

ACOUSTICAL INSULATION

GENERAL

SUMMARY

- A. Section Includes: Acoustical insulation above ceilings and within partitions as shown on Drawings and as specified.

DELIVERY, STORAGE AND HANDLING

- A. Packing and Shipping: Deliver materials to site in Manufacturer's original unopened packaging with labels intact. Protect finished surfaces with removable wrapping or coating which will not bond when exposed to sunlight.
- B. Storage: Adequately protect against damage while stored at the site.
- C. Handling: Comply with Manufacturer's instructions.

PRODUCTS

MANUFACTURERS

- A. Furnish products of one of the specified Manufacturers, except as approved by the Architect, subject to compliance with Specification requirements.
 1. Manville Building Products Group
 2. Owens Corning Fiberglas
 3. U.S. Gypsum Company

MATERIALS

- A. Sound Control Batts. 2-1/2 inches at 2-1/2 inches metal furred walls and 3-1/2 inches or thicker at all other walls. Provide fiberglass unfaced, ASTM C665, Type 1, Class B, with a Fire Hazard Classification of 25-50 or less when tested in accordance with ASTM E-84.

EXECUTION

INSTALLATION

- A. Install acoustical insulation batts in sound-rated stud partition walls where indicated on Drawings. Size batts for a friction fit and install in accordance with Manufacturer's recommendations.
- B. Install acoustical insulation batts above lay-in ceilings, and other locations as shown on Drawings, in strict accordance with Manufacturer's printed instructions.
- C. Butt ends of batts closely together and fill all voids.

CLEANING

- A. During the course of the Work and on completion, remove and dispose of excess

materials, equipment and debris away from premises. Leave Work in clean condition

PAINING

GENERAL

SUMMARY

- A. Section Includes: Painting as specified and as noted on Drawings. Surfaces requiring finishing and left unfinished by the requirements of other Sections shall be painted or finished as part of the Work of this Section.

DEFINITIONS

- A. Touch-Up: Painting of items missed by painter at no additional cost to Owner.
- B. Re-Paint: Repairs to paint work for damages caused by other trades

SUBMITTALS

- A. Product Data: Submit schedule of manufacturers of products required for the Work, together with specifications recommended by each manufacturer.
- B. Samples: Submit samples of each type of finish specified.
1. Architect will furnish Contractor a color schedule of colors selected either from manufacturer's stock colors or specially requested color mixes before Work is begun.
 2. Submit two 8 inch x 10 inch samples of each color, including the correct sheen and texture, on heavy cardboard or masonry. Submit sealer and stain finishes on material or the same quality and species of wood on which that particular finish shall be used. Rejected samples shall be resubmitted until approved.
 3. Samples shall be submitted at least 30 days prior to the start of painting work. Label and identify each sample as to location and application. Upon submittal of color samples, minor variations or changes in color selection may be requested by the Architect and new samples ordered, until final color approval.

QUALITY ASSURANCE

- A. Standards: Preparation, application and workmanship shall be in accordance with manufacturer's recommendations and applicable provisions of the following:
1. Painting and Decorating Contractors of America (PDCA) "Painting Specification Manual" and "Standards".
 - a. PDCA P1-92, "Touch-Up Painting and Damage Repair - Financial Responsibility:" A properly painted surface shall be as defined in this Standard.
 - b. PDCA P2-92, "Third Party Inspection Qualifications and Responsibilities."
 - c. PDCA P3-93, "Designation of Paint Colors."
 - d. PDCA P4-94, "Responsibilities for Inspection and Acceptance of Surfaces Prior to Painting and Decorating."
 - e. PDCA P5-94, "Benchmark Sample Procedures for Paint and Other Decorative Coating Systems."
 2. Gypsum Association - GA210, "Gypsum Board for Walls and Ceilings."

DELIVERY, STORAGE, AND HANDLING

- A. **Packing and Shipping:** Deliver materials to site in manufacturer's sealed containers, legends and labels, intact.
- B. **Storage:**
 - 1. Adequately protect against damage while stored at site.
 - 2. In no case shall the amount or method of materials stored exceed the amount permitted or the manner allowed by local ordinances, state laws, or fire underwriter regulations.

PROJECT/SITE CONDITIONS

- A. **Environmental Requirements:** Do not apply exterior paint in damp or rainy weather or until after the surface has dried thoroughly from the effects of such weather.
 - 1. Do not apply varnish or paint when temperature is below 50 degrees F.. Avoid painting surfaces exposed to hot sunlight.
 - 2. During interior application, maintain minimum temperature of 65 degrees F. unless otherwise directed by Architect or manufacturer's printed instructions. Hold temperature as constant as possible.
 - 3. Provide adequate ventilation at all times so the humidity cannot rise above the dew point of the coldest surface to be painted.
 - 4. Moisture-containing surfaces, such as concrete, stucco and cement plaster shall have a moisture content of less than 8 percent as measured by moisture meter. Remove surface salt deposits prior to painting. Verify that pH is neutral, or within acceptable limits of Paint Manufacturer. Paint after thoroughly cured.

MAINTENANCE

- A. **Extra Materials:** Upon completion of the Work, furnish Owner with one fresh gallon of each type and color of paint and finish used on this Project. Label containers with manufacturer's name, batch, color, shelf life, instructions, and cautions.

PRODUCTS

MANUFACTURERS

- A. Furnish products of one of the following manufacturers, except as otherwise approved by Architect, subject to compliance with specification requirements.
 - 1. Dunn-Edwards Corporation (Arizona Representative: Tim Garver, 480/968-3413, ext. 3221)
 - 2. Frazee Industries (Arizona Representative: Denise Bowser, 602/275-5444)
 - 3. ICI Dulux (Arizona Representative: Marv Nance, 480/784-4000)
 - 4. Kelly-Moore Paint Co. (Arizona Representative: Bob Kietzman, 602/272-7993)
 - 5. PPG (Arizona Representative: James Hicks, 602/956-1150)
 - 6. Sherwin Williams (Arizona Representative: Jackie Jordan, 1-888-365-6042)
 - 7. Tnemec (Arizona Representative: Teri Hand, 480/951-8686)

MATERIALS

- A. Provide materials in accordance with the Schedule of Paint Products at the end of this Section as applicable to project. Contractor shall provide either waterborne or solventborne products at contractor's option and as follows:
 - 1. Waterborne:

- a. Provide where low odor and fast dry are desired.
 - b. Non-blocking materials shall be used for doors, door jambs, railings and other locations subject to handling, or where surfaces will come into contact with other painted surfaces or belongings.
2. Solventborne:
- a. Provide where harder finish is required (such as "wet" areas) and odor will not create problems with occupants.
 - b. These products shall not be used where color retention is a concern. Verify with Architect.
3. Materials used shall comply with applicable Federal and local air pollution regulations, lead content laws, and current VOC requirements. If products listed in Schedule of Paint Products located at the end of this Section are not in compliance with regulations, laws, or requirements, Contractor shall notify Architect and shall provide information regarding substitute products.
- B. Basic painting materials such as linseed oil, shellac, turpentine, thinners, driers, and other similar products, shall be of highest quality, made by reputable, recognized manufacturers, and have identifying labels on containers. Paint materials shall be factory fresh.
- C. Alternate materials submitted for prior approval shall have qualities and materials equal to the other listed manufacturer's scheduled, top of the line, first quality products. Materials selected for coating systems for each type of surface shall be the products of a single manufacturer.
- D. Standard Gloss Range: Provide paints in accordance with the following ranges in accordance with ASTM D523 and in accordance with Finish Schedules on drawings:

<u>Sheen</u>	<u>Geometry</u>	<u>Gloss Range</u>
Flat	85 degree	Below 15 (see also Paint Finishes herein)
Eggshell	60 degree	5-20
Lo Luster	60 degree	15-25
Satin	60 degree	15-35
Semi-Gloss	60 degree	30-65
Gloss	60 degree	Over 65

- E. Paints shall be ready mixed except for field catalyzed coatings.

EXECUTION

EXAMINATION

- A. Verification of Conditions: Examine subsurfaces to receive Work and report in writing with a copy to Architect, conditions detrimental to Work. Commencement of Work will be construed as acceptance of subsurfaces.

PROTECTION

- A. Before painting, remove hardware, accessories, electrical plates, lighting fixtures and similar items and protect.
- 1. Provide "Wet-Paint" signs and other barricades and protections as required to protect adjacent surfaces and work of other trades, whether being painted or not.
 - 2. Mask permanent labels.
 - 3. Provide, distribute, and maintain a sufficient supply of clean drop cloths and other protective coverings.

4. Protect foliage and other exterior finished surfaces from contact with cleaning materials and thoroughly flush with water after contact.
5. On completion of each space, replace above items.

SURFACE PREPARATION

A. General:

1. Surfaces requiring painting or finishing shall be thoroughly dry and cured, free of dirt, dust, rust, stains, scale, mildew, wax, grease, oil, deteriorated substrates, bond-breakers, efflorescence and other foreign matter detrimental to the coating's adhesion and performance. Repair voids, cracks, nicks, and other surface defects, with appropriate patching material. Finish flush with surrounding surfaces and match adjacent finish texture.
2. Spot prime marred or damaged shop coats on metal surfaces with appropriate metal primer.
3. Determine moisture content of plaster, stucco, cementitious materials, wood, and other moisture-holding materials by use of a reliable electronic moisture meter.
4. Determine alkalinity of plaster, stucco and other cementitious materials by performing appropriate tests.
5. Do not paint surfaces where moisture content or alkalinity exceeds that which is allowed by paint manufacturer.

B. Existing Surfaces:

1. Clean, sand, patch, repair, and prepare existing surfaces to be painted so that such existing finished surfaces are indistinguishable from new surfaces.
2. Surfaces which cannot be prepared or painted as specified shall be immediately brought to the attention of the Architect in writing.
3. Remove loose peeling and checked paint./
4. Remove mildew by washing the surface with a commercially available mildew killer/remover.
5. Remove efflorescence by wire brushing, power brushing or washing. Thoroughly rinse surfaces wire brushed. After removal of efflorescence, wash the surface with a commercially available cleaner acceptable to the manufacturer of the substrate.
6. Remove existing wallcovering and wash the surface to remove paste residue. Seal surface before making any surface repairs.
7. Dull and roughen glossy surfaces to obtain proper adhesion by either sanding, washing with a tri-sodium phosphate solution, or treating with a liquid deglossing compound.
8. Overlap and feather edge spot-primed areas.

C. Wood

1. Sandpaper to smooth and even surface and then dust off. After primer or stain coat has been applied, thoroughly fill nail holes and other surface imperfections with putty tinted with primer or stain to match wood color. Sand woodwork between coats to a smooth surface. Cover knots and sap streaks with a thin coat of shellac, or seal with a suitable stain blocking sealer.
2. Finish door and window edges after final fitting. Finish interior of cabinets in the same manner as the exterior unless otherwise specified. Seal interior of drawers unless otherwise specified.
3. Backpriming:
 - a. Backprime exterior woodwork, which is to receive paint finish, with exterior primer paint.
 - b. Backprime interior woodwork, which is to receive paint or enamel finish, with enamel undercoater paint.

- c. Backprime interior and exterior woodwork, which is to receive stain and/or varnish finish with VOC compliant varnish acceptable to the Architect.
 - d. Back-prime wood trim before installation.
 - 4. Where existing stained surfaces are indicated to be coated with a transparent stain, test apply stain to small area where directed by Architect and obtain Architects approval of color.
- D. Steel and Iron:
 - 1. Remove grease, oil, mill scale, rust and rust scale and touch-up chipped or abraded places on items that have been shop coated. Remove and reprime incompatible or damaged shop applied primers. Comply with the Steel Structures Painting Council's (SSPC) recommendations for cleaning of uncoated steel and iron surfaces.
 - 2. When area will be exposed to view, sandpaper the entire primed area smooth, feather the edge of surrounding undamaged prime coat and spot prime in a manner to eliminate evidence of repair.
 - 3. Where steel or iron at existing Work have a heavy coating of scale, remove by sand blasting, sanding, descaling, grinding or wire brushing, as necessary, to produce a satisfactory surface for painting.
- E. Galvanized Metal and Aluminum:
 - 1. Thoroughly clean by wiping surfaces with a non-hydrocarbon solvent that will not leave an oily residue. Apply surface conditioner or vinyl-wash pretreatment as required for proper adhesion if required by paint manufacturer. Prime galvanized metal with galvanized iron primer as recommended by paint manufacturer. A test sample of the complete painting system should be applied and checked for adhesion before final painting begins.
 - 2. Clean visible portions of throats of galvanized steel ductwork with solvent; wipe dry with clean rags and paint flat black.
- F. Concrete:
 - 1. The method of surface preparation shall be at Contractor's discretion, provided the results are satisfactory to the Architect, and method is in compliance with applicable codes and requirements.
 - 2. Clean and prepare surfaces of tilt-up precast concrete wall panels to be painted by power washing surface to remove all efflorescence, chalk, dust, dirt, grease, oils, and release agents.
 - 3. Repair surfaces to be painted prior to application of prime and finish coat(s). Apply a tinted primer to the substrate to help identify surface imperfections. After the primer has thoroughly dried, patch, fill and repair surface imperfections to match and flush-out with adjacent finish texture and profile.
 - 4. Before first paint coat is applied, spot prime nails and other exposed metal occurring in the surfaces with a rust inhibitive primer as recommended by paint manufacturer.
- G. Plaster and Gypsum Board Surfaces:
 - 1. Fill cracks, holes or imperfections in with compatible patching material and smooth off to match adjoining surfaces. Before painting, surfaces shall be first tested for dryness with a moisture testing device.
 - 2. Apply no paint or sealer on gypsum board or plaster when the moisture content exceeds 8 percent. Test sufficient areas in each space and as often as necessary to determine if the surface has the proper moisture content for painting. If the moisture content is between 8 percent and 12 percent, prime with alkali resistant primer.
 - 3. If 8 percent or less, prime with specified primer. Remove the dry salt deposits

from plaster surfaces by brushing with a stiff brush before painting.

- H. Acoustical Surfaces (Lay-in acoustical ceiling panels, acoustical wall panels, etc.):
 - 1. Thoroughly vacuum clean surfaces to remove dust and debris from acoustical surface pores. Use a soft brush attachment that will not damage or loosen acoustical surface.
 - 2. Seal surface stains with a suitable stain blocking sealer that will not fill pores of acoustical surface.

