

BuildingName
The Description of the Project
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SPECIFICATION DIVISION 12

NUMBER SECTION DESCRIPTION

DIVISION 12 FURNISHINGS

SECTION 123553 - LABORATORY CASEWORK

END OF CONTENTS TABLE

DIVISION 12 FURNISHINGS
SECTION 123553 - LABORATORY CASEWORK

11/03 CHANGED SPECIFICATIONS FOR EYE WASHES.

9/11: ADDED SOLID PHENOLIC (TRESPA) SHELVES, TACK STRIPS AND CUSTOM DRYING RACK ASSEMBLY.

PART 1 - GENERAL

1.1 SUMMARY

- A. Extent of laboratory casework and fixtures is shown on drawings and schedules, and indicated by the provisions of this Section.

EDIT BELOW TO SUIT PROJECT.

- B. Types of laboratory casework include:

Base cabinets.
Wall cabinets.
Storage cabinets.
Tables.
Shelf units.
Tops and curbs.
Sinks.
Mechanical and electrical service fixtures shown on drawings.
Other units as indicated.

DELETE BELOW IF NO P.LAM. CASEWORK.

- C. Plastic laminate casework is included in Division 06 Section "Interior Architectural Woodwork".

DELETE BELOW IF NO FUME HOODS.

- D. Fume hoods are included in Division 11 Section "Laboratory Fume Hoods".

DELETE BELOW IF NO ENVIRONMENTAL ROOMS.

- E. Shelving in environmental room is specified in Division 13, "Controlled Environmental Rooms".

DELETE ONE OR BOTH BELOW IF NO MECHANICAL OR ELECTRICAL FITTINGS ARE INCLUDED.

- F. Installation of plumbing fixtures supplied under this Section are included in Division 22 sections.

- G. Installation of electrical fixtures supplied under this Section are included in Division 26 sections.

1.2 SUBMITTALS

- A. Product Data: Submit mfr's product data indicating compliance with requirements.

B. Samples for Initial Selection: Submit sample cards of actual finishes to be used showing manufacturer's standard range of colors/finishes for the following:

1. Paint coating for metal furniture.

DELETE ABOVE IF NO METAL CASEWORK. DELETE BELOW IF NO WOOD CASEWORK.

2. Stains for wood furniture.

DELETE BELOW IF NO P.LAM TOPS, SHELVES, PRIVACY SCREENS, ETC.

3. Plastic laminate for accessory items.

USUALLY DELETE BELOW EXCEPT FOR CUSTOM FINISHES TO MATCH ARCHITECT'S SAMPLE.

C. Samples for Verification: Samples of each specified color/finish applied to each applicable type of substrate material. Provide samples sized not less than 4-inches by 4-inches and consisting of the actual materials specified for the final product.

D. Shop Drawings: Submit shop drawings for laboratory furniture showing plans, elevations, ends, cross-sections, service run spaces, location and type of service fixtures and as follows:

1. Layout of units with relation to surrounding walls, doors, windows, and other building components.

2. Details and location of anchorages and fitting to floors, walls, and base.

3. Details of shelf standard and bracket attachments, fittings, and fasteners, including relationship to laboratory tops, walls, ceilings, and other attachment points.

4. Coordinate shop drawings with other work involved.

E. Material Certificate: Provide manufacturer's certificate indicating compliance with specified requirements for stainless steel Type and Grade.

F. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, indicating compliance of laboratory casework finishes and countertops with requirements specified for chemical and physical resistance.

1.3 QUALITY ASSURANCE

A. Source Limitations: Obtain laboratory casework, including countertops, sinks, service fittings, and accessories, through one source from a single manufacturer.

B. Product Standard: Comply with SEFA 8, "Laboratory Furniture--Casework, Shelving and Tables--Recommended Practices."

C. Catalog Standards: Mfr's catalog numbers are shown on drawings for convenience in identifying certain equipment. Unless modified by notation on drawings or otherwise specified, mfr's current catalog description for indicated number constitutes requirements for each such unit.

1. Provide cabinet door swings as indicated on drawings.

2. Use of catalog numbers and specific requirements set forth in drawings and specifications, does not preclude the use of equivalent products by other listed approved mfrs, but are given for the purpose of establishing a standard of design, quality of materials, product content, construction, and workmanship.
3. Numbers on drawings refer to products of the following:

SELECT ONE OF THE FOLLOWING, OR EDIT TO SUIT SELECTED PRODUCT CATALOG.

Thermo Scientific: Hamilton Laboratory Furniture
Kewaunee Scientific Equipment Corporation.

- D. Flammable Liquid Storage Cabinets: Provide flammable liquid storage type constructed in compliance with NFPA 30 and UL or FM labeled.
- E. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

1.4 DELIVERY, STORAGE AND HANDLING

DELETE TWO REQUIREMENTS BELOW FOR MOST RENOVATION WORK.

- A. Deliver wood laboratory furniture only after wet operations in building are completed.
- B. Store completed wood laboratory furniture in a ventilated place, protected from the weather, with relative humidity therein of 50% or less, at 70 degrees F (22 degrees C).
- C. Protect finished surfaces from soiling and damage during handling and installation. Keep covered with polyethylene film or other protective covering.

1.5 PROJECT CONDITIONS

- A. Field Measurements: Check actual space available by accurate field measurement before fabrication. In addition to dimensions for clearance, check for obstructions, including columns, piping, ducts and conduits. Show recorded measurements on final shop drawings. Coordinate fabrication schedule with construction progress to avoid delay of work.
 1. Where construction of new structures and systems is not complete, proceed with fabrication without field measurements, and coordinate fabrication tolerances to ensure proper fit of laboratory casework items without field modification.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide the products of one of the following:

DELETE BELOW IF NO METAL CASEWORK. USUALLY RETAIN ALL MANUFACTURERS/SUPPLIERS LISTED BELOW

- B. Metal Casework; associated suppliers:

1. Air Master Systems Cor., Millenia Series.
2. BMC Laboratory Cabinets; R.D. Landstra Associates.
3. Kewaunee Scientific Equipment Corp.; Farnell Equipment Co.
4. Laboratory Design & Supply; mfr. direct.
5. Mott Manufacturing Ltd.; Sigma Systems; Detroit Technical Equipment Company.

DELETE BELOW IF NO WOOD CASEWORK. USUALLY RETAIN ALL SUPPLIERS LISTED BELOW.

