel legs and four-sided under-top surround. End assemblies shall be factory pre-welded, with welded length-connectors for 3/8 inch (9.53 mm) diameter double bolted 2 inch x 2 inch (50.8 mm x 50.8 mm) 12 gauge (2.66 mm) horizontal top supports. Provide levelers with non-rusting footpad of tear drop design, for attaching to floor, as directed by contract documents. Provide leg shoes as indicated by product designation. Work top attachment brackets shall be pre-welded to horizontal and end frame members.
- B. C-Frame Bench and Table Assemblies: Shall be constructed of 1 1/2 inch (38.1 mm) wide x 2 1/2 inch (63.5 mm) deep 12 gauge (2.66 mm) steel tube, corner welded, and ground smooth. Provide 3/8 inch (9.5 mm) diameter levelers with non-rusting footpads. Under-top horizontal connectors shall be 1 inch x 1 inch (25.4 mm x 25.4 mm) 12 gauge (2.66 mm), bolted to vertical C-frames. Open frame lower horizontal connectors shall be 1 1/2 inch x 1 1/2 inch (38.1 mm x 38.1 mm) 12 gauge (2.66 mm) bolted to vertical C-frames. Table frames with laminate back panel horizontal connectors shall be 1 inch x 1 inch (25.4 mm x 25.4 mm) channel, to receive panel.
- C. Table Frame Cabinet Hanging System: Provide rolled-channel horizontal top member and tubular horizontal lower cabinet standoff. Provide, for the attachment and relocation of product designated cabinet types, at assemblies specified or indicated by product designation.
- D. Adjustable Height Bench System:
 1. Drilled hole adjustable bench unit frame shall be of structurally formed 1 3/4 inch x 1 3/4 inch (44.5 mm x 44.5 mm) 12 gauge (2.66 mm) steel tubes and channels welded and bolted together to form a rigid framework for the attachment of worktops, casters/levelers, and storage components. Vertical support shall be of four-post, open front design for chair clearance.
 - a. Adjustable in height from 30 inches (762 mm) to 38 inches (965 mm) on maximum 2 inch (50.8 mm) centers.
 - b. Adjustable in height without tools.
 - c. Units sized for use within a Frame System module to replace frame-supported work tops, or independently.
 - d. Designed to allow attachment/movement of lower storage components anywhere within its length, without tools.
 - e. Products designated as mobile shall include four swivel casters, 4 inches (101.6 mm), two brakes.
 - f. Mobile Cart System shall be convertible to a Modular Bench System by replacing swivel casters with individual leg levelers.
 2. Crank Adjustable Height Tables: Provide, in work top sizes according to product designation. Tables shall be height adjustable from a minimum range of 28 inches (711 mm) to 36 inches (914 mm), with gear driven removable hand-crank, or electric motor if so designated. Mechanisms shall meet ANSI/BIFMA Standards. Frames shall be of a

welded and bolted assembly, and stationery or mobile according to product designation.
Black.

- E. Steel Support Legs at Cabinet Assemblies: Shall be 2 inch x 2 inch (50.8 mm x 50.8 mm) 12 gauge (2.66 mm) steel with welded top or side plate according to product design. Provide 3/8 inch (9.5 mm) diameter leveler with non-rusting foot pad of tear drop design for floor attachment, and leg shoe according to product design.
- F. Cantilevered Work Top Support Bracket: Shall be of 1 1/2 inch x 1 1/2 inch (38.1 mm x 38.1 mm) 12 gauge (2.66 mm) steel vertical, welded and ground smooth to 1 1/2 inch wide x 2 1/2 inch deep (38.1 mm x 63.5 mm) 12 gauge (2.66 mm) horizontal, of the overall size as indicated on contract documents, or as designated by product number. Provide molded cap inserts at wall and countertop fastener holes.
- G. Angular Work Top Support Bracket: Shall be factory welded 1 1/2 inch x 1/4 inch (38.1 mm x 6.4 mm) flat steel of vertical, horizontal, and angular design according to size indicated on contract documents, or designated by product number.
- H. Free Standing Student Island Assemblies:
 - 1. Framing shall be of angular and channel shapes, minimum 1 1/2 inch x 1 1/2 inch (38.1 mm x 38.1 mm) x 1/8 inch (3.2 mm) coated steel consisting of factory pre-welded four-sided pedestal support frame of four vertical, four upper, and four lower members. Provide cabinet hanging rails four-sides as indicated by product designation. Upper frame shall be factory welded and bolted rolled channels and brackets to support work top and related perimeter aprons. Overall size and shape as directed by product number.
 - 2. Exposed laminate faced components shall be balanced vertical grade high-pressure plastic laminate on 3/4 inch (19.1 mm) 47 lb (21.3 kg), Grade M3 particleboard core, natural setting adhesive, and hot melt machine applied edging.
 - a. Apron corner joints shall be mitered, glued, splined, and blind-bracketed. No exposed fasteners.
 - b. Horizontal space beneath apron shall be closed off with removable panels.
 - c. Pedestal panels shall be removable, and edged four-edges with .020 inch (.51 mm) PVC/ABS, for moisture seal.