WORKMANSHIP

- A. Apply products to achieve paint manufacturer's printed specifications for dry mil thickness
- B. Apply each coat of paint evenly and comply with manufacturer's drying time before applying subsequent coats.
- C. Finished work shall be uniform, match approved color, texture and coverage, and free from runs, sags, clogging or excessive flooding. Make edges of paint adjoining other materials or colors sharp and clean, without overlapping. Where varnishes or enamel is used, lightly sand, dust and clean undercoats to obtain a smooth finish coat. Sand carefully between each coat of finish on smooth surfaces for good adhesion of subsequent coats.
- D. Where clear finishes are required, ensure tinted fillers match wood. Work fillers well into the grain before set. Wipe excess from the surface.
- E. Where specific mil thicknesses are required, check thickness by the following methods:
 - 1. Over ferrous metal - Elecometer Film Gauge
 - 2. Other surfaces - Tooke Dry Mil Inspection Gauge

APPLICATION

- A. The number of coats scheduled is the minimum number of coats required. Additional coat(s) shall be applied, at no additional cost to the Owner, to completely hide base material, provide uniform color and to produce satisfactory finish results.
- B. Apply coatings without thinning except as specifically required by label directions, or required by these specifications. In such cases, thinning shall be the minimum reduction permitted.
- C. Priming will not be required on items delivered with prime or shop coats, unless otherwise specified. Touch up prime coats applied by others as required to ensure an even primed surface before applying finish coat.
- D. Block Fillers: Provide level of block fill as scheduled to conform with the following:
 - 1. Level 1 – Regular Fill: Minimum block fill, reduces irregularity in masonry profile. One coat, spray applied.
 - 2. Level 2 – Medium Full Fill: Masonry profile slightly reduced. One coat, spray applied and back-rolled.
 - 3. Level 3 – Full Fill: Minimum block fill required for semi-gloss and gloss finishes. Use where conformance with health regulations is required. Number of coats as required to conceal most of masonry texture, spray applied and back-rolled.
 - 4. Level 4 – High Density Fill: Minimum of three coats. 1st coat massaged and forced into masonry texture to assure uniform high density. 2nd coat, with build sufficient to fully conceal masonry texture and joints. Additional coats as

required to level. Spray apply coats, back-roll and squeegee final coat. Add sand to final coat to achieve light sand texture where indicated.

- E. Plumbing, Mechanical and Electrical:
 - 1. Exterior and interior exposed water, gas, waste piping, sprinkler piping, conduit, lighting and electrical panels, telephone terminal boxes, galvanized ducts and insulated ducts, shall be painted in areas other than mechanical rooms, unless otherwise scheduled.
 - 2. Paint exposed unfinished fixtures, metal ducts, switch boxes, control panels, devices, starters, junction boxes, vents, drains, and other similar items, as directed by Architect.
- F. Spray paint prime coated (not pre-finished) grilles and registers with enamel or lacquer to match walls and ceilings. Paint materials shall not sag, run or bind movable parts of grilles, registers, louvers, baffles, and other similar items.
 - 1. Throats of ducts shall be given one coat of flat black paint, wherever visibility of the interior of the duct is allowed through registers or other similar items. At fiber lined duct, use black latex paint.
 - 2. Examine the Mechanical and Electrical Drawings and Specifications to determine the amount of exposed work to be painted.
- G. Paint exposed surfaces of every member; paint items inaccessible after installation before installation, if required to be painted. Edges, tops, and bottoms of wood doors shall be sealed and finished with the same finish as the door faces, to meet door manufacturer's warranty requirements. Verify edge color with Architect as different colors may be selected for each face.
- H. Paint items fitted with finish hardware after hardware has been temporarily removed.
- I. Heating and other equipment on or adjacent to walls or surfaces scheduled for painting, shall be disconnected, using workmen skilled in appropriate trades, and moved temporarily to permit painting of surface. Following completion of painting, replace and reconnect items.
- J. Each succeeding pigmented coat shall be distinguishably lighter than the previous coat. Tint prime and undercoats to a color similar to finish coat. Each coat of material applied must be inspected and approved by the Architect before the application of the succeeding specified coat; otherwise no credit for the concealed coat will be given, and the Contractor shall assume the responsibility to recoat work in question. Contractor shall notify the Architect when each coat is completed.
- K. Brush, wipe or roll stain in 2 coat application. Avoid lap marks by maintaining "wet-edge" continually being merged with existing liquid coverage and stop only at natural edges, turns and breaking places.
- L. Do not paint over Underwriters' Laboratory labels, fusible links, exposed sprinkler heads, and other similar items.
- M. Paint piping, electrical or other equipment, conduit, vents, and other similar items, on roof or other exterior locations as directed by Architect.
- N. Finish closets and the interior of cabinets with same color as adjoining rooms, unless otherwise specified. Finish other surfaces same as nearest or adjoining surfaces, unless otherwise shown or scheduled.
- O. Paint surface of walls which will be concealed by cabinets, chalkboards and other items

attached to wall.

ADJUSTING

- A. At completion, do touch-up and re-paint work and leave finish surfaces in good condition.

CLEANING

- A. During the course of the Work, remove misplaced paint and stain spots or spills. Leave Work in clean condition acceptable to Architect.
- B. Remove oily rags and waste daily, taking precaution to prevent fire.

SCHEDULES

- A. Color Schedule:
 - 1. Architect will provide a complete schedule of colors. Colors may be selected from various manufacturer's color palettes. Manufacturer supplying paint shall match these colors. Contractor shall prepare duplicate set of samples of treatments for major surfaces. If a specific surface or item receiving a paint finish does not have a specific color indicated or selected by the Architect, obtain clarification from the Architect. Do not assume the confirmation of the same color on the adjacent surfaces.
 - 2. Final coat of paint shall not be applied until colors have been approved by the Architect.
- B. Schedule of Finishes: Refer to the "Finish Schedule" on the Drawing for designated finishes of areas.
- C. Finishing of the following listed items and materials will not be required and shall be protected:
 - 1. Stainless Steel, brass, bronze, copper, monel, chromium, anodized aluminum; specially finished articles such as porcelain enamel, plastic coated fabrics, and baked enamel, unless otherwise indicated.
 - 2. Finished products such as ceramic tile, glass, brick, resilient flooring and acoustical tiles, board and metal tees.
 - 3. Pre-finished products such as wood folding partitions and doors, wood classroom and laboratory casework, bleachers and elevator cabs.

EXTERIOR PAINT FINISHES

- A. This schedule uses the generic names listed in the Schedule of Paint Products.
- B. Exterior Steel: Apply to exposed steel surfaces or architectural metal building canopy structures and other components including grillwork, fins, canopies, columns, etc., indicated to be painted (This product is not listed in the Table of Paint Products).
 - 1. 1st coat: Sherwin Williams DTM Acrylic Primer/Finish @ 2.5 to 5 mils dft.
 - 2. 2nd coat: Sherwin Williamson DTM Acrylic Coating @ 2.5 to 4 mils dft.
- C. System 101 (Ferrous Metals): Apply to exposed steel such as beams and column connectors, metal doors and frames, grilles, light fixture standards in parking areas, metal handrails, sectional and coiling doors, canopy overhangs and other exposed miscellaneous ferrous metals that are not pre-finished.
 - 1. 1st Coat: Ferrous Metal Primer (Red or White color as applicable to finish coats).

2. 2nd Coat: Same material as 3rd coat in accordance with manufacturer's recommendations.
 3. 3rd Coat:
 - a. Flat: Paint - Waterborne (100% Acrylic) (if noted on Drawings). Sheen shall be 4 to 6% per a 86 degree gloss meter.
 - b. Semi-Gloss unless noted otherwise. Enamel, Semi-Gloss - Waterborne (100% Acrylic - Non-Blocking).
 - c. Gloss (if noted on Drawings): Enamel, Gloss - Waterborne (100% Acrylic - Non-Blocking).
- D. System 102 (Galvanized Metals): Apply to exposed galvanized metal such as copings, louvers and metal flashings.
1. Clean metal to remove foreign matter or any coating applied by the metal manufacturer. Apply Surface Conditioner or Vinyl Wash Pretreatment (if required by paint manufacturer).
 2. 1st Coat: Galvanized Metal Primer.
 3. 2nd Coat: Same material as 3rd coat as recommended by manufacturer.
 4. 3rd Coat:
 - a. Flat: Paint, Flat - Waterborne (100% Acrylic) unless noted otherwise. Sheen shall be 4 to 6% per a 85 degree gloss meter.
 - b. Semi-Gloss (if noted on Drawings): Enamel, Semi-Gloss - Waterborne (100% Acrylic - Non-Blocking).
 - c. Gloss (if noted on Drawings): Enamel, Gloss - Waterborne (100% Acrylic - Non-Blocking).
- E. System 103 (Aluminum): Apply to exterior louvers and other miscellaneous exposed exterior unfinished aluminum surfaces.
1. Clean metal to remove foreign matter or any coating applied by the metal manufacturer. Apply Surface Conditioner or Vinyl Wash Pretreatment.
 2. 1st Coat: Aluminum Primer.
 3. 2nd Coat: Same material as 3rd coat as recommended by manufacturer.
 4. 3rd Coat:
 - a. Flat: Paint, Flat - Waterborne (100% Acrylic) (if noted on Drawings) Sheen shall be 4 to 6% per a 85 degree gloss meter.
 - b. Semi-Gloss unless noted otherwise. Enamel, Semi-Gloss - Waterborne (100% Acrylic - Non-Blocking).
 - c. Gloss (if noted on Drawings): Enamel, Gloss - Waterborne (100% Acrylic - Non-Blocking).
- F. System 104 (Concrete Masonry Units): Apply to exterior concrete masonry unit construction indicated to be painted. (Refer to Section 07190 "Water Repellents and Masonry Stains" for use on concrete masonry units indicated to be stained.) Roller apply 2nd or 3rd coat.
1. 1st Coat: Concrete Masonry Block Filler. Provide Level 2 or 3 Fill as required by gloss.
 2. 2nd Coat: Concrete and Masonry Primer.
 3. 3rd Coat:
 - a. Flat: Paint, Flat - Waterborne (100% Acrylic) unless noted otherwise. Sheen shall be 4 to 6% per a 85 degree gloss meter. One of the coats shall be roller applied.
 - b. Semi-Gloss (if noted on Drawings): Enamel, Semi-Gloss - Waterborne (100% Acrylic - Non-Blocking).
 - c. Gloss (if noted on Drawings): Enamel, Gloss - Waterborne (100% Acrylic - Non-Blocking).
- G. System 105 (Concrete and Stucco): Apply to exterior cementitious surfaces as indicated

or noted. Precast concrete lintels, beams, caps, sills, etc. at exterior of buildings shall not be painted, unless specifically noted. Roller apply 2nd or 3rd coat.

1. 1st Coat: Concrete and Masonry Primer.
 2. 2nd Coat: Same material as 3rd coat as recommended by manufacturer.
 3. 3rd Coat:
 - a. Flat: Paint, Flat - Waterborne (100% Acrylic) unless noted otherwise. Sheen shall be 4 to 6% per a 85 degree gloss meter. One of the coats shall be roller applied.
 - b. Semi-Gloss (if noted on Drawings): Enamel, Semi-Gloss - Waterborne (100% Acrylic - Non-Blocking).
 - c. Gloss (if noted on Drawings): Enamel, Gloss - Waterborne(100% Acrylic - Non-Blocking).
- H. System 106 (Exterior Wood): Apply to wood fascias, soffits, trim, wood posts, columns, beams and exposed trim and framing where indicated to be painted.
1. 1st Coat: Exterior Wood Primer - Waterborne (100% Acrylic) unless noted otherwise.
 2. 2nd and 3rd Coats:
 - a. Flat - Rough-Sawn Wood: Paint, Flat - Waterborne (100% Acrylic) unless noted otherwise. Sheen shall be 4 to 6% per a 60 degree gloss meter.
 - b. Semi-Gloss - Smooth Surface Wood (if noted on Drawings): Enamel, Semi-Gloss - Waterborne (100% Acrylic - Non-Blocking).
 - c. Gloss - Smooth Surface Wood (if noted on Drawings): Enamel, Gloss - Waterborne (100% Acrylic - Non-Blocking).
- I. System 107 (Exterior Gypsum Board): Apply to exterior grade gypsum board soffits.
1. 1st Coat: Exterior Gypsum Board Primer/Undercoater - Waterborne unless noted otherwise.
 2. 2nd and 3rd Coats: Flat Paint - Waterborne (100% Acrylic) unless noted otherwise. Sheen shall be 4 to 6% per a 85 degree gloss meter. One of the coats shall be roller applied.
- J. System 108 (Sealer - Masonry Parapet Top Surfaces): Apply in accordance with manufacturer's printed instructions.
1. 1st Coat: Tamms Industries "Tammolastic" elastomeric acrylic resin based coating, or VIP Ter Polymer Sealants 5000 series. (These products are not listed in the Schedule of Paint Products located at the end of this Section.)
 2. 2nd Coat: Same material as 3rd coat.
 3. 3rd Coat: VIP Last-O-Coat 8000 series.

INTERIOR PAINT FINISHES

- A. This schedule uses the generic names listed in the Schedule of Paint Products.
- B. System 201 (Ferrous Metals): Apply to exposed metals such as steel doors, hollow metal frames, metal beam saddles, columns, grilles and registers, stair and hand railings, ladders, and other exposed miscellaneous metals.
1. 1st Coat: Ferrous Metal Primer (Red or White color as applicable to finish coats).
 2. 2nd Coat: Same material as 3rd Coat as recommended by manufacturer.
 3. 3rd Coat:
 - a. Eggshell: Enamel, Eggshell.
 - b. Semi-Gloss (if noted on Drawings): Enamel, Semi-Gloss.
 - c. Gloss (if noted on Drawings): Enamel Gloss.