- C. Wood Casework; associated suppliers:

1. Kewaunee Scientific Equipment Corp.; Farnell Equipment Co.
2. Mid Canada Millwork.
3. Mott Manufacturing Ltd.; Detroit Technical Equipment Company.

MANUFACTURER BELOW HAS ONLY FLUSH OVERLAY TYPE PRODUCTS. DO NOT INCLUDE IF PROJECT MUST INCLUDE ONLY LIPPED OVERLAY CASEWORK.

4. Laboratory Design & Supply; mfr. direct.

BELOW ARE NEW TO PML. INCLUDE FOR PROJECTS WITH ESTIMATED CASEWORK VALUE LESS THAN \$100,000

5. CIFLab L-Line (lipped overlay) and E-line (full overlay); Stonecreek Interior Systems, LLC
6. Diversified Casework; R.D. Landstra Associates.
7. Wood-Metal Industries; Division of Wood-Mode, Inc.; Farnell Contracting.

USUALLY RETAIN ALL BELOW.

- D. Resin Tops and Sinks:

Kewaunee Scientific; "Kemresin"
Durcon Co.; Durcon-IIA"
Epoxy Products "Epoxy"

- E. Stainless Steel Sinks and Tops:

Elkay Co.
Just Manufacturing

- F. Fiberglass Sinks:

Kreolab, Inc.

- G. Solid Phenolic Shelves:

Kewaunee Scientific
Resistop

Trespa Athelon

H. Shelf Standards and Brackets:

Cooper B-Line, Inc.

Flex-Strut, Inc.

Kewaunee Scientific Equipment Corporation

Nu-Strut framing channel system, Kumar Industries, Inc.

Unistrut Corp.

I. Service Fittings:

Chicago Faucet

SPS (distilled water faucets)

T & S Brass

Watersaver

Wolverine Brass

DELETE THE ARTICLE BELOW IF NO METAL LABORATORY CASEWORK IN PROJECT.

2.2 METAL LABORATORY CASEWORK

A. Metal: Prime furniture steel, stretcher or roller leveled, free of scales, buckles, or other defects; ASTM A 366, Class 1 (matte) finish. Provide steel laboratory furniture components of following minimum U.S. Standard gages:

1. Back panels, inner door panels, drawer outer pan, inner pan and body, and shelves: 20 gage. Add reinforcement or use 18 gage material for shelves over 36" long.
2. Sides, ends, fixed backs, bottoms, tops, soffits, outer door pans, and other items not otherwise specifically noted: 18 gage. Bottoms may be 20 gage if reinforced.
3. Intermediate horizontal rails, table frame aprons and cross rails, center posts, top gussets: 16 gage.
4. Drawer runners, sink supports: 14 gage.
5. Leveling and corner gussets: 12 gage.

B. Casework Fabrication: Provide units which are square, fully reinforced with angles, gussets, and channels, integrally framed and welded to form a dirt and vermin retardant enclosure; and as follows:

1. Flange metal upward on three sides of cabinet bottoms.
2. Where applicable, reinforce base cabinets for heavy sink support.
3. Maintain uniform clearance around door and drawer fronts, not exceeding 3/32-inch.
4. Fabricate laboratory furniture to dimensions, profiles, and details shown.
5. Assemble units in shop in as large components as practicable to minimize field jointing.
6. Provide base cabinets with removable backs in cupboard areas to provide openings for access to plumbing lines and shut-off valves.
7. Fabricate units on precision dies to provide field interchangeability of drawers, hinged doors, and similar pieces.

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C. Cabinet Components: Provide cabinets with the following, as applicable to selected units:

1. Flush Doors: Outer pan and inner pan formed and telescoped into box formation, with channel reinforcements full height on center of each pan. Fill doors solid with fire-resistant, sound-deadening material.
2. Glazed Doors: Hollow metal stiles and rails of similar construction as flush doors, with glass held in resilient channel or gasket material.
3. Hinged Doors: Mortise at flanges for hinges and reinforce with minimum 16 gage angle, welded inside inner pan at hinge edge. Provide nylon roller catches and stainless steel strike welded to door assembly.
4. Drawers: Assemble fronts from telescoping inner and outer pans, designed to eliminate raw edge of steel at top. Fabricate sides, back, and bottom of one piece, with rolled or formed top of sides for stiffening and comfortable grasp or drawer removal. Weld drawer front to sides, back, and bottom to form a single, integral unit. Provide drawers and rubber bumpers, runners and positive stops to prevent metal-to-metal contact or accidental removal.
5. Adjustable Shelves: Sides and ends formed down, and returned to front and back.
6. Glass for Glazed Doors: Double strength "B" quality.
7. Drawer Guides: Provide nylon rollers with metal guide channels, with integral stops to eliminate accidental removal of drawer. Include provisions to prevent rebounding action when doors are closed.
8. Filler Strips: Provide where required for closing space between cabinets and walls and ceilings, of same material and finish as cabinets. Hem exposed edges. Job fabricated fillers not acceptable.
9. Utility Space: Provide space, cut-outs, and holes for pipes, conduits and fittings and cabinet bodies to accommodate services and their support-strut assemblies.
10. Toe Space: Approximately 4" high by 3" deep, closed metal with no open pockets. Open channel formations are not permitted.
 - a. Provide base cabinets with individual, integral toe kick bases. Separate toe kick bases independent of base cabinets are not permitted.

D. Steel Cabinet Finish: Coat metal casework as follows:

1. Pretreatment: After assembly, thoroughly clean surfaces of grease, dirt, oil, flux and other foreign matter by physical and chemical means. Treat entire unit with metallic phosphate process leaving surfaces with uniform, fine-grained, crystalline phosphate coating providing bond for subsequent finish.
2. Prime and Finish Coats: One coat high-bake primer followed by one or more coats of high-bake chemical-resistant enamel, to provide a hard and smooth, satin luster finish, applied to treated surfaces.

- a. In concealed areas, including inside of doors and drawers, behind cross rails and mullions, inside of sub-base members, inside front and rear posts, and behind adjustable shelf front and back edges, provide rust inhibiting coating.

MODIFY BELOW FOR CUSTOM COLOR TO MATCH ARCHITECT'S SAMPLE, IF REQUIRED.

- 3. Colors: Unless otherwise indicated, color to be selected by Architect from mfr's standard palette of at least 5 colors.

DELETE THE ARTICLE BELOW IF NO WOOD CASEWORK IN PROJECT.