2.05 WORK TOPS

Provide, to the extent as illustrated on contract documents or as shown, detailed, and profiled. Provide in as long as practical lengths for building entrance and room conditions.

- A. Epoxy Resin: Modified epoxy resin, 1 inch (25.4 mm) slab and backsplash, separate. Provide drip groove within overhang at front and exposed ends. Bevel exposed edges. Color, non-glare Black.

(Colors other than Black must be specified)

[SPECIFIER SELECT]

[Grey]

[White]
- B. Chemical Resistant Plastic Laminate: Shall be Wilsonart Chemsurf on 1 inch (25.4 mm) thick solid particleboard core, ANSI Grade M-3, balanced with high-pressure liner. Provide self-edging, or radiused profile as detailed or by specific product cataloged profile number designation. Colors as selected from full Wilsonart Group I Line.

- C. Standard Grade Plastic Laminate: Shall be Wilsonart on 1 inch (25.4 mm) thick solid particleboard core, ANSI Grade M-3, or as otherwise detailed on project documents. Balance with high-pressure liner. Provide self-edging, 3 mm PVC/ABS, or radiused profile as detailed, or by specific product cataloged profile number designation.
- D. Phenolic Resin: Chemically resistant solid, high-pressure, reinforced, phenolic resin laboratory grade work tops. Resistop or Trespa. Black. One inch (25.4 mm) thick slab and backsplash, separate.
- E. Stainless Steel: 16 gauge (1.52 mm), Type 304, number 4 finish, sound deadened, with Marine edges. Integral sink bowls shall be 16 gauge (1.52 mm), Type 304, number 4 finish.
- F. Mobile Cabinet Tops: Shall be high-pressure plastic laminate on exterior and high-pressure cabinet liner on underside. Edges shall be 3 mm PVC/ABS.

2.06 SINKS AND MECHANICAL/ELECTRICAL FIXTURING

- A. Sinks: Shall be of the type, size, and material as indicated by product number designation.
 - 1. Epoxy Resin: Shall be of generally rectangular shape, molded, with inside coved corners and bottom sloped to the outlet. Sinks shall be provided with 1 1/2 inch (38.1 mm) outlet, overflow, and stopper furnished loose for field application.
 - a. Under mount style shall be supported by frame and jacking devices as indicated by product number designation.
 - b. Drop-in style nests in routed countertop for smooth top-to-sink transition. Under-sink framing not required.
 - 2. Stainless Steel: 18 gauge (1.52 mm) Type 304, with sound deadened bottoms and chrome plated outlets. Provide stainless steel cup strainer with neoprene stopper.
- B. Mechanical Service Fixtures: Shall be of the type, style, design, and function as indicated by catalog product designation. Chrome plated, unless otherwise specified, with universal color-coded index buttons:

<u>SERVICE</u>	<u>LETTERS</u>	<u>COLOR</u>
Compressed Air	CA	Orange/Black
Cold Water	CW	Green/White
Deionized Water	DI	White/Black
Distilled Water	DW	White/Black
Gas	GAS	Blue/White
Hot Water	HW	Red/White
Oxygen	OXY	Lt. Green/Black
Steam	STM	Black/White
Vacuum	VAC	Yellow/Black

- 1. Service Fixtures: Provide mechanical service fixtures from one of the following:
 - a. Water Saver Faucet Company.

- b. Chicago Faucet Company.
 - c. T & S Brass.
- C. Electrical Service Fixtures: Shall be of the extent and type as indicated by product number designation.
1. Electrical Service Fixtures: Shall conform to ANSI/NFPA 70 national standard. Shall be of the extent and type as indicated by product number designation. Duplex receptacle shall be furnished with approved receptacle box, for installation and connection by Division 16.
 2. Plug strip shall be three or seven outlet as indicated by product designation. 240 joules surge capacity: <300V IEEE 587A let-through (NM +- 6kV ANSI/IEEE C62.41 Category A Ring Wave Test). 20-60dB EMI/RFI Filtering. Factory install within laboratory modules according to product description and/or illustration.
 - [] 3. Specify extent of project requirements for GFI, ground fault interrupter, 20 amp fixtures with LED indicator light.

2.07 FUME HOODS

Shall be of the style and type indicated by product number. Fixtures and/or accessories shall be furnished loose for installation, servicing, and connections by other trades.