- C. System 202 (Interior Wood Finishes - Enamel): Apply to wood door frames, columns, exposed and concealed casework and millwork, wood-window wall construction, medium density plywood surfaces, shelving, roll-up wood doors, perforated and plain type hardboard, particleboard and other exposed miscellaneous wood and trim, except wood specified for a transparent or stain finish.
1. 1st Coat: Enamel Undercoater.
 2. 2nd and 3rd Coat:
 - a. Eggshell: Enamel, Eggshell
 - b. Semi-Gloss (if noted on Drawings): Enamel, Semi-Gloss
 - c. Gloss (if noted on Drawings): Enamel, Gloss
- D. System 203 (Interior Wood Finish - Flat): Apply to plywood telephone backing boards and other miscellaneous softwood as noted, specified or scheduled.
1. 1st Coat: Enamel Undercoater/Primer.
 2. 2nd and 3rd Coat: Flat Paint, - Waterborne (Vinyl Acrylic)
- E. System 204 (Galvanized Metals): Apply to exposed galvanized metal.
1. Clean metal to remove foreign matter or any coating applied by the metal manufacturer. Apply Surface Conditioner or Vinyl Wash Pretreatment (if required by paint manufacturer)
 2. 1st Coat: Galvanized Metal Primer
 3. 2nd and 3rd Coats:
 - a. Eggshell: Enamel, Eggshell
 - b. Semi-Gloss (if noted on Drawings): Enamel, Semi-Gloss
 - c. Gloss (if noted on Drawings): Enamel Gloss
- F. System 205 (Aluminum): Apply to interior louvers and other miscellaneous exposed unfinished aluminum surfaces.
1. Clean metal to remove foreign matter or any coating applied by the metal manufacturer. Apply Surface Conditioner or Vinyl Wash Pretreatment
 2. 1st Coat: Aluminum Primer
 3. 2nd and 3rd Coats:
 - a. Eggshell: Enamel, Eggshell
 - b. Semi-Gloss (if noted on Drawings): Enamel, Semi-Gloss
 - c. Gloss (if noted on Drawings): Enamel, Gloss
- G. System 206 (Gypsum Board, Plaster and Concrete - Wet Areas): Apply to gypsum board, plaster and concrete surfaces in toilet rooms, janitor rooms, kitchens, and other areas as scheduled.
1. 1st Coat: Enamel Undercoater - Solventborne, unless noted otherwise.
 2. 2nd and 3rd Coats:
 - a. Eggshell (if noted on Drawings): Enamel, Eggshell - Solventborne.
 - b. Semi-Gloss: Enamel, Semi-Gloss - Solventborne or Enamel - Solventborne (Epoxy-Polyester).
- H. System 207 (Gypsum Board, Plaster and Concrete - Non-Wet Areas): Apply to gypsum board, plaster and concrete except for wet areas.
1. 1st Coat: Waterborne Primer/Sealer. (Solventborne {Alkyd} shall be used at new untextured smooth gypsum board surfaces covered with powdery or unstable soft top joint cement)
 2. 2nd and 3rd Coat:
 - a. Eggshell: Enamel, Eggshell
 - b. Semi-Gloss (if noted on Drawings): Enamel, Semi-Gloss
 - c. Flat (if noted on Drawings): Paint, Flat

- I. **System 209 (Interior Concrete Masonry - Wet Areas):** Apply to concrete masonry block units in kitchen, toilet rooms, bathrooms, janitor rooms, vestibules and other walls noted for enamel finish.
 - 1. 1st Coat: Block Filler, w/o Aggregate. Provide Level 3 Full Fill.
 - 2. 2nd Coat: Primer/Sealer or same material as 3rd Coat as recommended by manufacturer.
 - 3. 3rd and 4th Coats: Enamel, Semi-Gloss - Solventborne or Enamel - Solventborne (Epoxy-Polyester).

- J. **System 211 (Interior Concrete Masonry - Non-Wet Areas):** Apply to exposed interior concrete masonry block units except areas specified above for enamel finish.
 - 1. 1st Coat: Block Filler, w/o Aggregate. Provide Level 1, 2 or 3 Fill as required by gloss.
 - 2. 2nd Coat: Same material as 3rd Coat as recommended by manufacturer.
 - 3. 3rd Coat: Enamel, Semi-Gloss - Waterborne.

CLEAR WOOD FINISHES

- A This schedule uses the generic names listed in the Schedule of Paint Products.

- B **System 301 (Stained and Clear Finish):** Apply to wood doors, handrails and chair rails. Fill open grain hardwood such as Oak.
 - 1. **Stained and Finished with Clear Satin or Gloss Varnish - Solventborne:**
 - a. 1st Coat: Semi-Transparent Stain - Solventborne (Oil)
 - b. 2nd Coat: Varnish, Gloss – Polyurethane (Solventborne)
 - c. 3rd Coat:
 - 1) Satin: Varnish, Satin – Polyurethane (Solventborne)
 - 2) Gloss: Varnish, Gloss – Polyurethane (Solventborne)
 - 2. **Stained and Finished with Clear Satin or Gloss Varnish– Waterborne:**
 - a. 1st Coat: Semi-Transparent Stain - Solventborne (Oil)
 - b. 2nd Coat: Varnish, Gloss – Polyurethane (Waterborne)
 - c. 3rd Coat:
 - 1) Satin: Varnish, Satin – Polyurethane (Waterborne)
 - 2) Gloss: Varnish, Gloss – Polyurethane (Waterborne)

SCHEDULE OF PAINT PRODUCTS

(continued)

EXTERIOR PRIMERS/UNDERCOATERS	System(s) (see 09900)	Dunn-Edwards	Fraze	ICI	Kelly Moore	PPG	Sherwin Williams	Tnemec
Red Ferrus Metal Primer Waterborne Solventborne	101	Intercryl 520 43-4	561 661	4020 4160	5725 1710	90-708 7-858	B66-310 B50NZ3	18 10-99
Galvanized Metal Primer Waterborne Solventborne	102	W713 42-44	561 661	4020 4160	1722 ---	90-712 6-209	B66W1 B50WZ30	18 27
Vinyl Wash Pretreatment /Surface Conditioner Waterborne Solventborne	102, 103	GE123 ---	---	88 ---	---	---	B71Y1 N/A	---
Aluminum Metal Primer Waterborne Solventborne	103	---	Jasco Prep n Prime	---	Jasco Prep n Prime	97-687	---	---
White Ferrus Metal Primer Waterborne Solventborne	101	W713 42-44	561 661	4020 4160	1722 ---	90-712 6-204	B66W1 B50WZ30	18 27
Concrete and Masonry Block Filler Waterborne (100% Acrylic) Waterborne Vinyl Acrylic & Other Solventborne	104	Intercryl 520 43-5	561 661	4020 4160	5725 1711	90-712 7-852	B66W1 B50Z Series	17 10-99W
Concrete and Masonry Primer Waterborne Solventborne	104-105	W305 W315 Interlac 895	262 ---	4000 3010 ---	521 ---	16-90 6-7 95-217	B42W46 B25W25 B42WA8/B42WA9	54-580 130 54-660
Epoxy (2 component) Masonry Surface Conditioner Waterborne Solventborne		W709 ---	266 379 S30	3030 ---	247 ---	6-603 ---	A24W300 B46WZ1000 B70W100/B60V15	151 66 84
Exterior Gypsum Board Primer/Undercoater Waterborne Solventborne	107	---	266 379	3030 ---	Rust. 9100 239 240	97 Series 6-808 ---	A24-100 Series B46WZ1000	151 205
		W713 42-1	168 372	2000 2110	295 ---	6-609 6-9	B42WJ50 Y24W20	6 36-603

(continued)

EXTERIOR PRIMERS/UNDERCOATERS (continued)	System(s) (see 09900)	Dunn-Edwards	Frazee	ICI	Kelly Moore	PPG	Sherwin Williams	Tnemec
Exterior Wood Primer	106	W708	168	2000	255	6-609	B42WJ50	6
Waterborne (100% acrylic) Solventborne		42-9	372	2110	220	6-9	Y24W20	36-603
Multi-Purpose Primer		W713	168	3210	295	90 Series	B66W1	18
Waterborne (100% acrylic) Solventborne		42-44	661	4160	---	97-689	B50WZ1	27
High Build Polyamide Epoxy Primer (2 Part)		Intergard 270	S30	4030	7125	98 Series	B70W100/B60V15	462
Waterborne		Interseal 670	Amercoat 385	233H	Rust. 9500	97-DTR	B67 400 Series	66
Solventborne (ferrous metals)		HS	Amercoat 385	201	---	97-DTR	B67 400 Series	66
Solventborne (galvanized metal)		Interseal 670						
		HS						

EXTERIOR PAINT - FINISH COATS	System(s) (see 09900)	Dunn-Edwards	Frazee	ICI	Kelly Moore	PPG	Sherwin Williams	Tnemec	
Paint, Flat (Gloss Rating 0-15 @ 85 degree gloss meter)		W203	206	2250	1240	10-Series	B42 Series	---	
Waterborne (Vinyl Acrylic)	101 - 107	W704	203	2200	1235	6-610	B3 Series	17	
Waterborne (100% Acrylic)									
Paint, Eggshell		W705	215	2402	1686 Plus	6-2045	B13 Series	17	
Waterborne (100% Acrylic)		---	622	---	---	---	---	15	
Solventborne		W940	126	2402	1236	6-900	A82	6	
Enamel, Low Luster		---	---	---	6620	---	---	15	
Waterborne (100% Acrylic - Non-Blocking)		W901	124	2406	1685 Plus	6-901	B42-100 Series	30	
Solventborne	101 - 106	9 Series	628	2516	1275	---	B55Z-600	23	
Waterborne (100% Acrylic - Non-Blocking)									
Solventborne (Industrial)			9 Series	628	---	---	018 P'ters	B55Z-600	23
Solventborne (Acrylic Aliphatic Polyurethane - 2 Component)			Interthane 870	Ameron Amersfield	378	---	95-8600 Series	B65-350/B60V30	73

(continued)

EXTERIOR PAINT - FINISH COATS (continued)		System(s) (see 09900)	Dunn-Edwards	Frazer	ICI	Kelly Moore	PPG	Sherwin Williams	Tnemec
Enamel, Gloss	Waterborne (100% Acrylic - Non-Blocking)	101 -106	W960	143	3028	1680 Plus	90-374/6-8534	B66W100	28
Solventborne (Quick Dry)			QD60	648	4318	---	7-800/95-9000 Series	B54Z	---
Solventborne (Silicone)			42-53	---	475	---	97-480	B56-300	---
Solventborne (Industrial)			10 Series	648	4328	1700	7-284	B54Z	2H
Solventborne (Aliphatic Polyurethane - 2 Component)			IP630	Ameron	379	Rust. 9400	97-800/95 Series	B65-500/B60V50	74
Solventborne (Acrylic Aliphatic Polyurethane - 2 Component)			Interthane 990 HS	Amershield	389	---	97-800	B65-300/B60V30	74
Elastomeric (Smooth)									
Waterborne (100% Acrylic)			Elastokote Premium	216	2260	1128	4-110	A5-100 Series	156
Textured Coating, Smooth									
Waterborne (Vinyl Acrylic)			W320	204	---	1129	4-series	A44W800	180
Solventborne			---	---	---	---	---	---	---
Textured Coating, Medium									
Waterborne (Vinyl Acrylic)			W322	204	3230	1112	4-series	A44W810	181
Solventborne			---	---	---	---	---	---	---
Textured Coating, Coarse									
Waterborne (Vinyl Acrylic)			W323	204	3230	---	4-series	A44W820	159
Floor Paint (Single or 2-component)									
Waterborne (Acrylic Epoxy)			W810	S40	4408	7100	98 Series	B90 Series	287
Solventborne			---	Amerlock 400	3118	Rust. 9100	97 Series	B62Z-100	280
Aluminum Paint									
Solventborne			10-28	Hammerite	4308	2030	6-230	B65SQ12	50-330
Aluminum Metal			---	---	---	---	90 Series	---	---
Waterborne			---	---	---	---	---	---	---
Solventborne			---	---	---	---	---	---	1077

EXTERIOR STAIN	System(s) (see 09900)	Dunn-Edwards	Frazee	ICI	Kelly Moore	PPG	Sherwin Williams	Tnemec
Solid Color Stain Waterborne (100% Acrylic) Solventborne (Oil)		W704 ---	206 ---	2600 2700	1240 Cabot's 6500	77-Rez (Olympic) Olympic	A16 Series A14Z Series	Conformal Stain WB Conformal Stain
Semi-Transparent Toner Waterborne (Water Repellent) Solventborne (Oil)		ONG ---	--- 385	--- ---	--- ---	77-Rez (Olympic) Olympic	Cuprinol Cuprinol	Prime A Pell H20 Prime A Pell 200
Semi-Transparent Stain Waterborne (Water Repellent) Waterborne Solventborne (Oil)	301	WPT3 --- Messmer's UV Plus	Aquaseal 2 --- 385	--- 2610 2710	--- 1285 Cabot's 6300	77-Rez (Olympic) 77-Rez Olympic	Aquaseal Aquaseal A14TZ1	Prime A Pell H20 Conformal Stain WB Conformal Stain

EXTERIOR CLEAR FINISHES	System(s) (see 09900)	Dunn-Edwards	Frazee	ICI	Kelly Moore	PPG	Sherwin Williams	Tnemec
Spar Varnish, Gloss Waterborne Solventborne		--- McClosky MC80-6509	Flecto Diamond Finish McClosky	--- ---	--- McClosky Man-O-War	--- 77-10	--- Minwax Helmsmans	--- ---
Aliphatic Polyurethane, Gloss (2 Part) Solventborne		IP631	Ameron Amershield	379	Rust. 9400	95 Series	---	76
Exterior Gloss Varnish, Alkyd (Paleamber) Solventborne		---	ZAR Gloss Alkyd	---	---	---	Minwax Helmsmans	---