2.3 WOOD LABORATORY CASEWORK

- A. Definitions: The following definitions apply to wood laboratory casework units:

- 1. Exposed portions of casework include surfaces visible when doors and drawers are closed. Bottoms of cases more than 4 feet above floor shall be considered as exposed. Visible members in open cases or behind glass doors shall be considered as exposed portions.

COORDINATE THE FOLLOWING REQUIREMENT WITH OWNER.

- a. Sides to be concealed in final installation shall be considered exposed for purpose of determining material and finish requirements.
- 2. Semi-exposed portions of casework include those members behind opaque doors, such as shelves, divisions, interior faces and ends, case back, drawer sides, backs and bottoms, and back face of doors.
 - a. Tops of cases 6 feet, 6-inches or more above floor, and drawer sides and back, shall be considered semi-exposed for purpose of material selection; concealed for purpose of finish selection.
- 3. Concealed portions of casework include sleepers, web frames, dust panels, interior faces and ends of cabinets with drawers only, and other surfaces not usually visible after installation, except as otherwise indicated.

- B. Materials: Provide units fabricated of the following:

- 1. Exposed Materials: Do not use exposed faces of lighter-than-average color joined with exposed faces of darker-than-average color. Do not use two adjacent faces which are noticeably dissimilar in grain, figure and natural character markings.
 - a. Solid Lumber: Clear, dry, sound, selected from compatible grain and color, no defects, and of same species as plywood panel exposed face veneer.

- b. Plywood: Provide panels of 7-ply construction, with face veneer clear, selected for grain and color compatible with exposed solid lumber, and with no defects. Provide solid crossbandings without voids. Except for doors and drawer faces, edgeband exposed edges with solid wood of same species as face veneer. Provide panels with the following veneer for exposed faces:

SELECT RED OAK BELOW UNLESS MATCHING EXISTING CABINETS.

- 1) Species: Plain sliced red oak.
 - 2) Species: Plain sliced white oak.
 - 3) Species: Rotary cut birch.
- 2. Semi-Exposed Materials:
 - a. Solid Lumber: Dry, sound, selected to eliminate appearance defects. Any species of hardwood, or softwood of similar color and grain to exposed portions.
 - b. Plywood: Hardwood, PS-51, Good Grade (1), or softwood PS-1/ANSI A199.1, Group 1, A-A, INT, of species to resemble color and grain of exposed members.
 - 3. Concealed Members:
 - a. Solid Lumber or Plywood: Any species, with no defects affecting strength or utility.
 - b. Hardboard: ANSI A135.4, Class 1, tempered; for use as drawer bottom, base cabinet interior bottom, and cabinet backs.
 - 4. Unacceptable Materials: The following veneered materials are not permitted in cabinetry construction, regardless of exposure condition:
 - a. Particleboard (pressboard or flakeboard).
 - b. Oriented strand board (OSB).
 - c. Laminated solid lumber panels.
 - d. Tempered hardboard, except as otherwise indicated.
- C. Wood Casework Fabrication: Fabricate laboratory furniture with manufacturer's standard dimensions, profiles, and details shown, unless otherwise indicated. Assemble units in the shop in as large components as practicable to minimize field jointing.
- 1. Provide units with manufacturer's standard door and drawer configuration, and as follows:

USUALLY SELECT LIPPED OVERLAY TYPE BELOW. NOT ALL MANUFACTURERS HAVE FLUSH OVERLAY OPTION.

- a. Lipped overlay type with rounded edges.
- b. Flush overlay type with square edges.

USUALLY SELECT GRAINING BELOW.

- c. Grain Pattern: Horizontal on drawers, vertical on doors.

BELOW IS OFFERED BY FISHER HAMILTON - USUALLY DELETE.

- d. Grain Pattern: Vertical, unmatched doors and drawer fronts.

FISHER-HAMILTON OFFERS ALL-VERTICAL OPTIONS ABOVE AND BELOW. BELOW REQUIRES FLUSH OVERLAY DOORS/DRAWERS.

- e. Grain Pattern: Vertical, matched doors and drawer fronts.
- 2. Cabinet Bodies: Fabricate units with full (4-sided) top frame, and with horizontal intermediate rails between each door and drawer. Fabricate wood-framed glass doors (if included) with solid lumber frames.
- 3. Shelves Within Cabinets: Fabricate units of 3/4-inch thick plywood, with the following configurations for the indicated cabinet types included in Project:
 - a. Full depth in wall and counter-mounted units; half depth in base units.

COMMON PRACTICE IS TO SELECT ABOVE AND DELETE TWO OPTIONS BELOW. IF SPLIT-DEPTH SHELF OPTION IS SELECTED, SHOW ON DRAWINGS OR REVISE PARAGRAPH TO DESCRIBE DESIRED COMBINATION.

- b. Full depth in base, wall and counter-mounted units.
 - c. Full depth in wall and counter-mounted units; split depth in base units as indicated on drawings.
- D. Clear Wood Finish:
- 1. General: Apply laboratory casework manufacturer's standard two or three-coat, chemical-resistant, transparent finish consisting of sealer and catalyzed topcoat(s). After installation, touch up to refinish damaged portions equal to original factory finish.
 - 2. Chemical and Physical Resistance of Finish System: Finish complies with acceptance levels of cabinet surface finish tests in SEFA 8 for Laboratory Grade Casework. Acceptance level for chemical spot test shall be no more than four Level 3 conditions.
 - 3. Preparation: Sand exposed and semi-exposed components, using machine and hand methods. Machine marks, cross sanding, tool marks or other surface blemishes are not acceptable.
 - 4. Exposed Portions: Carefully sand finishes after each surface treatment. Apply finishes as follows:
 - a. Sealer coat, if required.

SELECT 1 OF THE 3 STAINS FOLLOWING

- b. Stain: None.
- c. Stain: Selected from mfr's standard range of tones.
- d. Stain: Non-standard, custom tone selected by Architect.
- e. Mineral filler: for open grained wood, if required.
- f. Multiple coats of highly chemical resistant finish, heat dried and sanded between each coat to produce a smooth, satin luster free of imperfections.
- 5. Semi-Exposed Portions: Apply sealer coat, stained to resemble exposed portions, and follow with heavy application of clear, water repellent finish coat to provide a smooth, washable surface.
- 6. Concealed Portions: One heavy coat of water repellent finish.