- A. LSI Extractor Series I: Metal hood system, with composition liner, ducted.
1. Super structure shall be double wall constructed of sheet steel outer, and phenolic resin board with acid-resistant light-reflecting white finish interior liner. Double wall design shall conceal steel framing, attachment brackets, and remote service fixture mechanisms. Hoods shall be self-supporting assembly of frame, inner, and outer shell. Access to in-wall fixturing shall be through removable panels on hood exterior or interior. Interior access panels shall not require gaskets, or special tools to remove.
 2. Light fixtures shall be vapor proof, installed on exterior of hood roof behind sealed, cemented, and caulked safety glass. One fluorescent fixture sized to hood widths, two fixtures at 8 foot (2438 mm) hood. Minimum illumination level shall be 80 foot candles within a 28 inch (711 mm) vertical height of the work surface, side to side, and front to baffle.
 3. Fume hood sash shall provide a clear view of interior and service fixtures. Provide 2 inch (50.8 mm) wide mullion at the center of sash for 6 foot (1829 mm) and 8 foot (2438 mm) wide hoods. Provide laminated safety glass within 2 inch (50.8 mm), 18 gauge (1.22 mm) chemical resistant epoxy sash rails, set with neoprene or PVC glazing. Bottom rail shall have an integral full width flush pull. Sash system design:
 - a. Top rail formed, to accept lead weight for fine-tuning of sash.
 - b. Single weight, pulley, 1/4 inch 7/11 braided stainless steel cable, and counter balance system to prevent sash tilting, and allow one finger operation at any point along pull, and hold sash at any position without additional movement.
 - c. System design prevents sash drop in the event of malfunction or cable failure.
 4. Exhaust baffles shall be of the same material and thickness as the liner, shall maintain essentially constant exhaust volume at any position. Changes in face velocity and exhaust volume as a result of baffle adjustment shall not exceed 5% for any baffle position at the specified face velocity.
 5. Baffle adjustment shall be accomplished while hood is in use, and permits setting for:
 - a. High thermo loading.

- b. Heavier than air gases or fumes generated near work surface.
 - c. Normal or average operation.
6. Baffle design shall be such as to not permit close off of all slots.
7. Additional design requirements:
- a. Access opening perimeter shall be of airfoil shape with corners radiused or angled to reduce incoming air turbulence.
 - b. Bottom foil shall provide a nominal 1 inch (25.4 mm) bypass when the sash is in the closed position.
 - c. Bottom foil shall be removable without special tools, and provide access channel for electrical cords. Bottom foil shall be Black Powder Coat.
 - d. Provide no less than 48 inch (1219 mm) vertical work space at the upper most portion of hood interior.
 - e. Work tops shall be epoxy resin unless otherwise specified herein, or by product number designation, dished 1/4 inch (6.4 mm).
8. Hoods shall conform to the requirements of ASHRAE 110-95.
9. Hoods shall be in compliance with UL1805.
- B. Extractor Series II: A double wall constructed hood system, with epoxy coated steel exterior and one-piece molded gel coated fiber glass reinforced polyester interior liner and baffle. Ducted.
- 1. Vertical rising sash, with 3/16 inch (4.8 mm) tempered safety glass for hoods up to and including 6 foot (1829 mm), and single counter balanced sash weight.
 - 2. Eight foot (2438 mm) hood shall have a postless dual vertical rising sash, with dual counter balance weights.
 - 3. Maintenance access shall be both front and sides of hood. No interior access panels required.
 - 4. Interior liner and baffle shall be fabricated of molded fiberglass re-enforced polyester resin with a White gel coated internal surface. Minimum thickness shall be 3/16 inch (4.8 mm). Flame spread shall be less than 25 per ASTM E-84.
 - 5. Hood sash shall be 3/16 inch (4.8 mm) thick tempered safety glass glazed with PVC extrusion.
 - 6. Fluorescent light assembly shall be serviceable from outside the fume hood cavity. Tubes included.
 - 7. LSI Extractor Series II fume hoods (only) shall be provided with mechanical and electrical fixtures as designated by product number, factory mounted, pre-plumbed, and pre-wired to junction boxes located in the upper right front of plenum area.
8. Additional design requirements:
- a. Access opening perimeter shall be of airfoil shape with corners radiused or angled to reduce incoming air turbulence.
 - b. Bottom foil shall provide a nominal 1 inch (25.4 mm) bypass when the sash is in the closed position.
 - c. Work tops shall be epoxy resin unless otherwise specified herein, or by product number designation, dished 1/4 inch (6.4 mm).