INTERIOR PRIMERS/UNDERCOATERS	System(s) (see 09900)	Dunn-Edwards	Frazee	ICI	Kelly Moore	PPG	Sherwin Williams	Tnemecc
Red Ferrous Metal Primer Waterborne Solventborne	201	Intercryl 520 43-4	561 661	4020 4160	5725 1710	90-708 7-858	B66-310 B50NZ3	18 10-99
White Ferrous Metal Primer Waterborne Solventborne	201	Intercryl 520 43-5	561 661	4020 4160	5725 1711	90-712 7-852	B66W1 B50 Series	17 10-99W
Galvanized Metal Primer Waterborne Solventborne	204	W713 42-44	561 661	4020 4160	1722 ---	90-712 6-209	B66W1 B50WZ30	18 27
Aluminum Primer Waterborne Solventborne	205	W713 42-44	561 661	4020 4160	1722 ---	90-712 6-204	B66W1 B50WZ30	18 66
Primer/Sealer (for drywall, etc.) Waterborne (Vinyl Acrylic) Waterborne (Zero VOC) Solventborne (Alkyd)	206,207,209 (206,207)	W102 W500 E28-1	061 --- 367	1000 LM9116 1110	971 1505 915	6-4 UC 80020 6-6	B28W601 B11W900 B79W10	51-792 --- 36-603
Vinyl Acrylic Wall Sealer Waterborne	211	W102	063	1030	971	17-21	B28W601	51-792
Enamel Undercoater/Primer	201 - 203, 206	W707 E22-1	061 367	1020 1120	975 985	6-855 6-6	B28W101 B79W10	18 36-603
Waterborne (100% Acrylic) Solventborne		W304 ---	---	---	---	---	B42W200/B42V201 ---	130 54-562
Block Filler, w/ Aggregate Waterborne Solventborne	209, 211	W315 W305 Interlac 895	262 --- Ameron 400 BF	3010 4000 ---	---	6-7 16-90 97- 685/686	B25W25 B42W46 B42WA8/B42WA9	54-580 130 54-660
Block Filler, w/out Aggregate Waterborne Waterborne (100% Acrylic) Solventborne (Polyamide-Epoxy)	210	---	---	---	---	---	---	---
Epoxy Polyester Primer Waterborne Solventborne		---	---	4030 4170	---	---	---	462 84

(continued)

INTERIOR PRIMERS/UNDERCOATERS (continued)	System(s) (see 09900)	Dunn-Edwards	Frazee	ICI	Kelly Moore	PPG	Sherwin Williams	Tnemec
Vinyl Wash Pretreatment/Surface Conditioner	204, 205	GE123	Jasco Prep n prime	88	Jasco Prep n prime	97-687/688	B71Y1 B50WZ30	---
Waterborne Solventborne								---
Concrete and Masonry Primer	211	W709 42-52 W718	266 379 Amerlock 400	3030 4010 18	247 Rustl. 9100	6-603 97 Series	A24W300 B46WZ1000 B70W100/B60V15	151 84 54-660
Waterborne Solventborne Epoxy (Two Component)								

INTERIOR PAINT - FINISH COATS	System(s) (see 09900)	Dunn-Edwards	Frazee	ICI	Kelly Moore	PPG	Sherwin Williams	Tnemec
Acoustic Paint	212	W615	003	SA1100	350	50 Series	B30W700	180
Waterborne (Vinyl-Acrylic)								
Paint, Flat	207 203	W420 W501 W501	011 018 018	1210 1200 LM9100	550 1500	6-70 UC 80021 UC 80021	B30WJ661 B11 B11	180 17 ---
Waterborne (Vinyl Acrylic)								15
Waterborne (Low Odor/Low VOC)								
Waterborne (Low Odor/Zero VOC)								
Solventborne								
Enamel, Low Sheen								
Waterborne (100% Acrylic)			126	1414	1686	---	---	6
Waterborne (Vinyl Acrylic)		W7300 W540	022 029	1434	1610 1510	6-510 UC 80022	B20W200 B9	---
Waterborne (Low Odor/Zero VOC)			622	---	6620	7-824		---
Solventborne								15
Enamel, Eggshell	201, 204, 205, 207							
Waterborne (100% Acrylic)								
Waterborne (Vinyl-Acrylic)								
Waterborne (Low Odor/Zero VOC)								
Waterborne (Non-Blocking - 100% Acrylic)	202 206	W7400 W540 W940 71 Series	022 029 126	1402 1412 LM9300 1402	1640	**6-411 UC 80022 **6-411	B20 Series 820W200 B9 B31 Series	180 ---
Solventborne								180 15

(**Not 100% Acrylic, but is their top of line product)

(continued)

INTERIOR PAINT – FINISH COATS (continued)									
Enamel, Semi-Gloss	System(s) (see 09900)	Dunn-Edwards	Frazer	ICI	Kelly Moore	PPG	Sherwin Williams	Tnemec	
Waterborne (100% Acrylic)	201, 204, 205, 207	W450	128	1406	1685	6-8510	B31 Series	29	
Waterborne (Non-Blocking - 100% Acrylic)	202, 211	W901	124	1406	1685	6-8510	B31 Series	29	
Waterborne (Low Odor/Low VOC)		W550	032	1416	1520	UC 80023	B10	29	
Waterborne (Low Odor/Zero VOC)		W550	032	LM9200	---	UC 80023	B10	---	
Waterborne (2 Component Epoxy)		---	S16	4406	---	98 Series	B70-200/B60V25	113	
Solventborne (Industrial)	206, 209	9 Series	328	---	1630	---	B55Z600	23	
Solventborne (Epoxy-Polyester)		9 Series	628	---	---	7-844	B55Z600	23	
Enamel, Gloss		---	---	235	---	16-Series	---	66	
Waterborne (Non-Blocking - 100% Acrylic)	201, 204, 205	W960	143	3028	1680	90-375	B21 Series	28	
Waterborne (2 Component Epoxy)	202	Intergard 735	Amercoal 335	4408	7100	98 Series	B70-200/B60V15	114	
Waterborne (Low Odor/Low VOC)		---	---	3038	---	---	---	28	
Solventborne		QD60	648	4308	1031	7-800/ 95-9000	B54Z	2H	
Solventborne (Quick Dry)		QD60	648	4318	1031	Series	B54Z	---	
Solventborne (Industrial)	206	10 Series	648	4328	1700	7019-Ptrs	B54Z	2H	
Solventborne (2-Component Epoxy)	209	Intergard 740	Amerlock 400	229	Rustl.	7-812 Series	B62Z100/B6VZ70	135	
Solventborne (Polyamide-Epoxy)	210	Intergard 740	---	250	9100	97 Series	B62Z- 100/B60VZ70	84	
Floor Paint (Single or 2-component)		W810	S40	4408	7100	98 Series	B90 Series	287	
Waterborne (Epoxy-Acrylic)		---	Amerlock 400	3118	Rustl.	7 Series	B54Z	280	
Solventborne					9100				

INTERIOR STAIN	System(s) (see 09900)	Dunn-Edwards	Frazee	ICI	Kelly Moore	PPG	Sherwin Williams	Tnemec
Semi-Transparent Stain Waterborne (Water Repellent)		WPT3	Aquaseal 2	---	---	77-Rez (Olympic)	---	Prime A Pell H20 Conformal Stain WB
Waterborne		WPT3	585	---	2050	77-Rez (Olympic)	Minwax	---
Solventborne (Wiping)		V109	685	1700	2152	77-Rez (Olympic)	Sherwood	---
Solventborne (Oil)	301	V109	685	---	1281	---	A49-200	Conformal Stain
Lacquer-Based Stain Waterborne		---	585	---	---	---	---	---
Solventborne	301	LQ122	786	EZL	4400	---	---	---
Pigmented Solid Color Stain Waterborne (100% Acrylic)		W704	206	---	1240	77-Rez (Olympic)	---	Conformal Stain WB
Solventborne (Oil)		---	---	---	Cabot's 6500	---	---	Conformal Stain
Semi-Transparent Toner Waterborne (Water Repellent)		ONC	Aquaseal 2	---	---	77-Rez (Olympic)	---	Prime A Pell H20
Solventborne (Oil)		---	385	---	---	---	---	Prime A Pell 200

INTERIOR CLEAR FINISHES	System(s) (see 09900)	Dunn-Edwards	Frazee	ICI	Kelly Moore	PPG	Sherwin Williams	Tnemec
Resin Sealer Waterborne		---	McClosky 6200	---	---	---	---	462
Solventborne		McClosky MC80-1931	McClosky	---	---	77-30	---	203
Sanding Sealer Waterborne (Acrylic Urethane)		McClosky MC80-6200	Fleclo	---	---	---	---	---
Solventborne (Brushing)		McClosky MC80-2025	Zar Polyurethane	---	2164	77-30	B26V3	---

(continued)

INTERIOR CLEAR FINISHES (continued)	System(s) (see 09900)	Dunn-Edwards	Frazer	ICI	Kelly Moore	PPG	Sherwin Williams	Tnemec
Varnish, Flat Solventborne		McClosky MC80-0007	---	---	---	---	---	---
Varnish, Satin (Low Sheen) Waterborne (Acrylic Urethane)	301	McClosky MC80-6841	Flecto Varathane	1802	2097	77-49	A68 Series	---
Solventborne (Alkyd)		McClosky MC80-6701	McClosky	---	---	---	A66 Series	---
Solventborne (Polyurethane)		McClosky MC80-6721	Zar Polyurethane	1902	22	---	A67 Series	---
Varnish, Semi-Gloss Waterborne (Acrylic Urethane)		McClosky MC80-6842	---	---	2094	---	---	---
Waterborne (Acrylic) Solventborne		McClosky MC80-6702	Flecto	---	---	---	A68	---
Solventborne (Polyurethane)		McClosky MC80-6723	McClosky	---	---	---	A66 Series	---
Varnish, Gloss Waterborne (Acrylic Urethane)	301	McClosky MC80-6843	Flecto	1808	2096	77-45	A68 Series	---
Solventborne		McClosky MC80-6703	McClosky	---	---	---	A66V91	---
Solventborne (Polyurethane)		McClosky MC80-6722	Zar	1908	21	---	A67 Series	---
Spar Varnish, Gloss Solventborne		McClosky MC80-6509	McClosky Man-O-War	---	McClosky Man-O-War	---	Minwax Helmsman	---
Paste Wax Solventborne		---	---	---	---	---	---	---
Lacquer Sanding Sealer Waterborne		WS10	560	---	---	---	---	---
Solventborne	301	LQX101	760	LS-340	4183	---	Clear Shield High Solids	---

INTERIOR CLEAR FINISHES (continued)	System(s) (see 09900)	Dunn- Edwards	Frazee	ICI	Kelly Moore	PPG	Sherwin Williams	Tnemec
Lacquer, Flat Waterborne Solventborne	301	WC2007 LQX105	520H038 704	--- LC-384	--- 4187 (satin)	--- ---	--- ---	--- ---
Lacquer, Semi-Gloss Waterborne Solventborne	301	WC2060 LQX104	520H042 727	--- LC-381	--- 4184	--- ---	T75F501 Clear Shield Semi-Gloss	--- ---
Lacquer, Gloss Waterborne Solventborne	301	WC2000 LQX103	540H034 746	--- LC-382	--- 4186	--- ---	T75C500 Clear Shield Gloss	--- ---
Lacquer, Crystal Clear Sanding Sealer Waterborne Solventborne		WS10 LQX131	560H032 760M00137	--- LS-153	2083 4283	--- ---	T75F528 T67F3	--- ---
Lacquer, Non-Yellowing, Flat Waterborne Solventborne		WC2007 LQX134	520H038 702M10062	--- LC-312	2087 (satin) 4287 (satin)	--- ---	T75F528 ---	--- ---
Lacquer, Non-Yellowing, Semi-Gloss Waterborne Solventborne		WC2060 LQX133	520H042 728M40068	--- LC-311	2084 4284	--- ---	T75F526 ---	--- ---
Lacquer, Non-Yellowing, Gloss Waterborne Solventborne		WC2000 LQX132	540H03X 745M90012	--- LC-308	2086 4286	--- ---	T75C525 ---	--- ---

EPOXY FLOOR AND WALL COATINGS

GENERAL

SUBMITTALS

- A. Product Data: Submit Manufacturer's Specifications and color chart.
- B. Samples: Submit Manufacturer's samples showing required texture. These samples shall serve as a basis for comparison through the duration of the Work.

QUALITY ASSURANCE

- A. Qualifications:
 - 1. Materials used in the epoxy floor and wall coating system shall be manufactured by a single Manufacturer to ensure compatibility and proper bonding.
 - 2. Applicator shall be a licensed Contractor, trained and approved by the Manufacturer and have a minimum of 3 years experience in the application of special coatings.

DELIVERY, STORAGE AND HANDLING

- A. Packing and Shipping: Deliver materials to site in Manufacturer's original unopened packaging with labels intact.
- B. Storage: Store in a dry location at a minimum of 65 degrees F.

PROJECT CONDITIONS

- A. Environmental Requirements:
 - 1. Maintain temperature at a minimum of 70 degrees F. during the installation and for 24 hours thereafter.
 - 2. Provide sufficient light, power, heat and working conditions to permit proper application of coating.

PRODUCTS

MATERIALS

- A. Epoxy coating: General Polymers 3712, 3712V Novo-Flo Solvent/Acid Resistant Coating System.
 - 1. Masonry block filler: Water-based catalyzed epoxy containing special aggregates and fillers compatible with Epoxy Coating.
 - 2. Primer: As required for substrate, compatible with Epoxy Coating.
 - 3. Reinforcing: Fiberglass, either the continuous filament type known as "roving" or 3/4 ounce fiberglass mat, and compatible with the specified coating material.
 - 4. Color and Texture: Match selected sample(s).
- B. Finished coating system shall have the following performance characteristics @ 73 degrees F:
 - 1. Abrasion Resistance: (ASTM D4060): 0.1 grams lost.
 - 2. Compressive Strength (ASTM C579): 9,000 psi.

3. Tensile Strength (ASTM C307): 6,000 psi.
4. Tensile Elongation (ASTM D638): 7%.
5. Flexural Strength (ASTM D790): 10,000 psi.
6. Resistant to Elevated Temperatures (MIL-D-3134J): No slip or flow at required temperatures of 158 degrees F
7. Adhesion (ASTM D4541): 335 (100% concrete failure, Type I).
8. Flammability (ASTM D635: Self-extinguishing (over concrete).

EXECUTION

EXAMINATION

- A. Verification of Conditions: Examine subsurfaces to receive Work and report detrimental conditions in writing to Architect. Commencement of Work will be construed as acceptance of subsurfaces.
 1. Concrete slabs shall be cured 30 days, be structurally sound and have a steel trowel finish.
 2. Surface shall be well sloped to drains, straight and level with the permissible degree of tolerance of 1/4" in 10'-0" in any direction.
 3. No curing compounds or surface contaminants shall be used in placing new concrete.

PREPARATION

- A. Surfaces to receive flooring system shall be prepared by the removal of concrete laitance from the surface of the slab by using the Blastrac non-polluting, dry method.
- B. Concrete shall have cured minimum of 35 days or more depending upon curing conditions.
- C. Concrete shall have minimum 300 psi surface strength and minimum of 2000 psi structural strength.
- D. Oil, grease, or petroleum based products that penetrate the slab deeper than the slab surface shall be removed according to the manufacturer's recommendation.
- E. Honor expansion and construction joints, according to manufacturer's recommendations.
- F. Protection: Applicator shall protect adjacent surfaces by masking and the use of drop cloths.