REMAINING PORTION OF THIS SECTION IS APPLICABLE TO BOTH WOOD AND METAL CASEWORK.

2.4 CASEWORK ACCESSORIES

- A. Leg Shoes: Extruded vinyl or rubber, black, open bottom type.

DELETE BELOW IF BASE INCLUDED IN FLOORING SECTION.

- B. Base Cabinet Molding: Extruded vinyl or rubber, black, 4-inches high. Provide as indicated on drawings, on casework items in contact with floor, and in the following locations:

1. Base and floor standing cabinet toe spaces.
2. Exposed sides of base and floor standing cabinets.
3. Filler and closure panels extending to floor.

- C. Grilles: Provide clear anodized aluminum grilles and frames in sizes and at locations shown on drawings, and as follows:

1. CT-16; Titus, or equivalent.

- D. Glass: ASTM C 1036 Type I (transparent glass, flat), Class 1 (clear), Quality q3 (glazing select); double strength.

USUALLY RETAIN ABOVE AND DELETE BELOW.

- E. Tempered Glass: ASTM C 1048 Condition A (uncoated surfaces), Type I (transparent glass, flat), Class I (clear), Quality q3 (glazing select), Kind FT (fully tempered); 1/8-inch thick.

2.5 CASEWORK HARDWARE

- A. Install hardware uniformly and precisely after final finishing is complete. Set hinges snug and flat in mortises unless otherwise indicated. Turn screws to flat seat. Adjust and align hardware so that moving parts operate freely and contact points meet accurately. Allow for final field adjustment after installation.

USUALLY SELECT BELOW AND DELETE OTHER HINGE OPTIONS.

1. Hinges: Manufacturer's standard 5-knuckle hinge with US26D satin chrome finish.
2. Hinges: Manufacturer's standard 5-knuckle, US32D stainless steel hinge with satin finish.

HINGE BELOW IS AVAILABLE WITH FLUSH OVERLAY STYLE ONLY.

3. Hinges: Manufacturer's standard concealed hinge for 170 deg. minimum swing.

USUALLY SELECT BELOW AND DELETE OTHER PULL OPTIONS.

4. Pulls: Manufacturer's standard surface mounted units of brushed aluminum.
5. Pulls: Manufacturer's standard surface mounted units of wire stock satin stainless steel.
6. Pulls: Manufacturer's standard flush recessed units of brushed aluminum.

BELOW NOT AVAILABLE FROM ALL MANUFACTURERS AND IN ALL STYLES - VERIFY BEFORE SELECTION.

7. Pulls: Manufacturer's standard flush recessed units of hardwood matching door/drawer face veneer species.
8. Catches: Manufacturer's standard mechanical roller type units. Magnetic catches are not acceptable.

9. Adjustable Shelf Supports (within cabinets): BHMA B84072, wrought steel, mortise mounted; or drilled holes with metal or plastic plug-type shelf supports.
10. Drawer Slides: Manufacturer's standard wood keel or metal ball bearing drawer slides. Where metal drawer metal slides are provided, comply with the following requirements:

INCLUDE ALL BELOW. ADJUST CAPACITY AS DESIRED. VOLUMES ROUGHLY CORRESPOND TO 18"W. BY 4"H. FOR 2100 CU. IN. AND 36"W. BY 8"H. FOR 4,600 CU. IN. INTENT IS TO ESTABLISH 100 LBF CAPACITY FOR ALL BUT VERY SMALL OR VERY LARGE AS DRAWERS.

- a. Minimum Rated Capacity: 75 lbs. for drawers with interior volumes of 2,100 cu. inches or less.
- b. Minimum Rated Capacity: 100 lbs. for drawers with a volume of more than 2,100 cu. inches, but less than or equal to 4,600 cu. inches.
- c. Minimum Rated Capacity: 150 lbs. for drawers with a volume of more than 4,600 cu. inches.

DELETE BELOW IF NO LOCKS REQUIRED. MEDICAL SCHOOL REQUIRES ONE LOCKED DRAWER OR CUPBOARD PER BENCH RUN AND 1 EACH SIDE OF ISLAND UNITS. MODIFY BELOW TO ADD "BEST" UNITS FOR RE-KEYABLE CORE, GREATER SECURITY, OR KEYING WITH BUILDING. MODIFY KEYING REQUIREMENT TO SUIT PROJECT.

11. Drawer/Door Locks: Manufacturer's standard factory keyed, 5-pin lock. Provide 2 keys for each lock. Key each drawer separately, unless otherwise indicated.

DELETE BELOW IF NO LABEL HOLDERS.

12. Label Holders: Manufacturer's standard, surface applied [brass] [chrome] units, approximately 2-1/2-inches by 1-inch with exposed fasteners in matching finish.

2.6 TOPS

- A. Tops, and Curbs: Provide smooth, clean, exposed tops and edges, in uniform plane, free of defects. Make exposed edges and corners uniformly rounded.

1. Top Sizes: Furnish tops in maximum practicable lengths.
2. Top Thicknesses: As indicated, with tolerance not exceeding plus or minus 1/32". Provide front and end overhang of 1" over base cabinets, formed with continuous drip groove on under surface 1/2" from edge.

- B. Top Materials:

SELECT THE FOLLOWING TOP MATERIAL TYPES APPLICABLE TO PROJECT.

1. Cast Epoxy Resin: Factory molded tops of modified epoxy resin formulation, uniform mixture throughout full thickness. Provide indented, "Marine" edge tops as indicated.
 - a. Finish: Non-glare black.
 - b. Thickness: 1-inch.
 - c. Physical Properties:
 - 1) Flexural strength - 4000 psi
 - 2) Compressive strength - 14,000 psi
 - 3) Hardness, Rockwell M-197

- 4) Water absorption in 24 hours - 0.05%
- 5) Heat distortion point - 400 deg. F (204 deg, C)
- 6) Resistant to thermal shock.
- d. Workmanship: Cast surfaces very smooth, with factory cut-outs for sinks, drip grooves, and service fixtures.
- 2. Resin Impregnated Sandstone: Natural quarried hard sandstone with uniform grain and texture, free of seams and veins. Using manufacturer's standard vacuum process, impregnate stone throughout with multiple coats of thermo-setting resin. Bake coating at high temperature to ensure complete polymerization of resin and permanent bond with substrate. Apply additional coats to tops and edges to ensure required chemical resistance. Configure units with top and corner edges rounded to a 1/4 inch radius, and with bottom and abutting side edges broken.
 - a. Finish: Non-specular smooth jet-black.