9. Hoods shall conform to the requirements of ASHRAE 110-95.
- C. Extractor Series III: Ductless portable fume hoods. Shall be of the size and design as indicated by product number, and as follows:
1. Hood system shall meet these safety standards for filtration efficiency, and saturation detection system:
 - a. SETRAF Standard Test.
 - b. OSHA 1910: 1450.
 - c. ANSI Standard Z9.5.
 2. Ductless filtering fume hood shall consist of filters, a filter housing, and enclosure designed for the filtration of toxic gases through a molecular filtering system. Filters shall be interchangeable, disposable carbon molecular cartridges, designed for the protection of the respiratory passages, and for the handling of toxic gases, vapors, and odors; including acids, solvents, solid particles, and odors. Filtration shall be guaranteed at 99.9% efficiency. Clean air is drawn from the front of the enclosure and pulled up through the filter by a fan or blower.
 3. LSI/Captair Series 804 shall contain a fan located downstream from the filter and is protected from all corrosion. The fan shall be compact with aerodynamic performance and made up of a cast aluminum housing, sheet steel impeller blades, painted Black.
 4. LSI/Captair Series 806 shall contain a centrifugal blower made up of a galvanized sheet steel impeller, cast aluminum housing, all Black "Rilsan" Polyamide II coated. Sealed ball bearings shall be thermally protected.
 5. Electrical wiring, switches, and lighting shall be located outside the working chamber away from corrosive, and/or flammable compounds. All electrical components must meet the requirements of UL, CSA, CEE, VDE, DIN, NEMA, ASE, and BSI Standards.
 6. Provide filter housing and enclosure of zinc steel alloy, protected with an acid resistant epoxy coating. The enclosure shall be constructed of 5/16 inch (7.9 mm) thick acrylic panels.
 7. Filters shall provide a filtering efficiency of more than 99% for polluting gases of a molecular weight equal to or greater than thirty. Filter media shall be of a carbon molecular nature, impregnated with an organo metallic catalyst. The specific surface area of the molecular filter shall be from 1800 to 2000 square meters per gram, resulting in a total surface area of 15,000,000 square meters exposed to the molecules per filter unit.
 8. Work tops shall be epoxy resin as designated over continuous, or individual bench assemblies, or as otherwise specified. Fume hood model numbers designated to receive integral dished acrylic work top shall be as indicated by product number designated.
 9. Provide government test lab reports that guarantee 99.9% filtration efficiency. Provide to the Owner a published Chemical Listing of exact retention capacities. Theoretical indexes are not allowed.

2.08 TECHNOLOGY CASEWORK CLUSTERS

Shall be of the size, style, and design of the multiple student foot print arrangements indicated by product designation, or contract documents. Generally, Science and Technology clusters shall be of high-pressure plastic laminate surfacing, with high-impact 3 mm PVC/ABS edging, and structural steel framework. Refer to other related sub-

component details within this specification, such as steel framed bench assemblies, and as further detailed herein

- A. Structural Power Tower: Shall be a factory pre-assembled, stand alone product module including structural framing, closure panels, attachment rails, and all necessary welded connectors and fasteners for related sub-component attachment.
1. Structural inter-framing shall be factory welded and bolted 14 gauge (1.90 mm) steel.
 2. Lower and upper closure panels shall be removable for column access, laminated with vertical grade high-pressure plastic laminate exterior and high-pressure cabinet liner interior, for balanced construction utilizing natural setting PVA adhesives. All panels shall be edged four edges with .020 inch (.51 mm) PVC/ABS for moisture control.
 3. Power Tower fixed center panel shall house service boxes for electrical, communications, video, and/or air, as specified by product designation or contract documents.
 4. Framing shall consist of interior-facing angles and channels for panel fastening, and electrical conduit.
 5. Power Tower shall allow electrical/communication services access from floor, wall, or ceiling.
- B. Command Module: Shall consist of Power Tower, intermediate Modular Pod, and fully cantilevered lower Work Station.
1. Intermediate Modular Pod shall consist of angular housing, with six-sided adjustable yet non-slide-off shelf, for monitor, TV, CPU, VCR, and keyboard. Provide seven plug power strip with surge protector and 6 foot (1829 mm) cord, at Power Tower.
 2. Lower Work Station shall consist of perimeter framing for work top, and fully cantilevered work top support brackets, and laminate back/support panels.
 3. All panels shall be minimum 3/4 inch (19.1 mm) with high-pressure laminate balanced surfaces and 3 mm PVC/ABS at exposed edges.
 4. Wire Management: Provide cable hangers under top and grommets at horizontals and vertical end wings.
 5. When specifically directed by product notations within contract documents, provide outlets and receptacle boxes for power, data, and/or mechanical fixtures so designated. Connections and runs by others.
 6. Provide HelpCall rocker switch, and amber signal light at Power Tower top, for student assist request.
- C. Work Tops: Shall be of balanced high-pressure laminate construction, minimum 1 inch (25.4 mm) thick solid core, of balanced construction.
1. All tops shall be modular and designed for future relocatability and/or reconfiguration.
 2. All work tops shall be edged on all edges, whether exposed or not.
 3. Work top leading edge shall be high-impact 3 mm PVC/ABS.
 4. Work top shall be supported by 1 1/2 inch wide x 2 1/2 inch deep (38.1 mm x 63.5 mm) C-frame brackets, cantilevered from Command Module, with lateral tube support at work top leading edge. No vertical or angular knee obstructions permitted within Science and Technology Clusters.
 5. Work tops at center Power Tower location to contain cable drop grommets.