APPLICATION

- A. Application for Flooring: In accordance with to manufacturer's instructions to achieve a uniform, seamless, skid-resistant surface.
 1. Existing slabs shall be cleaned of any laitance, residue, oil, grease, etc. prior to any primer applications. No moisture barrier applications above or below is required.
 2. Apply primer. Allow to cure overnight.
 3. Apply 2 coat epoxy system.
 4. Total thickness of coating: As recommended by Manufacturer for specific application.

METAL TOILET COMPARTMENTS

GENERAL

SUBMITTALS

- A. **Shop Drawings:** Submit shop drawings showing plans, elevations, details of construction, finish color, hardware fittings and fastenings. Indicate locations of blocking or materials by others for proper securement of the finished Work.
- B. **Samples:** Submit 2 samples of Manufacturer's standard colors and hardware for selection and approval by Architect.

QUALITY ASSURANCE

- A. **Regulatory Requirements:** Comply with the following:
 - 1. ANSI A117.1 "Making Buildings and Facilities Accessible to and Usable by Physically Handicapped People."
 - 2. Public Law 101-336 "The Americans with Disabilities Act of 1990 (ADA).
 - 3. ADA Accessibility Guidelines (ADAAG).
 - 4. The Arizonans with Disabilities Act of 1992 Administrative Rules (AzDAAG)
 - 5. Uniform Federal Accessibility Standards (UFAS).

DELIVERY, STORAGE AND HANDLING

- A. **Packing and Shipping:** Deliver materials to site in Manufacturer's original unopened packaging with labels intact. Protect finished surfaces with removable wrapping or coating which will not bond when exposed to sunlight.
- B. **Storage:** Adequately protect against damage while stored at the site.

PROJECT CONDITIONS

- A. **Field Measurements:** Verify dimensions shown on Drawings by taking field measurements; proper fit and attachment of parts is required.

PRODUCTS

MANUFACTURERS

- A. **Furnish products of one of the following Manufacturers subject to compliance with Specification requirements.**
 - 1. Weis/Robart Partitions, Inc.
 - 2. Accurate Partition Corp.
 - 3. Sanymetal Products Co.
 - 4. American Sanitary
 - 5. Global Steel Products Corp.
 - 6. All American Metal Corp.
 - 7. Metpar
 - 8. Approved Equal

MATERIALS

- A. Doors and Partition Panels: 1 inch thick, sound insulated.
1. Panel plates: 2 sheets of galvanized-bonderized steel not less than 22 gauge for doors, or 20 gauge for partitions, with formed edges sealed with a continuous oval crown locking strip.
 2. Door edges: Electrically welded with welds spaced not over 18 inches apart around the entire perimeter.
 3. Locking strips on doors and partitions: Mitered, welded and finished at the corners.
 4. Core material: Manufacturer's standard sound-deadening honeycomb of impregnated Kraft paper.
- B. Pilasters:
1. 1-1/4 inch thick made of 2 sheets of 20 gauge galvanized-bonderized steel, welded and finished as specified above.
 2. Secure to concrete floor with cadmium plated steel bolts, lock washers and expansion shields.
 3. Make adjustments by means of jack screw fastening through heavy gauge steel saddle integral with pilaster.
 4. Conceal anchoring device with a 3 inch high, one-piece slip-on type No. 302 polished stainless steel plinth without exposed fasteners.
- C. Stirrup Brackets: Heat-treated, polished and anodized extruded aluminum alloy. Provide for attachment of dividing partitions and pilasters to one another and to the walls. Provide theft proof trim in place with concealed anchor slips without the use of exposed screws.
- D. Hinges: Concealed, controlled gravity hinge, with upper and lower hinge brackets factory mounted on the pilaster.
1. Bracket: Flush with external surfaces of pilaster face sheets and finished to match the pilaster.
 2. Recess top hinge pivot door fitting and insert into door edge approximately 2 inches below the top. Mount stainless steel Delrin pivot pin within the door structure supported both above and below the pivot bracket.
 3. A thrust bearing fixed in place by a stationary vertical pintle concealed within the door shall carry the door weight.
 4. Control operation of the door by opposing cams under spring tension mounted on the fixed pintle.
 5. Adjust hinge to permit door to rest at an angle, or to hold door open or closed when not latched.
 6. Hinge shall avert momentum stresses by permitting free movement without raising or lowering door.
 7. Moving parts shall be self-lubricating and completely concealed within the 1 inch door thickness.
 8. Top and Bottom Door Hinge Fittings: Non-ferrous alloy. Door hinge fittings to permit the outer face of the castings to be fully flush with the face plates of the door. Interlock corner door fittings with oval-crown locking strip around the door perimeter.
- E. Equip each door with a cast alloy chrome-plated coat hook and bumper on the inside face of doors attached by one-way head screws, and with concealed latch with face mortised flush with edge locking strip. Working parts completely concealed within door thickness.
1. Latch bolts: Accessibility compliant, slide latch, stainless steel with exposed escutcheon plate and button, polished chrome plated, non-ferrous metal.

2. Furnish for all doors.
Stop and keeper: One-piece heavy cast, non-ferrous alloy. Polished chrome plated finish with 3/4 inch diameter rubber bumper, locked in place, made theft-proof and through-bolted to pilaster with one-way head shoulder screw and sex nuts.
- F. Accessibility Provisions: Where shown on the Drawings, provide accessible compartments, interior space as required by ADA, with outswinging doors, size as indicated.
 1. Door opening size minimum 2 feet 10 inches clear, or greater where required by applicable codes.
 2. At outswinging doors, install an additional bumper on the outside of the door.
- G. Urinal Partitions:
 1. Pilaster braced, of same material and construction used for toilet partitions.
 2. Size: Approximately 58 inches high, 24 inches deep, mounted 12 inches above the floor.

FABRICATION

- A. Provide manufacturer's standard overhead braced and floor-ceiling mounted type partitions and screens.

DOOR, PARTITION PANEL AND PILASTER FINISH

- A. Preparation: Mechanically cleaned surfaces to be finished by means of automatic vapor degreasing equipment.
- B. Finish: Electrostatic applied prime coat and finish color coat of thermal-setting acrylic enamel, baked on to produce a uniform, smooth, lustrous protective finish.
- C. Color: Selected from Manufacturer's standard colors.

EXECUTION

EXAMINATION

- A. Verification of Conditions: Examine subsurfaces to receive Work and report detrimental conditions in writing to Architect. Commencement of Work will be construed as acceptance of subsurfaces.
- B. Coordination: Coordinate with other work which affects, connects with, or will be concealed by this Work.

INSTALLATION

- A. Install toilet compartments in strict accordance with Manufacturer's printed instructions, at locations indicated. Erect straight and plumb, with horizontal lines level.
- B. Provide clearance at wall approximately 1 inch for panels and 1 inch for pilaster. Conceal evidence of drilling, cutting and fitting to room finish.
- C. Provide uniform clearance at vertical edges of doors from top to bottom not to exceed 3/16 inch.

FIELD QUALITY CONTROL

- A. Adjust hardware for satisfactory operation. Adjust door hinges to hold door open at approximately 30 degrees. Upon completion of the installation, put each operating component through at least ten operating cycles. Adjust to achieve optimum operation.
- B. Upon completion of the installation, visually check exposed surfaces, and touch up scratches and abrasives to be completely invisible to the unaided eye from a distance of five feet.

CLEANING

- A. During the course of the Work and on completion, remove and dispose of excess materials, equipment and debris away from premises.

END OF SECTION

LOUVERS

GENERAL

SUBMITTALS

- A. Shop Drawings: Submit Drawings showing dimensions and installation details
- B. Product Data: Submit data indicating design characteristics
- C. Samples: Submit samples of finish and of each color.
- D. Certification: Submit certified AMCA rating.

QUALITY ASSURANCE

- A. Certification: Louvers shall be tested and rated in accordance with AMCA Standard 500.

DELIVERY, STORAGE AND HANDLING

- A. Packing and Shipping: Deliver materials to site in Manufacturer's original unopened packaging with labels intact.
- B. Storage: Adequately protect against damage while stored at the site.
- C. Handling: Comply with Manufacturer's instructions.

PROJECT/SITE CONDITIONS

- A. Field Measurements: Take site dimensions affecting this Work.

PRODUCTS

MANUFACTURERS

- A. Furnish products of one of the following Manufacturers, except as approved by the Architect, subject to compliance with Specification requirements:
 - 1. Airolite
 - 2. Airstream Products Div., Penn Ventilator
 - 3. Construction Specialties, Inc.
- B. Specifications are based on Model submitted by an approved manufacturer.

MATERIALS

- A. Aluminum: Extruded; ASTM B 221, 6063-T52 alloy and temper.
- B. Louvers: Sight-proof, 6 inches deep, minimum 0.081 inch thick with reinforcing bosses fully welded to extruded aluminum channel shape frame minimum 0.081 inch thick to provide a rigid and square self supporting unit with concealed mullions as required per span and as indicated.

- C. Bird Screen: 0.063 inch diameter interwoven aluminum wire mesh, 1/2 inch square design in aluminum frame.
- D. Insect Screen: 18 x 16 size, aluminum mesh.
- E. Aluminum Finishes:
 - 1. Prior to fabrication, prepare the aluminum surfaces for finishing in accordance with the aluminum producer's recommendations and standards of the finisher or processor.
 - 2. Process components of each assembly simultaneously to attain complete uniformity of color.
 - 3. Finish: 70% Fluoropolymer (PVDF), Kynar 500/Hylar 5000 paint coating conforming with the requirements of AAMA 605.2.
 - 4. Color: As selected by Architect.

EXECUTION

EXAMINATION

- A. Verification of Conditions: Examine subsurfaces to receive Work and report detrimental conditions in writing to Architect. Commencement of Work will be construed as acceptance of subsurfaces.
- B. Coordination with other Work: Coordinate with other Work which affects, connects with, or will be concealed by this Work.

INSTALLATION

- A. Separate aluminum from direct contact with dissimilar metals by painting contact surfaces with zinc chromate primer and aluminum paint or with a coat of heavy-bodied bituminous paint or by non-absorptive tape or gasket.
- B. Install louvers in openings properly aligned and level
- C. Secure louver rigid with concealed fasteners of non-corrosive metals to suit abutting materials.
- D. Set and tie in to flashings to ensure diversion of moisture to exterior.

**CORNER GUARDS, HANDRAILS AND WALL PROTECTION
(Vinyl/Acrylic Type)**

GENERAL

SUBMITTALS

- A. General: Submittals shall be provided in accordance with Section 01330.
- B. Product Data: Submit manufacturer's specifications, design data and installation instructions.
- C. Samples: Submit manufacturer's complete color line for selection by Architect.

QUALITY ASSURANCE

- A. Regulatory Requirements: Comply with the following:
 - 1. ANSI A117.1 "Making Buildings and Facilities Accessible to and Usable by Physically Handicapped People."
 - 2. Public Law 101-336 "The Americans with Disabilities Act of 1990 (ADA).
 - 3. ADA Accessibility Guidelines (ADAAG).
 - 4. The Arizonans with Disabilities Act of 1992 Administrative rules (AzDAAG).
 - 5. Uniform Federal Accessibility Standards (UFAS).
- B. Standards: Comply with the following:
 - 1. Flame Spread: Less than 25 in accordance with UL 723 and NFPA 255 and self-extinguishing in accordance with ASTM D635.
 - 2. Fire Rating: 2 hours in accordance with UL 263.

DELIVERY, STORAGE AND HANDLING

- A. Packing and Shipping: Deliver materials to site in manufacturer's original unopened packaging with labels intact.
- B. Storage and Protection: Adequately protect against damage while stored at the site.

PROJECT CONDITIONS

- A. Field Measurements: Verify dimensions shown on Drawings by taking field measurements.

PRODUCTS

MANUFACTURERS

- A. Furnish products of one of the following manufacturers, except as approved by the Architect, subject to compliance with specifications requirements:
 - 1. Balco Metalines.
 - 2. Construction Specialties, Inc.
 - 3. IPC Institutional Products, Inc.
 - 4. Korogard Wall Protection Systems.
 - 5. Tepromark International, Inc.

COMPONENTS

- A. Corner Guards (Surface Mounted Vinyl): 3 inch wing design with 1/4 inch radius corner.
 - 1. Model: Korogard G210 135 degree and G200, Acrovyn Model SM-10M 135 degree and Model SM-20, Balco Type CGS-3-135 and Type CGS-3, Lexan Corner Guard, 2-1/2" x 2-1/2" x 4'-0".
 - 2. Material: Vinyl acrylic.
 - 3. Wall thickness: 078 inch.
 - 4. Finish: Matte finish pebblette grain surface.
 - 5. Colors: As selected by Architect.
 - 6. Retainer: Aluminum or PVC; steel for fire-rated.
 - 7. Hardware: Provide attachment hardware for complete and secure assembly.
 - 8. Provide matching closure caps where required.
 - 9. Fire Rated Units: Provide UL rated corner guard extrusions where indicated
 - 10. Length: Sixty inches (60") in height each piece.
 - 11. Quantity: Provide 20 corner guards to be located by Architect or Owner in field.

EXECUTION

EXAMINATION

- A. Verification of Conditions:
 - 1. Examine subsurfaces to receive Work and report detrimental conditions in writing to Architect. Commencement of Work will be construed as acceptance of subsurfaces.
 - 2. Verify that prepared bases are in correct position and properly sized.

INSTALLATION

- A. Install components in accordance with manufacturer's printed instructions.
- B. Securely lock in place yet provide for free floating action to absorb heavy impact without damage to guard, retainer or adjacent wall.
- C. Corner guards and handrails shall be installed straight, true and to heights as indicated
- D. Install wall panels and trim securely to substrate.
- E. Coordinate placement of items with other trades.

CLEANING

- A. During the course of the Work and on completion, remove and dispose of excess materials, equipment and debris away from premises. Leave Work in clean condition.

SIGNAGE

GENERAL

SUMMARY

- A. Section Includes:
 - 1. Exterior cast or fabricated metal building signage.
 - 2. Interior identification signage.