SELECT ONE BELOW

- b. Thickness: 1-1/4 inch.
- c. Thickness: 1 inch.
- d. Physical Properties: Density - 140 pcf; modulus of rupture - 3,200 psi; compressive strength - 15,900 psi; Brinnel hardness - 84.
- e. Workmanship: Complete machining, cutouts, drilling, grooving, sizing, and similar operations before impregnation.
- 3. Stainless Steel: 16 gage, ANSI type 304 with No. 4 satin finish, unless otherwise indicated.
 - a. Weld shop joints, grind smooth and polish to become practically invisible. Provide hair-line butt jointed field joints, mechanically bolted through continuous channels welded to underside at edges. Keep field jointing to a minimum. Apply reinforcing channels to underside of top where necessary to insure rigidity without deflection.
 - b. Extend top down to provide 1-1/4 inch thickness and 1/2 inch return flange under frame. Sound deaden entire under-surface with heavy build mastic coating.
 - c. Form backsplash with 1/4 inch cove, integral with top surface.
 - d. Provide 1/4 inch indented "marine edge" around perimeter of countertops throughout, except provide 1 inch high raised tops where indicated. In tops with sinks, pitch top surface two ways to bowl to provide adequate drainage without channeling or grooving.
- 4. Plastic Laminate (P. Lam.): Provide plastic laminate sheet, black color through entire thickness with satin finish, complying with NEMA LD-3, and as follows:
 - a. Flat Tops: General purpose grade; 0.050 inches thick.
 - b. Formed Tops: Post-forming grade; 0.042 inches thick.
 - c. Sub-top: 3/4 inch thick sub-top of hardwood faced plywood, medium density overlaid plywood, or 45 pound phenolic resin bonded particleboard.
 - d. Shop-bond laminate to sub-top with fully waterproof bond glue. Smooth sand surfaces to which plastic laminate is to be bonded. Apply standard phenolic backing sheet to back of panels.

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- e. Build up exposed edges of tops to 1-1/2 inch thickness. Self-edge exposed edges of top, splash, and openings with same plastic laminate used for tops.
- f. Unless otherwise indicated, construct top and back splash of one piece with intersection coved. Intersections of end splash with top and back splash need not be coved.

2.7 SHELVES, STANDARDS AND BRACKETS

A. Acid Resistant Plastic Laminate Shelves:

CHANGE TO 1-1/4 IF DESIRED. 1" IS STANDARD FROM KEWAUNEE.

- 1. Core material: 1 inch thick particleboard, 40-50 pound density particleboard according to ANSI A208.1-2009, grade M-2 specifications.
- 2. Finish: Chemical Resistant high-pressure decorative laminate on both faces and all edges.
 - a. Manufacturers:
 - 1) Wilsonart; Chemsurf
 - 2) Formica Group; Chemtop2
- 3. Color: Black.

B. Solid phenolic shelves:

- 1. Material: Solid phenolic core chemical and stain resistant panels. Material shall be a natural kraft paper based, saturated / impregnated with phenolic resin and processed under high heat and pressure to form a composite panel, to provide a work surface with high chemical resistant and abrasion resistant properties. Finished material shall be extremely hard and resistant to scratches and abrasion.
 - a. Finish: Non-glare black.
 - b. Thickness 1-inch.
 - c. Edge: Standard edge with 3/16" Radius or Bevel Finish
 - d. Physical Properties:
 - 1) Flexural strength: MD 23,000 psi / CD 15,000 psi
 - 2) Compressive strength: MD 31,000 psi / CD 25,000 psi
 - 3) Hardness, Rockwell M-95 to 115
 - 4) Water absorption in 24 hours - 0.35%

C. Cast Epoxy Resin Shelves: Provide epoxy resin shelving units conforming to epoxy resin top and curb specifications.

- 1. Thickness: 1 inch.

D. Shelf Support Structures: Fabricate wall-mounted, bench top mounted, ceiling-suspended, and other shelf support structures, including standards, brackets and other elements as shown on drawings. Provide manufacturer's standard pre-fabricated steel structural system, complete with connections, braces, fasteners, and anchorage devices as shown, or if not shown, as required to construct complete fabricated units that are tight, secure and capable of resisting expected loads without damage or permanent deformation.

BELOW IS EXAMPLE ONLY. MODIFY FOR VERY LIGHT OR HEAVY LOADING.

1. Expected Shelf Loads: Self-weight of shelf section plus live-loads as follows for size indicated:
 - a. Less than 10-inches deep: 25 lbf per lineal foot.
 - b. 10-inches deep to 14-inches deep: 50 lbf per lineal foot.
 - c. Over 14-inches deep to 18-inches deep: 75 lbf per lineal foot.
 - d. Over 18-inches deep: 100 lbf per lineal foot.

BELOW IS UNISTRUT'S PERMAGREEN FINISH. DELETE IF ANOTHER FINISH IS REQUIRED.

2. Finish: Factory applied standard paint coating.

DELETE BELOW IF PRIMED-ONLY FINISH ABOVE IS RETAINED.

3. Finish: Factory applied primer and alkyd paint finish coats.
 - a. Finish Color: Match casework finish.
 - b. Finish Color: Match fume hood exterior finish.
 - c. Finish Color: Custom color selected by Architect.
 - d. Finish Color: Selected by Architect from mfr's standard casework colors.

2.8 MISCELLANEOUS FABRICATIONS

DELETE BELOW IF NO WOOD PIPE CHASE COVER. REVISE TO SUIT PROJECT DETAILS. MODIFY FOR P.LAM. UNITS

- A. Wood Pipe Enclosure Covers: Fabricate units of red oak veneer plywood matching casework. Construct with chrome plated screw fasteners and grommets to allow removal of a single panel, providing access to pipes and conduit concealed by the enclosure.
 1. Provide indicated base trim as follows:
 - a. "Fry Reglet"; Shape No. 1680; 6063-T5, .050" thick aluminum with black, "Duramar" finish. Install with mitered joints, neatly cut and butted tight.

DELETE BELOW IF NO METAL PIPE CHASE COVER. REVISE TO SUIT PROJECT DETAILS.

- B. Metal Pipe Enclosure Covers: Fabricate units of metal materials matching casework. Provide chrome plated screw fasteners and grommets to allow removal of a single panel, providing access to pipes and conduit concealed by enclosure.