6. Optional work top materials for Laboratory Clusters, only if specifically detailed or called out in contract documents at Technology products:
 - a. 1 inch (25.4 mm) epoxy resin.
 - b. 1 3/4 inch (44.5 mm) edge grain Maple butcher block.
- D. Companion Wing Group and Table Stations: Shall be modular and relocatable, cantilevered and thru-bolted to Power Column work counter supports.
 1. High-pressure balanced laminate construction with 3 mm PVC/ABS edging, or as otherwise specified.
 2. Designed to span over stationery or mobile storage cabinets.
 3. Shall include removable sight divider, surfaced with high-pressure laminate, tackboard, or tackable cork as architecturally designated.
 4. Shall contain under-surface cable tray, nominal 4 inches x 6 inches high (102 mm x 152 mm) with 3 inch (76 mm) vertical return, 16 gauge (1.52 mm) metal with hemmed front edge, color Black.
 5. Shall contain cable drop grommets.
- E. Storage Components: Shall be of flush, inset door/drawer design, of high-pressure plastic laminate construction, stationary or mobile, according to product number designation. Reference other portions of this specification for additional material, construction, and hardware details.
 1. Door and drawer faces shall inset flush between leading edges of cabinet end panels.
 2. Premium grade construction with fully inset and captured 1/2 inch (12.7 mm) back panel.
 3. All body edging, including interior vertical dividers, shelves, body members, and door/drawer edges shall be high-impact 3 mm PVC/ABS.
 4. Door hardware shall be institutional grade 5-knuckle hinge with mill ground barrel tips, non-removable pin, and epoxy powder coated. Pulls shall be semi-recessed flush design with large finger grip area.
 5. Drawer hardware shall be epoxy coated, captive roller design, self-closing, and of 100 lb (45 kg) dynamic (live load) rating.
 6. All exterior surfaces including both ends, and back (if mobile) shall be NEMA LD3-2000 VGL high-pressure plastic laminate, balanced with CLS high-pressure cabinet liner. Laminate with natural setting PVA adhesives. Edge with automatic, machine applied hot melt adhesives with automatic and consistently uniform beveling and buffing. Exterior edging corners shall be radiused and buffed to a 1/8 inch (3.2 mm) radius.
- F. Upper Column Signage: Shall be J-channel with open top for instructor placement of N.I.C. activities signage, photos, or the like. Provide at each student side of Power Column.
- G. Module Assemblies:
 1. Power Tower and its related panels, rails, and base system shall be factory assembled.
 2. Sub-components and related work tops shall be factory assembled and prepared for field connection to center Command Module.

3. All designated electrical fixtures and boxes shall be furnished, installed, and factory wired under this Scope of Work to a single junction box per product component, per service type, for final connection by Division 16.

2.09 PLANT GROWTH AND DISPLAY SYSTEM

According to product designation shall be Window Into Science™, by Growth Systems, Inc. Design requirements shall include:

- A. System: Shall be composed of vertically positioned double slotted 90 inch (2286 mm) standards, supported by floor plates and upper wall plate, to cantilever over front of classroom window wall.
 1. Provide Gro Shelves™, according to product description, each with three position switch and four lamps, supported by double bladed brackets interlocking with Gro Shelves™, and trays, preventing forward or lateral movement, yet not obstructing light.
 2. Provide one support standard with multiple power outlets for service Gro Shelves™, connected to room GFI receptacle. Power source shall be regulated by twenty-four hour electronic photo period timer.
 3. Provide stainless steel trays positioned above Gro Shelves™ as supports. Trays contain longitudinal support rails for plastic hydroponic supports. Capillary moisture mats shall be located in the bottom of long trays, and four plastic supports positioned on the top of short trays; quantities according to product designation.

2.10 WALL RAIL SYSTEM

A wall mounted system of horizontal rail, and cantilevered cabinet/work tops. Systems 90® as manufactured by LSI Corporation of America, Inc. Performance requirements include the unlimited relocatability of storage components and work tops anywhere along its support rail, without tools. Work tops and storage cabinets shall adjust vertically to three positions, on 3 inch (76 mm) increments.

- A. Storage Components: Shall be constructed in accordance with AWI Premium Grade standards. Product hanger clips shall be structurally formed steel of a design to interface with horizontal rail, and be structurally fastened to storage component. Each storage cabinet shall be finished both ends with vertical grade high-pressure plastic laminate, and finished sub-top, regardless of location.
- B. Work Tops: Shall be of the independent component design as shown on contract documents, as detailed, and of the materials specified herein and/or scheduled on contract documents.
 1. Each work top shall be independently relocatable with finished edges on both ends.
 2. Work tops supported by storage cabinets shall be relocated by the release of mechanical fasteners and repositioned as required.
 3. Work tops supported by independent brackets shall be relocated to any position along wall rail.
 4. Project scope designated as Independent Top Support shall be provided with support brackets at all locations including those over storage cabinets, for independent movement of cabinet and work top.
- C. Framing: Provide to the extent as scheduled or indicated within contract documents to accept both storage components and/or separate work tops as detailed.