SUBMITTALS

- A. Product Data: Submit Manufacturer's brochures indicating materials and finishes.
- B. Shop Drawings: Show sizes of members, method of construction, copy layout, and mounting details for proper mounting. Furnish template for mounting metal letters.
- C. Samples: Furnish full size rubbing prior to casting plaque. Submit sample letter and anchoring device. Submit selection of aluminum plaque finishes for Architect's approval.

QUALITY ASSURANCE

- A. Regulatory Requirements: Comply with the following:
 - 1. ANSI A117.1 "Making Buildings and Facilities Accessible to and Usable by Physically Handicapped People."
 - 2. Public Law 101-336 "The Americans with Disabilities Act of 1990 (ADA).
 - 3. ADA Accessibility Guidelines (ADAAG).
 - 4. The Arizonans with Disabilities Act of 1992 Administrative Rules (AzDAAG)
 - 5. Uniform Federal Accessibility Standards (UFAS).

DELIVERY, STORAGE AND HANDLING

- A. Packing and Shipping: Deliver materials to site in Manufacturer's original unopened packaging with labels intact.
- B. Storage and Protection: Store items in dry, protected areas. Adequately protect against damage while stored at the site. Keep free of corrosion or other damage.

PROJECT CONDITIONS

- A. Field Measurements: Verify dimensions shown on Drawings by taking field measurements.

PRODUCTS

MANUFACTURERS

- A. Furnish products of one of the following Manufacturers, except as approved by the Construction Manager, subject to compliance with Specification requirements:
 - 1. Plastic Signage:

- a. Best Manufacturing Company
 - b. Vomar Products, Inc.
 - c. Signsource
 - d. Mountain States Specialties
2. Metal Signage:
- a. ARK Ramos Manufacturing Co., Inc.
 - b. Matthews.
 - c. Southwell.
 - d. Spanjer Brothers, Inc.
 - e. Metallic Arts.

MATERIALS

- A. Materials shall be new stock, free from defects, imperfections strength, durability, and appearance. Provide materials as shown and detailed on drawings and as specified herein.
- B. Metals - General:
 - 1. For fabrication of exposed metal work, use only materials which are smooth and free of surface blemishes including pitting, roughness, seam marks, roller marks, and trade names.
 - 2. Do not use materials which have stains and discolorations.
 - 3. For exposed items of work which include plain flat surfaces in width of more than 50 times the metal thickness, provide sheet stock from mill which has been stretcher leveled to highest standard of flatness commercially available.
- C. Cast Acrylic Sheet: Provide cast (not extruded or continuous cast) methyl methacrylate monomer plastic sheet, in sizes and thicknesses indicated, with a minimum flexural strength of 16,000 psi when tested in accordance with ASTM D 790, a minimum allowable continuous service temperature of 176 deg F (80 deg C), and of the following general types:
 - 1. Colored Coatings for Acrylic Plastic Sheet: Use colored coatings, for background colors, that are recommended by acrylic manufacturers for optimum adherence to acrylic surface and are nonfading for the application intended.
 - 2. Transparent Sheet: Where sheet material is indicated as "clear," provide colorless sheet in matte finish, with light transmittance of 92 percent, when tested in accordance with the requirements of ASTM D 1003.
 - 3. Opaque Sheet: Where sheet material is indicated as "opaque," provide colored opaque acrylic sheet in colors and finishes as selected from the manufacturer's standards.
- D. Aluminum Sheet: Provide aluminum sheet of alloy and temper recommended by the aluminum producer or finisher for the type of use and finish indicated, and with not less than the strength and durability properties specified in ASTM B 209 for 5005-H15.
- E. Vinyl Film: Opaque reflectorized vinyl film, 0.0035-inch minimum thickness, with pressure-sensitive adhesive backing, suitable for exterior as well as interior applications.
- F. Fasteners: Use concealed fasteners fabricated from metals that are not corrosive to the sign material and mounting surface.
- G. Tape: VHB (very high bond) double-stick foam tape as manufactured by 3M.
- H. Anchors and Inserts: Use nonferrous metal or hot-dipped galvanized anchors and inserts for exterior installations and elsewhere as required for corrosion resistance. Use toothed steel or lead expansion bolt devices for drilled-in-place anchors. Furnish inserts,

as required, to be set into concrete or masonry work.

METAL SIGNAGE

- A. **Metal Letters:**
1. **Material:** Cast or Fabricated Steel.
 2. **Lettering:** 12 inches high, font as indicated on Drawings.
 3. **Finish:** Fluoropolymer factory applied finish containing a minimum of 70 percent Penawalt Kynar 500 resin and meeting AAMA's 605.2 high performance specifications. Apply 3 coats including primer coat, color coat, and clear top coat.
 4. **Color:** To be selected by Architect and Owner.
 5. **Mounting:** Threaded studs set in adhesive, flush mounted or projected with spacers, as indicated.
 6. Provide the bid cost for 30-12" metal letters.

PLASTIC SIGNAGE

- A. **Interior Signage:** All interior signage shall comply with applicable ADA requirements. Interior signage shall provide for one sign per room. Numerical / identification test shall be assigned by Owner.
1. **Base:** Melamine plastic laminate, 1/8 inch thick, rated non-static, fire retardant and self extinguishing.
 - a. **Colors:** As selected by Architect and in accordance with local and Federal requirements
 - b. **Mounting:** Screw attach to wall or door or door frame as indicated by Construction Manager. Minimum 2 screws per sign. Height shall be 60 inches above finish floor to centerline of sign at wall mounted signs..
 - c. **Finish and contrast:**
 - (1) Matte finish.
 - (2) Characters shall contrast with background by at least 20 percent.
 2. **Letters and Braille characters:**
 - a. Raised 1/32 inch upper case, sans serif or simple serif, and accompanied with Grade 2 Braille. Raised characters shall be at least 5/8 inch high, but not higher than 2 inches.
 - b. **Letters and numbers:** Width-to-height ratio from 3:5 to 1:1, and stroke width-to-height ratio from 1:5 to 1:10.
 - c. **Text:** Required quantity of each sign shall be as directed by Architect.

EXECUTION

EXAMINATION

- A. **Verification of Conditions:** Examine subsurfaces to receive Work and report detrimental conditions in writing to Construction Manager. Commencement of Work will be construed as acceptance of subsurfaces.
- B. **Coordination:** Coordinate with other Work which affects, connects with, or will be concealed by this Work.

INSTALLATION

- A. **General:** Locate sign units and accessories where indicated, using mounting methods of the type described and in compliance with the manufacturer's instructions.

- B. Apply one coat of bituminous paint to concealed aluminum and steel surfaces in contact with cementitious or dissimilar materials.
- C. Install plumb and level in accordance with Manufacturer's instructions.
- D. Install engraved signs after surfaces are finished, in locations indicated
- E. Securely fasten wall mounted items to solid backing.
- F. Clean and polish exposed surfaces.
- G. Wall Mounted Panel Signs: Attach panel signs to wall surfaces using the methods indicated below:
- H. Silicone-Adhesive Mounting: Use liquid silicone adhesive recommended by the sign manufacturer to attach sign units. Use double-sided vinyl tape where recommended by the sign manufacturer to hold the sign in place until the adhesive has fully cured.
- I. Double-Stick Tape Mounting: Clean surfaces to be joined and apply double stick tape to back of wall mounted signage in continuous strips at approximate 2 inch center to center spacing between strips. Apply sign to wall surface taking care to properly align and plumb signage before removing release paper.

CLEANING

- A. During the course of the Work and on completion of the Work, remove excess materials, equipment and debris and dispose of away from premises. Leave Work in clean condition.

FIRE PROTECTION SPECIALTIES

GENERAL

SUBMITTALS

- A. Product Data: Submit Manufacturer's data and installation instructions for each item, including dimensions and anchorage details.

QUALITY ASSURANCE

- A. Standards: Comply with ANSI/UL 92 and 711.
- B. Regulatory Requirements: Conform to ANSI/NFPA 10 and the following:
1. ANSI A117.1 "Making Buildings and Facilities Accessible to and Usable by Physically Handicapped People."
 2. Public Law 101-336 "The Americans with Disabilities Act of 1990 (ADA).
 3. ADA Accessibility Guidelines (ADAAG).
 4. The Arizonans with Disabilities Act of 1992 Administrative Rules (AzDAAG)
 5. Uniform Federal Accessibility Standards (UFAS).

PRODUCTS

MANUFACTURERS

- A. Furnish products of one of the following Manufacturers, except as approved by the Architect, subject to compliance with Specification requirements:
1. Larsen's Manufacturing Co.
 2. J.L. Industries
 3. General
 4. Knox
 5. Supra Products Co.

EQUIPMENT

- A. Multi-Purpose Dry Chemical Extinguisher:
1. Capacity and UL Rating: 5 lbs., 2A-10B:C.
 2. Tank: DOT approved steel cylinder.
 3. Metal valves and siphon tube.
 4. Replaceable molded valve stem seal.
 5. Pressure gauge.
- B. Wall Bracket: Manufacturer's standard J-type for wall hung extinguishers.
- C. Fire Extinguisher Cabinet:
1. Model as manufactured by approved list is acceptable.
 2. Trim Style and Projection: Semi-recessed, 1-1/4".
 3. Inside box dimensions: 24" x 9-1/2" x 5" minimum.
 4. Door:
 - a. Solid with Lock
 - b. Trim and Door (Stainless Steel): One piece, constructed of #4 finish, 304 stainless steel. Doors to be tubular, hollow-metal design.

- c. Door Glazing: Glass, clear, 1/8 inch thick float tempered.
- 5. Surface Mounted Box (Stainless Steel Door and Trim): 304 stainless steel with #4 finish.
- 6. Cabinet Signage: Vertical lettering "FIRE EXTINGUISHER" on door; color red.
- 7. Cabinet Mounting Hardware: Appropriate to cabinet.

EXECUTION

EXAMINATION

- A. Verification of Conditions: Examine subsurfaces to receive Work and report detrimental conditions in writing to Architect. Commencement of Work will be construed as acceptance of subsurfaces.
- B. Coordination: Coordinate with other Work which affects, connects with, or will be concealed by this Work.

INSTALLATION

- A. Install items in accordance with Manufacturer's directions. Install cabinets plumb and level at heights shown on Drawings.
- B. Comply with regulatory requirements and anchor securely.
- C. Verify that extinguishers are charged and tagged.
- D. Place extinguishers in cabinets and on wall brackets.

CLEANING

- A. During the course of the Work and on completion, remove and dispose of excess materials, equipment and debris away from premises. Leave Work in clean condition.

PLASTIC LAMINATE FACED CASEWORK

GENERAL

SUMMARY

- A. Section Includes: Laminate clad casework, including base cabinets, wall cabinets, tall cabinets, shelf units, related counter tops and other units as indicated on the Drawings and as specified.

DEFINITIONS

- A. Exposed Surfaces:
1. Exposed cabinet sides.
 2. Surfaces visible when drawers and opaque doors are closed.
 3. Surfaces visible when behind glass doors.
 4. Bottoms of cabinets if 42 inches or more above finish floor.
 5. Tops of cabinets if less than 72 inches above finish floor.
 6. Surfaces without solid door or drawer fronts, (e.g. interiors of open bookcases)
- B. Semi-exposed Surfaces:
1. Surfaces which become visible when opaque doors are open or drawers are extended, including backs of doors and complete interior of unit bodies that have doors and drawers.
 2. Bottom of cabinets more than 30 inches but less than 42 inches above finish floor.
 3. Tops of cabinets 72 inches or more above finished floor when visible from an upper level.
- C. Concealed Surfaces:
1. Unexposed cabinet sides.
 2. Bottoms of cabinets less than 30 inches above finish floor.
 3. Tops of cabinets over 78 inches above finish floor and not visible from an upper level.
 4. Stretchers, blocking, vertical partitions between drawers and backs behind drawers.
 5. Any other surface not normally visible after installation.

SUBMITTALS

- A. Shop Drawings: Submit Drawings with the following data:
1. Indicate materials, dimensions, unit profiles, cross sections and elevations, fastening, jointing details, finishes and accessories except when indicated by Manufacturer's catalog.
 2. Show details and location of anchorages.
 3. Layout of units with relation to surrounding walls, doors, windows and other building components.
 4. Indicate sink centerline locations, plumbing and electrical components, and blocking locations and heights.
 5. Indicate locations of seams in counter tops, including seams in plastic laminate.
 6. Indicate required field measurements beyond Manufacturer's control.
- B. Product Literature: Submit Manufacturer's descriptive literature and brochures of

casework units. Include literature for specialty items not manufactured by the Casework Manufacturer.

- C. **Samples:** Submit 2 samples of each finish to be applied at factory. Submit complete color range of plastic laminates, plastic edge molding and wood veneers. Samples will be reviewed by Architect for color, texture and pattern only.

QUALITY ASSURANCE

- A. **Manufacturer Qualifications:** Manufacturer shall provide evidence of at least 5 years fabrication and installation experience for Projects of size and scope similar to this Project. Evidence shall be submitted with Shop Drawings.
- B. **Mock-up:** Submit full size samples of casework construction, (base and wall units), with face, drawer, door, counter top and hardware at time of Shop Drawing submittal. Approved samples shall remain in Architect's possession until completion of Work and shall be used as the standard against which all Work will be evaluated.

DELIVERY, STORAGE AND HANDLING

- A. **Delivery:** Contractor shall make certain modular casework is not delivered until building and storage areas are sufficiently dry and will not be damaged by excessive changes in moisture content. Wet operations (e.g. plastering, painting) shall be complete.
- B. **Storage:** Adequately protect against damage while stored at the site. Store, away from construction traffic, under protective cover.
- C. **Handling:** Comply with Manufacturer's instructions.