DELETE BELOW IF NO WOOD PRIVACY PANELS AT DESKS. MODIFY FOR P.LAM. UNITS

- C. Wood Privacy Panels: Fabricate units of red oak veneer plywood matching casework; and of dimensions and configuration shown. Use concealed fasteners where practicable.

THE FOLLOWING IS A UNISTRUT-AND-NYLON BELT SYSTEM SIMILAR TO UNITS IN DOW CHEMISTRY BUILDING

- D. Tank Restraints: Provide units as shown on drawings, complete with necessary fasteners and anchors, as required for a complete installation:

1. Nylon Strap: Provide 1 inch wide by 54 inch long nylon strap with brass buckle; equal to AGM Container Controls, Inc., Tuscon, Arizona <http://www.agmcontainer.com> (1-800-995-5590).

USUALLY MODIFY THE FOLLOWING TO ELIMINATE SPECIFIC MODEL NUMBERS. NUMBERS SHOULD BE INDICATED ON DRAWINGS.

2. Restraint Bracket: Provide continuous cold-rolled steel channel section equal to Unistrut P-3300. Provide P-1713 attachment brackets at both ends of nylon strap.
- E. Tack strips: Provide 2" aluminum rail with tackable tan cork insert and flat end stops. Mount per manufacturer's recommendation using concealed fasteners.
1. Manufacturers:
 - a. Cig-Jan Products, Ltd.
 - b. Claridge Products and Equipment, Inc.
 - c. Marsh Chalkboard Co.; Div. Marsh Lumber Co.
 - d. Polyvision Corp.
- F. Custom drying rack assembly: Refer to details on Drawings.

ADD DESCRIPTION HERE OF SPECIAL UNISTRUT FABRICATIONS.

2.9 SINKS

- A. Tub Sinks, General: Fabricate tub sinks of monolithic construction without seams, with bottoms pitched to drain outlets, and as follows:

THE FOLLOWING REQUIREMENTS ARE APPLICABLE TO MOST TUB SINKS. SELECT MATERIAL TYPES APPLICABLE TO PROJECT.

1. Sizes: as indicated or mfr's closest stock size of equal or greater volume, as acceptable to Architect.
2. Outlets: 1-1/2 inch diameter, 2 3/4" inch minimum length, fabricated of cast epoxy resin, or stainless steel; of same material as sink.

DELETE BELOW IF NO RESIN TUB SINKS.

- B. Cast Epoxy Resin Tub Sinks: Nonglare black, molded in one piece with surfaces smooth, corners coved and bottom sloped to outlet. Minimum physical properties and chemical resistance as specified for cast epoxy resin tops; 1/2-inch minimum thickness.

DELETE BELOW IF NO STAINLESS STEEL TUB SINKS.

- C. Stainless Steel Tub Sinks: 18 gage, Type 316, with No. 4 satin finish.
1. Fabricate with horizontal and vertical corners rounded to at least 5/8 inch radius. Slope sink bottoms to pitch to outlet.
 2. Provide double wall construction for sink partitions with top edge rounded to at least 1/2 inch diameter.
 3. Continuous butt weld joints and provide factory punching for fixtures.

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4. Apply approximately 1/8 inch thick heat resistant underseal to undersink surfaces for condensation prevention and sound deadening.
5. Where stainless steel sinks occur in stainless steel tops, factory assemble sinks and tops into one integral unit with welds ground smooth and polished to near invisibility.

DELETE BELOW IF NO CUP SINKS.

- D. Cup Sinks: Fabricate cup sinks of cast epoxy resin or stainless steel as indicated on drawings. Conform to requirements specified for materials as specified for tops or sinks.

DELETE BELOW IF NO STAINLESS STEEL SCULLERY SINKS.

- E. Stainless Steel Scullery Sinks: 18 gage, Type 316, with No. 4 satin finish.
1. Fabricate with horizontal and vertical corners rounded to at least 5/8 inch radius. Slope sink bottoms to pitch to outlet.
 2. Provide double wall construction for sink partitions with top edge rounded to at least 1/2 inch diameter.
 3. Continuous butt weld joints and provide factory punching for fixtures.
 4. Apply approximately 1/8 inch thick heat resistant underseal to undersink surfaces for condensation prevention and sound deadening.
 5. Where stainless steel sinks occur in stainless steel tops, factory assemble sinks and tops into one integral unit with welds ground smooth and polished to near invisibility.

REVIEW WITH MECHANICAL ENGINEER TO ENSURE THAT ALL LABORATORY SERVICE ITEMS ARE SPECIFIED AND COORDINATED. SPECIFICALLY, EMERGENCY SHOWERS AND EYEWASHES ARE SOMETIMES MISSED ON PROJECTS.

2.10 MECHANICAL SERVICE FIXTURES

- A. Service Fixtures, General: Provide units complete with washers, locknuts, unions, nipples and other accessories for positive mounting to supporting laboratory units. Include wall and deck flanges, escutcheons, handle extension rods, remote valves, and similar items required. Fabricate units to withstand test pressure of 100 psig, unless otherwise indicated.
1. Service fixtures are indicated on drawings by symbols, with design type of each fixture indicated by letter and number reference marks.
 2. Handles: Provide 3-arm or 4-arm forged brass handles for valves, stops, faucets, remote controls, and cocks, except for ground key cocks, and micro-adjustable needle cocks.
 3. Hand of Fixtures: Provide right hand fixtures.
 4. Service Outlets Identification: Provide colored plastic index disks with embossed identification letters at each service fixture handle or knob. Secure disks to fixture handles to be tamperproof.

- B. Material and Finish: Fabricate service fixtures from cast or forged red brass containing a minimum of 81 percent copper. Exposed surfaces including fittings and escutcheons: polished chrome plated finish. Fixtures fabricated of plastic are not acceptable in any application, except as follows:
1. Distilled Water Fixtures: As indicated.
 2. Fixtures Inside Fume Hoods: Solvent resistant plastic coated brass as indicated.

EDIT THE FOLLOWING TO SUIT PROJECT.

USE BELOW FOR ECONOMY GRADE UNITS. THESE CANNOT BE FINELY CONTROLLED AND ARE INTENDED FOR "ALL-ON" OR "ALL-OFF" USE.

- C. Ground Key Type Hose Cocks: Tapered core and handle of one piece forged brass, ground and lapped, held in place under constant spring pressure.