1. Provide one horizontal wall rail for upper storage cabinets, and one horizontal wall rail for lower storage cabinets/work tops.
2. Rail Composition: Aluminum, high-strength alloy, Type 6061-T6 of a design to allow a two-fastener attachment, one above the other, of rail to in-wall blocking. Rail finish shall be natural aluminum unless otherwise specified. Rail design shall allow vertical lift-off of storage cabinet or work top without forward or backward tipping of product to fully disengage. Rail shall be of such design to withstand a single point static load of 1,000 lbs (450 kg).
3. Rail Closure: Provide continuous laminate strip to conceal wall fasteners and create a feature strip, color as selected. Closure strip shall be continuous whether covered by storage component, or not. Rail design shall be such to allow placement or removal of closure strip from the front of the rail, and further, that closure strip shall not interfere with cabinet/work top hanger clips.

2.11 FRAME SYSTEM RELOCATABLE CASEWORK

A free-standing framework of vertical and horizontal rolled steel channels to which cabinets and work tops attach, Systems 90® Lab Frame Program as manufactured by LSI Corporation of America, Inc. Frame system shall provide a continuous horizontal chase for mechanical and electrical services.

- A. Frame System Performance Requirements: Unlimited relocatability of storage cabinets and work tops anywhere within its support frame module as described herein. Storage components and work tops shall be cantilevered, and independently finished.
- B. Adjustability:
 1. Lower storage cabinets shall be relocatable anywhere horizontally within the frame module, or to other modules. Cabinets shall be adjustable vertically to develop work top heights of 30 inches (762 mm), 33 inches (838 mm), and 36 inches (914 mm).
 2. Upper storage cabinets shall be relocatable horizontally anywhere along Systems Framing regardless of vertical frame position. Further, components shall be adjustable vertically to any height from reagent shelf to top of upper framing.
 3. Tall storage cabinets shall be relocatable anywhere along Systems Framing regardless of vertical frame position.
 4. Storage components designed to occur under 30 inch (762 mm) deep work tops shall be same depth, and interchangeable, with those at 25 inch (635) deep work tops. At 30 inch (762 mm) deep work tops provide relocatable stand-off brackets to develop a 1 inch (25.4 mm) set back of cabinet face to work top front edge.
- C. Storage Components: Shall be constructed in accordance with AWI Premium Grade standards.
- D. Storage Cabinet Hanger Clips: Shall be structurally formed steel of a design to interface with horizontal frame wall, and be structurally fastened to storage component.
- E. Work Tops: Shall be of an independent component design as shown on the architectural contract documents, with or without backsplash, 25 inch (635 mm) or 30 inch (762 mm) depth as detailed, and of the materials specified herein and/or scheduled. Reagent shelf shall be same material as work top unless otherwise specified.
- F. Work Top Adjustability: Each work top shall be independently relocatable, with finished edges on both ends.
 1. Work tops over storage components shall be adjustable to heights of 30 inches (762 mm), 33 inches (838 mm), and 36 inches (914 mm).

2. Work tops without storage below shall be infinitely adjustable from 9 inches (229 mm) above finished floor (18 inches (457 mm) at foot support location), to same level as reagent shelf.
 3. Adjustable work top support bracket frame fastener shall be of a design that allows full and continuous height movement, provides positive frame attachment, and shall not allow the improper re-attachment of supports after relocation.
 4. The end space between work tops at different heights shall be closed off with relocatable spacers of 3 inch (76.2 mm) increments.
- G. Heavy Duty Support: Work tops designated for Heavy Duty Support, shall incorporate one or both of the following relocatable devices, for only those worktops so scheduled or indicated on architectural documents.
1. Lateral support bar, directly under work top, forward and rear, attached to work top support brackets, to minimize deflection under heavy load.
 2. Adjustable-height vertical leg support of minimum 12 gauge (2.66 mm) steel and adjustable leveler pad located directly under work top, or attached to underside of work top support bracket, as directed by contract drawings.
- H. Related Systems Hardware: Work top bracket and intermediate foot support shall be of welded steel plate design, to perform as follows:
1. Bracket designed to attach to vertical frame at any point along its height.
 2. Bracket to support a minimum static load of 1,000 lbs (450 kg).
 3. Intermediate foot support shall be used only where directed by schedule, or architectural documents. Provide out-board leveling pad for plumb of the frame.
 4. Foot support shall balance minimum vertical load of 1,500 lbs (675 kg).
 - I. Systems Framing: Provide as scheduled or detailed on contract documents, to accept storage components, separate work tops, and chase closure panels.
1. Provide vertical and horizontal rigid framing in width modules of 24 inches (610 mm), 36 inches (914 mm), 48 inches (1219 mm), or 60 inches (1524 mm), utilizing singular/common vertical frame components. Lower framing shall be available in reagent shelf heights of 36 inches (914 mm) and 42 inches (1067 mm). Upper framing shall be 42 inches (1067 mm) in height for adjustable upper storage. Framing shall also perform as follows:
 - a. Perimeter wall framing shall not depend upon construction/building wall for support.
 - b. Perimeter framing shall be interchangeable with peninsular/island framing.
 - c. Lower framing shall be interchangeable with upper framing.
 - d. System shall be designed as to allow addition or removal of upper framing at anytime without disruption of reagent shelf, electrical, or mechanical fixturing.
 - e. Framing shall independently support work top and storage cabinet and allow their independent relocation.
 - f. Framing shall allow placement and removeability of lower services-chase closure panel without tools.
 2. Framing Closure Strip: Shall seal framing rail against dust and moisture, and be provided where framing is exposed. Color-thru in White to match frame.