2 PRODUCTS

MANUFACTURERS

- A. Furnish products of one of the following Manufacturers, except as approved by the Architect, subject to compliance with Specification requirements:
 - 1. Case Systems
 - 2. European Techniques
 - 3. Form-A-Fab
 - 4. LSI Corporation of America
 - 5. Meyer-Lundahl

MATERIALS

- A. **Particleboard:** Minimum 45 lb. density, "western" type, fir, meeting or exceeding ANSI A208.1, 1-M-3 requirements with moisture content 8 percent or less. Thicknesses as specified herein.
- B. **Hardboard:** Prefinished, 1/4 inch thickness, meeting or exceeding CS-251.
- C. **Plywood:** 9-ply hardwood.
- D. **Plastic Laminate:**
 - 1. **Horizontal Grade:** High pressure decorative laminate, NEMA LD-3, Grade GP50, .050 inch thickness, color as selected; a maximum of 5 colors for this Project.
 - 2. **Vertical Grade:** High pressure decorative laminate, NEMA LD-3, Grade GP28,

- (.028 inch thickness), color as selected; a maximum of one color per unit face and a maximum of five colors for this Project. This grade of laminate shall be counterbalanced.
3. Cabinet Liner Grade: High pressure cabinet liner, NEMA LD-3, Grade CL-20, (.020 inch thickness). Color shall be light beige or dove grey as selected; one color only for this Project. This grade of laminate shall be counterbalanced.
 4. Melamine: Tested to meet NEMA Test LD-3. Color shall be light beige or dove grey as selected; one color only for this Project. This grade of laminate shall be counterbalanced.
 5. Backer: High pressure backer, NEMA LD-3, Grade BK-20, (.020 inch thickness). Color shall be light beige or dove grey as selected; one color only for this Project. This grade of laminate shall be counterbalanced.
- E. Edge trim: Hot melt glue applied 3mm PVC banding with eased corner. Color shall be as selected; a maximum of one color per unit face and a maximum of five colors for this Project. Extruded barbed "T" design polyethylene edging and 1mm PVC banding are not acceptable.
- F. Glass: Framed glass shall be 1/8-inch DSA with extruded rigid PVC plastic frame designed to hold and trim glass; color to be light beige, sienna brown, dove grey or black as selected. Sliding glass doors shall be 1/4-inch plate glass.
- G. Metal Parts: Counter top support brackets, legs and miscellaneous metal parts shall be furniture steel, welded, degreased, cleaned, treated and powder painted in light beige, sienna brown, dove grey or black colors as selected.
- H. Hardware:
1. Pulls: Semi-recessed black ABS plastic, fastened with glue and screws. Color to be light beige, sienna brown, dove grey or black as selected.
 2. Hinges: Heavy duty, five knuckle 2-3/4 inch, overlay type, hospital tip, .095 inch hick steel, institutional type hinge with edges eased. Hinge shall have a minimum of eight No. 8, 5/8-inch FHSM screws at edge and leaf. Door shall swing 270 degrees. Finish shall be [brushed chrome] [black] [light beige] [greystone].
 3. Drawer Guides: Blum No. 230M nylon ball bearing, self-closing from a 4 inch extension except as follows for special drawer types. Each pair shall have a minimum load capacity of 75 pounds and shall be constructed of zinc coated rolled steel. Regular drawers shall be equipped with 2 drawer stops attached to the cabinet ends. Cabinet drawer stops shall be metal with attached rubber bumper and shall be installed to prevent the drawer face from touching the cabinet end in a closed position. Drawer types other than standard type shall have the following guides:
 - a. File Drawers: Blum No. 4309 full extension suspensions with a minimum load capacity of 100 pounds each. File drawers shall be provided with steel plate and rod index followers.
 - b. Paper Storage Drawers: Grant No. 335 with a minimum load capacity of 100 pounds each.
 - c. Kneespace Drawers: Grant No. 522 with a minimum load capacity of 50 pounds each.
 4. Adjustable Shelf Supports: Heavy-duty, self-locking nylon, designed to fit 32mm pre-drilled holes in cabinet ends and partitions and capable of supporting 200 pounds. Supports shall capture shelf top and bottom and have 2 pins 5mm in diameter to prevent the shelf support from rotating and tipping. Provide as required for either 3/4 inch or one inch thick shelves. Color to [match interior of cabinet] [clear]. Pins or KV type shelf standards are not acceptable.
 5. Catches:

- a. Base and wall cabinets: Magnetic type, provide minimum 6 pound pull per catch.
- b. Tall cabinets: Magnetic type or spring loaded roller with molded plastic strike, minimum 14 pound pull per catch.
- 6. Locks: National Lock No. M4-7054C, removable core, disc tumbler, cam style lock with strike. Each lock shall be furnished with 2 keys. Provide locks for drawers and doors as shown on cabinet elevations. Locks for sliding 3/4 inch doors shall be disc type plunger lock, sliding door type with strike. Locks for sliding glass doors shall be a ratchet type sliding showcase lock.
- 7. Chain Bolts: Provide 3 inch long with 18 inch pull and an angle strike to secure inactive door on cabinets over 72 inches (1800mm) in height.
- 8. Elbow catches: Provide at inactive doors up to and including 72 inches in height.
- 9. Sliding Door Track: Anodized aluminum double channel.
- 10. Coat Rods: 1-1/4 inch, 14 gage chrome plated steel.
- I. Dowels (Cabinet Joinery): Industrial grade hardwood laterally fluted with chamfered ends and a minimum diameter of 10mm, except for drawers which shall have a minimum diameter of 8mm.
- J. Adhesives and fasteners: Manufacturer's standard as per reviewed Shop Drawings.

FABRICATION

- A. General Requirements:
 - 1. Details shall conform to flush overlay cabinet construction.
 - 2. Corners of doors, drawer fronts, and cabinet end panels shall be eased or radiused. Sharp corners will not be permitted
 - 3. Edge banding shall be applied after face surfaces.
- B. Cabinet Joinery: Tops and bottoms shall be joined to cabinet ends using a minimum of 6 dowels at each joint for 24 inch deep cabinets and a minimum of 4 dowels at each joint for 12 inch deep cabinets. Internal cabinet components such as fixed horizontals, parting rails and verticals are to be doweled in place. Dowels are to be securely glued and cabinets clamped under pressure during assembly to assure secure joints and cabinet squareness. Stapled, and glued butt joints shall not be allowed.
- C. Door and Drawer Fronts: 3/4 inch thick particleboard, laminated with vertical grade plastic laminate on the exterior surface and cabinet liner grade plastic laminate on the interior surface. All edges shall be finished with edge trim. Double doors shall be provide on cabinets in excess of 24 inches in width. Doors 48 inches and over in height shall have 3 hinges per door. Provide framed glass insert in doors as indicated.
- D. Construction: Sides, unit tops or subtops or stretchers, bottoms of base and wardrobe units, fixed intermediates, adjustable shelves up to 30 inches wide and exposed backs shall be constructed of 3/4 inch thick particle board. Standard unit backs which are attached to walls shall be 1/4 inch thick prefinished hardboard, color to match interior of cabinet. Adjustable shelves over 30 inches wide shall be one inch thick particleboard. Base cabinets shall have full depth subtops or 2 3-3/4 inch deep stretchers across top of cabinet with cabinets over 27 inches wide having a third stretcher between door and drawer. Sink base units shall have a 1 inch by 1 inch by 1/8 inch angle iron rail in lieu of full subtop. Fixed intermediates shall be provided on units over 36 inches wide.
- E. Finishes: Exposed surfaces shall have vertical grade plastic laminate finish. Semi-Exposed surfaces on opposite side from exposed surfaces or subject to moisture, (e.g. sink base units), shall have cabinet liner grade plastic laminate finish. Semi-Exposed

surfaces opposite a side other than a semi-exposed surface and not subject to moisture may have either cabinet liner grade plastic laminate finish or melamine finish at Manufacturer's option. Concealed surfaces shall have melamine finish. All exposed edges shall be finished with edge trim, color to match door and drawer front edge color. Adjustable shelves shall have melamine finish on top and bottom surfaces and shall be edged on front and back edge to allow for rotation by user.

- F. Drawers: Sides, back and sub-front shall be 1/2 inch thick particleboard laminated with melamine. Back and sub-front shall be dowelled and glued into sides. Standard bottom shall be 1/2 inch thick, prefinished, color matching, particleboard, applied and screwed to front, sides and back. Bottom of paper storage drawers shall be heavy-duty 3/4 inch particleboard with plywood reinforcements. Provide retaining hood at the rear of paper storage drawers. Top edge of subfront, sides and back shall have edge trim.
- G. Counter tops: One inch thick particleboard with horizontal grade plastic laminate on top surface and backer on bottom surface. Provide continuous in longest lengths possible. Seams shall be located as shown on approved Shop Drawings. Joints required for continuous runs or corners shall be factory prepared utilizing bolt-type joint fasteners. Joints shall not occur at sink openings. Provide 4 inch backsplash and postformed drip edge. Backsplash shall have the backside sealed. Tops and ends of backsplashes shall be finished to match top. Counter top edges to be finished to match top. Backsplashes shall be provided at ends terminating at walls.

EQUIPMENT SCHEDULE

- A. See Drawings for casework components and Manufacturer's model numbers

EXECUTION

EXAMINATION

- A. Verification of Conditions: Examine subsurfaces to receive Work and report detrimental conditions in writing to Architect. Commencement of Work will be construed as acceptance of subsurfaces.
- B. Coordination: Coordinate with other Work which affects, connects with, or will be concealed by this Work.

INSTALLATION

- A. Install casework in accordance with Manufacturer's printed instructions under the supervision of the Manufacturer's representative with factory-trained personnel.
- B. Set casework accurately in place, level, true and straight with no distortions. Shim as required. Scribe and cut to accurate fit and secure to floor and walls with connecting or attaching devices. Install scribes and trim members as required. Exposed scribes against walls shall not exceed one inch in width.
- C. Securely fasten casework to walls, floors and other units as necessary for units to remain in place without movement under normal loading, except units not normally in a fixed position.
- D. Adjust casework and hardware so that doors and drawers operate smoothly without warp and bind. Lubricate operating hardware as recommended by Manufacturer.

ADJUSTING AND CLEANING

- A. Adjust moving parts, including doors and drawers, for proper operation.
- B. Repair or remove and replace defective Work as directed upon completion of installation.
- C. During the course of the Work and on completion, remove and dispose of excess materials, equipment and debris away from premises. Leave Work in clean condition.
- D. Clean surfaces, including interiors, and leave ready for use. Repair minor damage to plastic surfaces per Plastic Laminate Manufacturer's recommendations.

CENTRAL HEIGHTS REMODEL

MECHANICAL SPECIFICATIONS INDEX

- Mechanical General Provisions
- Basic Materials and Methods
- Mechanical Systems Insulation
- Plumbing
- Automatic Sprinkler System
- Air Distribution

ELECTRICAL SPECIFICATIONS INDEX

- Basic Electric Materials and Methods
- Raceways, Boxes, and Cabinets
- Wires and Cables
- Wiring Devices
- Electrical Identification
- Utility Coordination
- Grounding
- Transformers
- Panel Boards
- Fuses
- Disconnects and Circuit Breakers
- Motor Controllers
- Transfer Switches
- Interior Lighting
- Exterior Lighting
- Ground-Fault Protection Systems
- Fire Alarm Systems
- Telephone Raceway Systems
- Lighting Control Equipment

MECHANICAL GENERAL PROVISIONS

GENERAL

1. This Section valid only when considered in total with other Contract Documents. Cross references are for convenience of reader and their inclusion in or omission from any Section in no way limits its scope or intent of any Contract Document.
2. General Provisions which make specific reference to Electrical Division only are included herein for clarity and simplification of Specifications writing and are not part of the Mechanical Work.
3. Unless noted otherwise, all work shown on Plumbing Drawings shall be performed by Plumbing Subcontractor; all work shown on Mechanical Drawings shall be performed by Mechanical Subcontractor.

SHOP DRAWINGS AND SAMPLES

- A. Provide Shop Drawings consisting of manufacturer's certified scale drawings, cuts, catalogs, or descriptive literature with complete certified characteristics of equipment, dimensions, capacity, code requirements, motor drive, testing, and certified performance curves for all fans and pumps.
- B. Review will be only for conformance with design concept of project and compliance with information given in Contract Documents. Review of a separate item will not indicate review of assembly in which item functions. Direct specific attention in writing on resubmitted Shop Drawings to revisions other than corrections called for on previous submissions.

RECORD DRAWINGS

- A. Maintain at site a set of black or blue on white prints of Engineering Drawings, upon which clearly indicate (by shading, coloring, or some other acceptable method) the day by day extent of Work installed. Indicate changes in elevation, location or size of materials deviating from original design.
- B. Clearly indicate any dimension changes in elevation, location, size or material, and offsets and valves. Locate all underground, concealed or buried piping by 2 or more dimensions per run of pipe between each direction change. Show all elevations (invert or centerline) with the point of elevation change clearly located. Valves numbered and lettered to correspond with numbers and letters of valve charts.

INVESTIGATION OF CONDITIONS

Examine the contract drawings and all available information concerning existing installation, structure, excavations, and local conditions bearing on labor, transportation, handling and storage of materials, etc. Visit the site to understand the nature and scope of all work to be performed. The submission of a bid will be taken as evidence that such an examination has been made and all conditions have been considered.

EXISTING INSTALLATION AND CONFLICTS

- A. Existing active services, water, gas, sewer, electric and other piping systems, when encountered, shall be protected against damage due to construction work. Do not prevent or disturb operation of active services which are to remain. If work makes temporary shutdowns of services unavoidable, consult with Owner as to dates, procedures and estimated duration of shutdown period in advance of the date work is to be performed.
- B. Work shall be performed to assure that the existing operating services will be shutdown only during the time allowed and required to make necessary connections. If a system cannot be shutdown, temporary bypass jumpers shall be installed until connections are complete.

- C. Be responsible for all costs incurred by the above shutdowns including bypass or jumper installations for work performed under this Division.
- D. If existing active utility services are encountered which require relocation, make request to proper authorities for determination of procedures. Where existing services are to be abandoned, they shall properly terminate in conformance with requirements of the utility company or municipal service involved.

CODES, ORDINANCES, CERTIFICATES, PERMITS AND FEES

- A. Give necessary notices, obtain permits, and pay taxes, fees and other costs in connection with Work; file necessary plans, prepare documents and obtain necessary approvals, of regulating authorities having jurisdiction; obtain all required Certificates of Inspection for Work and deliver to Architect before request for acceptance and final payment for Work.
- B. Include in Work, without extra cost to Owner, labor, materials, services, apparatus, Drawings (in addition to Contract Drawings and Documents) required to comply with applicable laws, ordinances, rules and regulations.
- C. Drawings and Specifications take precedence when they are more stringent than codes, ordinances, standards and statutes. Codes, ordinances, standards and statutes take precedence where they are more stringent or conflict with Drawings and Specifications.
- D. Following industry standards, specifications and codes are minimum requirements:
 - 1. Applicable city, county, and state mechanical, electrical, gas, plumbing, health and sanitary codes, laws and ordinances.
 - 2. City or other applicable building codes.
 - 3. Standards and requirements of local utility companies.