USE BELOW WHERE RESEARCHERS REQUIRE UNITS THAT CAN BE FINELY CONTROLLED.

- D. Needle Valve Type Hose Cocks: Provide units with renewable, self-centering floating cones and renewable seats of stainless steel or monel metal. Provide units designed for 100 psig operating pressure.

- E. Water Valves and Faucets: Provide units with renewable barrel locked in valve body. Barrel shall contain all wearing parts, with renewable disks.

1. Furnish all water faucets with integral vacuum breakers in goose neck, regardless of model number indicated on drawings.

INCLUDE ABOVE EXCEPT IN CHEMISTRY BUILDING.

2. Provide bench-top mounted gooseneck water faucets with fittings required to allow gooseneck to swivel 360 degrees.
3. Provide each fixture with an integral vacuum breaker, regardless of model number indicated on drawings or in schedules.

BELOW IS STANDARD DI UNIT. NOTE THAT THIS PARAGRAPH SPECIFIES MODEL NUMBERS, WHICH IS ATYPICAL. USUALLY DELETE MODEL NUMBERS HERE AND INCLUDE THEM ON DRAWINGS.

- F. Brass Distilled (Purified) Water Fixtures: Provide units fabricated of forged brass, with polypropylene internal construction, and with no metal parts in contact with water. Provide each fixture with self-closing valves (unless otherwise indicated), and with a polypropylene vacuum breaker:

1. Deck Mounted Fixtures: Model 7833SC-7110; Watersaver.

DELETE ABOVE OR BELOW, OR RETAIN BOTH TO SUIT PROJECT.

2. Panel Mounted Fixtures: Model 7834SC-7110; Watersaver.

DELETE TWO FIXTURES LISTED ABOVE AND SUBSTITUTE NON-SELF-CLOSING MODELS BELOW IF CLIENT WILL NOT ACCEPT THE SELF-CLOSING MODEL. FIRST FIXTURE LISTED IS DECK-MOUNTED AND SECOND FIXTURE IS PANEL-MOUNTED.

3. Deck Mounted Fixtures: Model 7833-7110; Watersaver.
4. Panel Mounted Fixtures: Model 7834-7110; Watersaver.

DELETE DI UNITS ABOVE AND INCLUDE ALL-PLASTIC CONSTRUCTION UNIT BELOW FOR ECONOMY AT REQUEST OR CLIENT.

- G. PVC Distilled (Purified) Water Fixtures: Provide units fabricated of PVC, with no metal parts in contact with water. Provide each fixture with self-closing lever valve (unless otherwise indicated), and with a PVC vacuum breaker:
1. Product: Subject to compliance with requirements, provide Filterchem SVG-50"; Special Plastics Systems, Alhambra, Ca.

DELETE BELOW IF NONE.

- H. Fixtures in Fume Hoods: Provide valves controlled from face of hood. Use angle valves where required.

SELECT ONE OF THE FOLLOWING FAUCET TYPES

1. Faucets: Provide wall-mounted gooseneck style faucets in hoods.
2. Faucets: Provide wall-mounted, hose cock water outlets in hoods.
 - a. Backflow Preventer: Provide manufacturer's standard in-line backflow preventer (vacuum breaker) installed outside hood interior between valve body and outlet for each water faucet.
3. Hose Cocks: Provide units with acid and solvent resistant baked-on plastic coating in mfr's standard color.

DELETE BELOW IF NONE. NOTE THAT THIS PARAGRAPH SPECIFIES MODEL NUMBERS, WHICH IS ATYPICAL. USUALLY DELETE MODEL NUMBERS HERE AND INCLUDE THEM ON DRAWINGS.

- I. Deck Mounted Emergency Eyewash: Provide swinging dual-head units activated by pulling the arm into position for use. Unit to have plastic heads and polished chrome arm:
1. Deck Mounted Unit: Model 7610; Haws.

SELECT ABOVE OR BELOW OR BOTH TO SUIT PROJECT. ABOVE IS MOUNTED AT THE REAR OF THE SINK ADJACENT TO THE FAUCET AND PULLS DOWN AND FORWARD FOR USE. BELOW IS MOUNTED ON THE SIDE OF THE SINK AND PULLS FORWARD HORIZONTALLY FOR USE. IF HANDICAP ACCESSIBILITY IS REQUIRED, A DIFFERENT TYPE OF FIXTURE MAY BE REQUIRED.

2. Deck Mounted Unit: Model 7611; Haws.

2.11 ELECTRICAL SERVICE FIXTURES

- A. Service Fixtures: Provide units complete with metal housing or box; necessary receptacles, terminals, switches, pilot lights, device plates, and fittings and gaskets required for mounting on casework. Provide only fixtures with Underwriter's Laboratories label.

1. Service fixtures are indicated on drawings by symbols, with design type of each fixture indicated by letter and number reference marks.
- B. Pedestal Type Fixtures: Cast aluminum housing complete with cover plates, neoprene gasket under base, and with specification grade receptacles or other devices indicated. Fabricate units with sloped single face or double face, as indicated, and concealed mounting holes in base for attaching to casework. Provide holes tapped for conduits.
- C. Recessed Type Fixtures: Galvanized steel outlet box, size as required complete with cover plate and receptacles or other devices as indicated.
- D. Cover Plates: Provide stainless steel cover plates for AC outlets and devices.
 1. Stainless Steel, Type 302, satin finish, with formed beveled edges.
- E. Mark the following devices whether shown on drawings or not.
 1. AC receptacles, other than standard 120 volt duplex, grounding type. Indicate voltage and phase.

BELOW USUALLY NOT REQUIRED FUME HOOD LIGHT SWITCHES ARE INCLUDED IN FUME HOOD SECTION.

2. Switches: Indicate equipment being controlled (e.g., "PUMP OUTLET"). Provide units with pilot lights when located remotely from associated equipment or switch, where function is not obvious. Indicate equipment or circuit being energized.
- F. Finishes for Electric Service Fixture Components: Mfr's standard finish. Provide galvanized finish on ferrous fittings.
- G. Receptacles: Furnish AC receptacles for AC circuits, 125 volt, 20 amp, 2 pole, 3 wire, NEMA Type 5-20R, specification grade, extra heavy duty grounding type with nylon or Lexan bodies.
 1. Provide GFCI (ground fault circuit interrupter) receptacles within fume hoods and within 6 feet of sink units. GFCI receptacles shall be rated for 2000 amps interrupting capacity and trip in 25 milliseconds or less when ground currents exceed 5 milliamps.