3. Framing Composition: Shall be structurally shaped rolled steel channels, of a design to withstand single point static loading of minimum 1,000 lbs (450 kg).
- J. Adjustable Bench System: Shall be compatible, and of a design to interface with lab system frame work. Adjustable height bench system shall perform as follows:
1. Unit frame shall be of structurally formed 1 3/4 inch x 1 3/4 inch (44.5 mm x 44.5 mm) 12 gauge (2.66 mm) steel tubes and channels welded and bolted together to form a rigid framework for the attachment of work tops, casters/levelers, and storage components. Vertical support shall be of four-post, open front design for chair clearance.
 2. Adjustable in height from 30 inches (762 mm) to 38 inches (965 mm) on maximum 2 inch (50.8 mm) centers.
 3. Adjustable in height without tools.
 4. Units sized for use within a Frame System module to replace frame-supported work tops.
 5. Design shall allow attachment/movement of lower storage components anywhere within its length, without tools.
 6. Products designated as mobile shall include four swivel casters, 4 inches (101.6 mm), two brakes.
 7. Mobile Cart System shall be convertible to a Modular Bench System by replacing swivel casters with individual leg levelers.

2.12 CHEMICAL AND STAIN RESISTANCE

- A. Testing of Lab Series work tops, cabinet exterior, and edging. 24 Hour Watch Glass: 5 drops applied to horizontal surface and covered with 25 mm watch glass for 24 hours. 2 Hour Edge Test: 2 drops applied to edge samples, allowed to stand for 30 minutes, then turned 90° to vertical position for 90 minutes. 2 Hour Vertical Surface Test: 5 Drops applied to test surface in nearly vertical attitude, allowed to stand for 2 hours.

B. Grading:

No Effect: No detectable change.

Excellent: Slight detectable change in color or gloss, but no change to the function or life of the material.

Good: A clearly discernible change in color or gloss, but no significant impairment of surface function or life.

Fair: Objectionable change in appearance due to surface discoloration or etch, possibly resulting in deterioration of function over an extended period of time.

Failure: Pitting, cratering, or erosion of surface material. Obvious and significant deterioration.

C. Work Tops

<u>Chemical</u>	<u>Epoxy Resin</u> <u>24 Hour</u>	<u>Phenolic Resin</u> <u>24 Hour</u>	<u>Acid Resistant Laminate</u> <u>24 Hour</u>	<u>Standard Grade Laminate</u> <u>24 Hour</u>
1. Hydrochloric Acid, 37%	No Effect	No Effect	No Effect	No Effect
2. Nitric Acid, 30%	No Effect	No Effect	No Effect	Fail
3. Sulfuric Acid, 33%	No Effect	No Effect	No Effect	Fair
4. Sulfuric Acid, 77%	No Effect	No Effect	No Effect	Fair

5. Phosphoric Acid, 85%	No Effect	No Effect	No Effect	Good
6. Chromic Acid, 60%	Good	No Effect	No Effect	Excellent
7. Acetic Acid, 98%	No Effect	No Effect	No Effect	No Effect
8. Formic Acid, 90%	No Effect	No Effect	No Effect	Excellent
9. Hydrofluoric Acid, 48%	Good	No Effect	No Effect	Fail
10. Ammonium Hydroxide, 28%	No Effect	No Effect	No Effect	No Effect
11. Sodium Hydroxide, 10%	No Effect	No Effect	No Effect	Excellent
12. Zinc Chloride (saturated)	No Effect	No Effect	No Effect	No Effect
13. Calcium Hypochlorite (saturated)	No Effect	No Effect	No Effect	No Effect
14. Sodium Sulfide (saturated)	No Effect	Excellent	No Effect	Good
15. Sodium Chloride (saturated)	No Effect	No Effect	No Effect	No Effect
16. Phenol, 88%	No Effect	No Effect	Excellent	No Effect
17. Cresol	No Effect	No Effect	No Effect	No Effect
18. Formaldehyde, 40%	No Effect	No Effect	No Effect	No Effect
19. Mineral Oil	No Effect	No Effect	No Effect	No Effect
20. Methyl Alcohol	No Effect	No Effect	No Effect	No Effect
21. Ethyl Alcohol	No Effect	No Effect	No Effect	No Effect
22. Butyl Alcohol	No Effect	No Effect	No Effect	Good
23. Kerosine	No Effect	No Effect	No Effect	No Effect
24. Gasoline	No Effect	No Effect	No Effect	Excellent
25. Toluene	No Effect	No Effect	No Effect	No Effect
26. Xylene	No Effect	No Effect	No Effect	Excellent
27. Acetone	No Effect	No Effect	No Effect	No Effect
28. Ethyl Acetate	No Effect	No Effect	No Effect	Excellent
29. Amyl Acetate	No Effect	No Effect	No Effect	No Effect
30. Ethyl Ether	No Effect	No Effect	No Effect	Excellent
31. Chloroform	No Effect	No Effect	No Effect	No Effect
32. Trichlorethylene	No Effect	No Effect	No Effect	No Effect
33. Carbon Tetrachloride	No Effect	No Effect	No Effect	No Effect
34. Monochloro Benzene	No Effect	No Effect	No Effect	No Effect
35. Dioxane	No Effect	No Effect	No Effect	No Effect
36. Furfural	No Effect	No Effect	Fair	Fair