SELECT ONE OF THE FOLLOWING.

2. Color: Dark brown.
3. Color: Ivory.
4. Products: Subject to compliance with requirements, provide products of one of the following:
 - Arrow Hart.
 - Bryant.
 - Hubbell.
 - Leviton.
 - Pass and Seymour.

RETAIN BELOW FOR FUME HOOD SWITCHES, AND OTHER AUXILLIARY EQUIPMENT SWITCHES (SUCH AS OUTLETS ON THE FACE OF, OR INSIDE, CABINETS).

H. Switches: Furnish single pole, double pole, or 3-way switches, as required, rated 120-277 volts AC and 20 amps, unless otherwise indicated.

1. Furnish pilot light adjacent to toggle switch, where noted as "PL" adjacent to switch identification.

SELECT ONE OF THE FOLLOWING.

2. Color: Dark brown.
3. Color: Ivory.
4. Products: Subject to compliance with requirements, provide products of one of the following:
Arrow Hart.
Bryant.
Hubbell.
Leviton.
Pass and Seymour.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. General: Install plumb, level, true, and straight with no distortions. Shim as required, using concealed shims. Where laboratory furniture abuts other finished work, scribe and apply filler strips for accurate fit with fasteners concealed where practicable.
- B. Base Cabinets: Set cabinets straight, plumb, and level. Adjust sub-tops within 1/16" of a single plane. Bolt continuous cabinets together. Unless otherwise noted, secure individual cabinets with not less than 2 fasteners into floor, where they do not adjoin other cabinets.
 1. Where required, assemble units into one integral unit with joints flush, tight, and uniform. Align similar adjoining doors and drawers to a tolerance of 1/16.
- C. Legs and Aprons: Install with exposed surfaces of legs approximately 1/8 in front of apron faces. Legs set flush or behind apron faces at conditions exposed-to-view are not permitted.
- D. Fillers and Closure Panels: Provide matching filler panels at openings between cabinets and adjacent walls, whether or not indicated on drawings. Provide closure panels at openings into service chases below aprons, whether or not indicated on drawings. Fasten fillers at ends of island benches and all closure panels with Phillips-head screws set in matching grommets, for easy removal.
- E. Wall Cabinets: Securely fasten to solid supporting material. Anchor, adjust, and align wall cabinets as specified for base cabinets.

RETAIN OR DELETE BELOW AS APPLICABLE TO PROJECT.

1. Where reinforcing of metal stud wall system is required, reinforcement is the work of other trades, but responsibility for accurate location and sizing of reinforcement is part of this work.
2. Adjust casework and hardware so that doors and drawers operate smoothly without warp and bind. Lubricate operating hardware as recommended by mfr.

3.2 INSTALLATION OF TOPS

- A. Field Jointing: Where practicable, make in same manner as factory jointing using dowels, splines, adhesives, and fasteners recommended by mfr. Locate field joints as shown, factory prepared so there is no job site processing of top and edge surfaces.
- B. Solid Hardwood, Stainless Steel and Plastic Laminate Tops: Use concealed clamping devices for field joints, locate within 6 inches of front, at back edges and at intervals not exceeding 24 inches. Tighten in accordance with mfr's instructions to exert a constant, heavy clamping pressure at joints.
- C. Natural Stone and Epoxy Tops: Secure to cabinets with epoxy cement applied at each corner and along perimeter edges at not more than 48 inches on center.
- D. Workmanship: Abut top and edge surfaces in one true plane, with internal supports placed to prevent deflection, and as follows:
 1. Solid Hardwood, Stainless Steel and Plastic Laminate: Provide flush hairline joints in top units using clamping devices.
 2. Natural Stone and Epoxy Resin: Use mfr's recommended adhesives and holding devices to provide joint widths not more than 1/16 inch wide at any location, completely filled and flush with abutting edges.
- E. Where necessary to penetrate tops with fasteners, countersink heads approximately 1/8 inch and plug hole flush with material equal in chemical resistance, color, hardness, and texture to top surface.
- F. After installation, carefully dress joints smooth, remove any surface scratches, clean and polish entire surface.
- G. Provide holes and cutouts as required for mechanical and electrical service fixtures.
- H. Provide scribe moldings for closures at junctures of top, curb and splash with walls as recommended by mfr for materials involved. Use chemical resistant, permanently elastic sealing compound where recommended by mfr.

3.3 INSTALLATION OF SHELVING UNITS

- A. Erect steel channel support system using manufacturer-recommended connectors, fasteners and anchors. Where not otherwise indicated, anchor into concrete structure using expansion bolts designed for the condition encountered. Lay shelves into support structure and fasten each shelf from underside with wood screws.

3.4 INSTALLATION OF SINKS

- A. Coordinate installation of sinks with work of Division 22.
 - 1. Underside Installation: Use mfr's recommended adjustable support system for table-type and cabinet-type installations. Set top edge of sink unit firmly pressed to counter top, set in mfr's recommended chemical resistant sealing compound to produce a tight and fully leakproof joint. Adjust sink and securely support to prevent movement.
 - 2. Semi-flush Installation: Use stainless steel sink frame, complete with clamping lugs and pads. Before setting, apply a full coat of mfr's recommended sealant under rim lip and along top. Omit sink frame in sinks fabricated with integral rim seal.

3.5 INSTALLATION OF ACCESSORIES

- A. Install in a precise manner in accordance with manufacturer's directions. Turn screws to a flat seat; do not drive into place. Adjust moving parts to operate freely without excessive bind.

3.6 CLEANING, ADJUSTING AND REPAIR

- A. Cleaning: Perform the following cleaning operations not more than 7 days prior to substantial completion:
 - 1. Clean shop-finished surfaces, and touch-up as required by Architect, and remove or refinish damaged or soiled areas.
 - 2. Clean glass surfaces installed under this section.
 - 3. Remove construction debris from drawers and cabinet interiors. Clean drawer and cabinet interiors as required to remove dirt, grease, dust and film.
 - 4. Dust exposed surfaces of casework and equipment; polish tops and curbs.
- B. Adjust drawer and door operation of each unit to provide smooth operation, positive latching, and close fit within specified tolerances.
- C. Repair, or remove and replace defective work as directed upon completion of installation.

END OF SECTION 123553