D. Cabinet Body

<u>Chemical</u>	Standard Grade	Acid Resistant	PVC Edge Test
	Laminate	Laminate	
	Cabinet Body Vertical Test 2 Hour	Cabinet Body Vertical Test 2 Hour	
1. Hydrochloric Acid, 37%	No Effect	No Effect	No Effect
2. Nitric Acid, 30%	Good	No Effect	Good
3. Sulfuric Acid, 33%	Excellent	No Effect	No Effect
4. Sulfuric Acid, 77%	Good	No Effect	No Effect
5. Phosphoric Acid, 85%	Excellent	No Effect	No Effect
6. Chromic Acid, 60%	Excellent	No Effect	Good
7. Acetic Acid, 98%	No Effect	No Effect	No Effect
8. Formic Acid, 90%	No Effect	No Effect	No Effect
9. Hydrofluoric Acid, 48%	Fair	No Effect	No Effect
10. Ammonium Hydroxide, 28%	No Effect	No Effect	No Effect
11. Sodium Hydroxide, 10%	No Effect	No Effect	Good
12. Zinc Chloride (saturated)	No Effect	No Effect	No Effect
13. Calcium Hypochlorite (saturated)	No Effect	No Effect	No Effect
14. Sodium Sulfide (saturated)	No Effect	No Effect	Excellent
15. Sodium Chloride (saturated)	No Effect	No Effect	No Effect
16. Phenol, 88%	No Effect	No Effect	Excellent

17. Cresol	No Effect	No Effect	Excellent
18. Formaldehyde, 40%	No Effect	No Effect	No Effect
19. Mineral Oil	No Effect	No Effect	No Effect
20. Methyl Alcohol	No Effect	No Effect	No Effect
21. Ethyl Alcohol	No Effect	No Effect	No Effect
22. Butyl Alcohol	Excellent	No Effect	No Effect
23. Kerosine	No Effect	No Effect	No Effect
24. Gasoline	No Effect	No Effect	No Effect
25. Toluene	No Effect	No Effect	No Effect
26. Xylene	No Effect	No Effect	No Effect
27. Acetone	No Effect	No Effect	No Effect
28. Ethyl Acetate	No Effect	No Effect	Excellent
29. Amyl Acetate	No Effect	No Effect	Excellent
30. Ethyl Ether	No Effect	No Effect	No Effect
31. Chloroform	No Effect	No Effect	Fair
32. Trichlorethylene	No Effect	No Effect	Excellent
33. Carbon Tetrachloride	No Effect	No Effect	No Effect
34. Monochloro Benzene	No Effect	No Effect	Excellent
35. Dioxane	No Effect	No Effect	Excellent
36. Furfural	Good	No Effect	Fair

3.00 EXECUTION

3.01 COORDINATION

- A. Coordinate: Work of this Section with related work of other Sections as necessary to obtain proper installation of all items.
- B. Verify: Site dimensions of cabinet locations in building prior to fabrication.

3.02 INSTALLATION

- A. Storage and Protection: Casework shall be protected in transit. Store under cover in a ventilated building not exposed to extreme temperature and humidity changes. Do not store or install casework in building until concrete, masonry, and drywall/plaster work is dry and HVAC System is balanced.
- B. Workmen: Install casework under the supervision of the manufacturer's representative with factory-trained mechanics certified by manufacturer.
- C. Workmanship:
 - 1. Erect casework straight, level, and plumb and securely anchor in place. Scribe and closely fit to adjacent work. Cut and fit work around pipes, ducts, etc.
 - 2. Install all items complete and adjust all moving parts to operate properly.
 - 3. Leave surface clean and free from defects at time of final acceptance.
- D. Clean Up: Remove all cartons, debris, sawdust, scraps, etc. and leave spaces clean and all casework ready for Owner's use.

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