MATERIALS AND EQUIPMENT

- A. Materials and equipment standard products of a reputable manufacturer regularly engaged in manufacture of the specified item. When more than one unit is required of any item, furnish by the same manufacturer, except where specified otherwise. Install material and equipment in accordance with manufacturer's recommendations. Should variance between plans and specifications occur with these, contact Architect immediately so that variations in installation can be known by all parties concerned.
- B. The plans show specific equipment that the design is to cover. Where it would be desirable to cover all equipment that may be bid, it is impossible to provide designs that fit all circumstances and possibilities that various equipment will require. The contractor, when substituting equipment different from the manufacturer shown on the drawing, will be responsible to include in the bid any necessary changes due to size, fit, electrical, characteristics or connections, weight and/or any ramifications on other building systems. The contractor assumes all responsibility for all necessary coordination with other trades under such conditions. Other manufacturers listed in the specification does not imply that naming those manufacturers meets all of the design requirements that the plans show nor release the contractor to all the above requirements.

SLEEVES

- A. Furnish and set sleeves in locations where pipes or conduit pass through floors, walls, partitions, concrete beams and roof. Assume cost for cutting, patching, finishing, etc. resulting from failure to accomplish this requirement. Openings not to impair strength, function, or esthetics of Work cut.

- B. Provide pipes passing through floors, walls, partitions, roofs or concrete beams with sleeves having internal diameter 1 inch larger than outside diameter of pipe, or of insulation on covered lines.
- C. Sleeves through outside walls or through slab on grade (except soil pipe through slab): Schedule 40 black steel pipe with 150 lb. black steel slip on welding flange welded at center of sleeve and painted with one coat of bitumastic paint inside and outside. Space between sleeve and pipe packed with lead wool or oakum to within 2 inches of each face of wall. Remaining space packed and sealed water-tight with water proof compound. Fabricated seals, Thunderline Link-Seal or equal, are acceptable.
- D. Sleeves through concrete floors or interior masonry or concrete walls: Schedule 40 black steel pipe, set flush with finished wall or ceiling surfaces but extending 1 inch above finished floors.
- E. Sleeves through interior walls other than masonry or concrete: 22 gauge galvanized sheet steel, set flush with finished surfaces of partitions.
- F. Sleeves in sprinklered areas: Provide watertight joint between floor and pipe or conduit passing through it by using pipe sleeves projecting 3" to 6" above the floor in accordance with NFPA 13, caulked at the top of the sleeves with oakum.
- G. Sleeves passing through membrane water proofing or lead safe: Provide 16 ounce soft sheet copper or four-pound lead flashing extending 12" beyond sleeves in all directions; secure to waterproofing or lead safe, turn down flashing into space between pipe and sleeve; insert oakum gasket, pour lead, caulk watertight.
- H. Uninsulated copper pipe through ferrous sleeves or in contact with cement or concrete: Wrap pipe with two layers of heavy plastic protective tape. Finish wrapping flush with sleeve ends.

ESCUTCHEONS

Fit exposed pipes or conduit passing through floors, walls, or ceilings with one-piece Beaton Cadwell chrome brass plates with round head set screws. Spring clips are not acceptable. Secure plates to pipe or conduit.

HANGERS, INSERTS, SUPPORTS AND BASES

- A. Provide required structural members, hangers, supports and inserts to keep piping and conduit in proper alignment and prevent transmission of injurious thrusts and vibrations. Where supported from concrete construction, do not weaken concrete or penetrate waterproofing. Hangers and supports capable of screw adjustment after piping or conduit is erected. Hangers shall be finely adjusted in vertical and horizontal direction under operating conditions.
- B. Support equipment and other mechanical or electrical items on curbs, legs, or steel framework. Provide all metal bases and supports, not part of building structure, unless specifically indicated to be under another Division. Materials and equipment furnished or provided under this Division as described for similar Work under other Divisions. Concrete, masonry, and wood bases and supports provided under other Divisions of this Specification. Furnish required foundation sizes, bolts, washers, sleeves, plates, templates, etc., for mechanical equipment provided. Review concrete, masonry, metal, or wood bases provided under other Divisions for adequacy and suitability and provide costs for necessary modifications such review may establish. Supports for panelboards, exposed feeders and similar items, Underwriter's Laboratories (UL) approved.

MANUFACTURER'S IDENTIFICATION

Manufacturer's nameplate, name or trademark permanently affixed to all equipment and material furnished under this Specification. Nameplate of Subcontractor or Distributor not acceptable.

ACCESS PANELS

Place no valves, traps, controls, unions, dampers, coils, air distribution boxes, cleanouts, junction boxes, pull boxes, expansion joints, etc., in any system at a location that will be inaccessible after construction is completed. Maintain accessibility for all components in systems.

MOTORS AND STARTERS

- A. All electric motors induction type conforming to requirements of NEMA, UL and NEC, suitable for required load, voltage, duty, phase, frequency, service and location. Motors are furnished and installed under the Mechanical Section specifying the driven equipment. Limit maximum motor speeds to 1750 RPM, unless otherwise specified.
- B. Provide totally enclosed, fan cooled (TEFC) motors outside the building or otherwise exposed to the weather, or suitably protect per NEMA standards. Provide open drip-proof motors generally inside the building, except where splash-proof or explosion-proof construction is required.
- C. Provide motors with double shielded, grease lubricated, ball bearings, with grease pockets on each side for regreasing in service. Provide inlet and outlet grease connections in motor housings for each bearing. Provide factory sealed permanently lubricated ball bearings on roof mounted equipment. Similar bearing may be provided on fractional horsepower motors. Provide sleeve bearings where so specified.
- D. Provide single phase motors of permanent split capacitor type unless otherwise specified. Provide with integral thermal overload protection.
- E. All motor starters provided under Electrical Division, unless furnished as an integral part of manufacturer's packaged equipment, or specified to be furnished with equipment. Responsibility for providing starter compatible with motor furnished rests with starter supplier. Furnish single phase motors with manual motor starters.

COORDINATION OF TRADES

- A. Examine fully Specifications and Drawings for other trades, to become familiar with all conditions affecting Work, and consult and cooperate with other Divisions and Sections for determining space requirements and adequate clearances with respect to other equipment in the building. Architect reserves the right to determine space priority in the event of interference between piping, conduit and equipment of various trades.
- B. If Work is installed without coordinating with other trades, and such installation interferes with their installation, make any changes necessary to correct the conditions, without extra charge.

EXCAVATION AND BACKFILL

- A. Perform necessary excavation, shoring and backfilling required for the proper laying of pipes and conduits inside the building and premises, and outside as may be necessary. Remove excavated materials as directed.
- B. Excavation and backfill as described for similar Work under SITEWORK Divisions. Perform Work under appropriate Mechanical Section.

CUTTING AND PATCHING

- A. Cut completed construction Work only if sleeves, openings, chases, etc., were inadvertently omitted, and only with specific permission of the Architect. In no case shall reinforcing steel be cut without specific written permission of the Architect.
- B. Provide sleeves, caps, plates, escutcheons, flashing, etc., required to fill or close the openings. Provide final grouting, concrete, asphalt, masonry, painting, and other materials as required. Make repairs in like and kind for exact matching of surfaces and finishes.

TESTS AND ADJUSTMENTS

Labor, materials, instruments and power required for testing provided under respective Sections for Work under that Section.

OPERATION BY OWNER

Owner may require operation of parts or all of respective installations prior to final acceptance. Cost of utilities for such operation to be paid by Owner. Operation of installation not to be construed as acceptance of Work.

INSTRUCTION MANUAL

- A. Thirty calendar days prior to completion of installation and final inspection of Work, furnish to Architect three copies of complete Instruction Manual, bound in booklet form and indexed for each respective trade specified under MECHANICAL Division.
- B. Each Manual shall contain the following items:
 - 1. List of all equipment with manufacturer's name, model number and local representative, service facilities and normal channel of supply for each item.
 - 2. Manufacturer's literature describing each item of equipment with detailed parts list.
 - 3. Individual equipment guarantees.
 - 4. Certificates of Inspection.
 - 5. Record blueprints and related Shop Drawings.
 - 6. Typewrite or print all written material contained in Manual.

BASIC MATERIALS AND METHODS

GENERAL

This Section valid only when considered in total with other Contract Documents. Cross references are for convenience of reader and their inclusion in or omission from any Section in no way limits its scope or intent of any Contract Document.

WORK SPECIFIED HEREIN

Pipe, fittings, valves, piping specialties and supporting devices for mechanical, plumbing, and fire protection work.

RELATED WORK: Specified in other Sections.

- A. General items applicable to mechanical, plumbing, and fire protection systems (in General Provisions).
- B. Specialties and accessories for mechanical hydronic and steam systems (in Liquid Heat Transfer Section).

MATERIALS

- A. Pipe and Fittings:
 - 1. Cast iron service weight bell and spigot or hubless soil pipe and fittings, conforming to CISPI 301-99 and IAPMO Standard CS-188, coated inside and out, with minimum 24 ga., Type 304 stainless steel couplings below ground, C.I.S.P.I. standard stainless steel couplings above ground, for the following applications:
 - a. Soil and waste piping inside buildings.
 - b. Vent piping.
 - c. Sewer piping, 3" and smaller, outside buildings.
 - 2. Copper tubing, seamless hard drawn, ASTM B-88, Type L in the building, above ground and Type K below ground, outside the building, (optional), with ANSI B-16 Class 150 wrought copper or cast bronze solder fittings. Use soft temper Type K tubing with no joints below building or other concrete slabs, for the following applications:
 - a. Domestic cold water piping.
 - b. Domestic hot water piping.
 - c. Domestic hot water return (circulation) piping.
 - d. Refrigeration piping; wrought copper fittings. Dehydrated and capped pipe.
 - e. Coil condensate pan drains.
 - 3. Copper tubing, seamless hard drawn ASTM B-306, Type DWV, with ANSI B-16 wrought copper or cast bronze solder drainage fittings, for the following applications:
 - a. Soil, waste and vent piping above ground (option).
 - 4. Vitrified clay, ASTM C-200, extra strength salt glazed, bell and spigot pipe and fittings, for the following applications:
 - a. Sanitary sewers, 4" and larger, from five feet outside buildings.
- B. Valves:
 - 1. General: Install at all connections to all equipment, and elsewhere as may be necessary or indicated, for complete control or isolation of any piece of equipment or service to branch lines.

Position valves in accessible location and of same size as piping. Provide infinite position handle and memory stop on valves used for balancing service, for the following applications:

- a. In chilled water, condenser water, or heating water piping, butterfly valves are acceptable in place of gate or globe valves in flanged systems, and Milwaukee Butterball valves are acceptable in place of gate valves in threaded or soldered systems where service permits. Provide extended stem (1-1/4") for all valves located within insulated piping systems.
 - b. Valves in domestic water systems shall be full-way type per UPC.
 - c. In general, all valves shall be screwed <or soldered 2"> and smaller; flanged 2-1/2" and larger. Provide bronze valves in copper or brass piping systems. (Exception: Valves 4" or larger in copper or brass piping may be iron body with dielectric protection.) Provide iron-body valves in ferrous piping systems.
2. Manufacturers: Crane, Fairbanks, Grinnell, Jenkins, Lukenheimer, Milwaukee, Mueller, Nibco, Powell, Stockham, Victaulic, or Star Pipe Products are acceptable equals to those named, based on manufacturer's standard published comparison charts.
 3. Gate valves: Milwaukee #148 threaded bronze gate valves, screwed bonnet, rising stem, solid wedge, 125# SWP. On copper pipe, Milwaukee #149. On welded pipe, Milwaukee F-2885, IBBM, OS&Y, 125# SWP, flanged.
 4. Globe valves: Milwaukee #502 (globe) or #504 (angle) bronze globe valves, screw-in bonnet, bronze disc, 125# SWP. On copper pipe, Milwaukee #1502.
 5. Check valves: Milwaukee #509 threaded bronze check valves, horizontal swing, screwed bonnet, 125# SWP. On copper pipe, Milwaukee #1509, IBBM, renewable bronze seat and disc, 125# SWP, flanged. On welded pipe, Milwaukee F-2974.
 6. Plug cocks: Screwed or flanged, 175" semi-steel, lubricated type, bolted bonnet. Provide wrench. Rockwell-Nordstrom 142 and 143, W-K-M or equivalent Resun, for the following applications:
 - a. For balancing service, install adjustable stop indicator. DeZurik Series 400 eccentric valve acceptable equivalent.
 7. Butterfly valves: Iron body, wafer (lug type on equipment connections), as indicated, bronze disc, EPT seat, 150 psi shut off at 212 degrees F, locking type operating handle. Centerline, Demco, DeZurick, Grinnell, valves 6" and larger with worm screw operator and hand wheel.
 8. Ball valves: Full port, teflon seat, bronze ball, two-piece construction, 125# SWP, threaded or solder, Conbraco, Jamesbury, or Hills-McCanna.
 9. Gate valves for outside water service: Am. Darling #52, flanged, AWWA approved, 175# WWP, IBBM, NRS; equivalent Mueller, Stockham.
- C. Piping Specialties and Accessories:
1. Unions: Malleable iron ground joint type, Crane #1280, brass to iron seat for ferrous pipe. Brass ground joint type for copper pipe.
 2. Roof flashing assemblies: Stoneman Stormtite lead roof flashing assemblies with steel reinforced vari-pitch boot, caulk-type open top model, type 1100-4 4 lb. lead, 8" skirt, for pipes other than plumbing vents passing through roof and roof drains. Flash plumbing vents with 4 lb. sheet lead extending at least 12" from vents at roof, with upper end turned down into vent pipe. Provide 4 lb. sheet lead extending at least 12" around body of drain. Coordinate installations with roofing contractor.
 - a. Provide 4 lb. sheet lead extending at least 12" around body of drain. Coordinate installations with roofing contractor.

3. Pipe isolators: Stoneman "Trisolators" or Potter-Roemer PR-Isolators at each pipe hanger, support, bracket or strap on all uninsulated copper lines 1/2" and larger.
 4. Dielectric insulating fittings: Dielectric fittings, unions; bushings or couplings, for water connections to domestic hot water heaters and connections between ferrous and copper pipe. Victaulic "clearflow" dielectric connections also acceptable.
- D. Pipe Hangers, Brackets and Supports:
1. Carpenter & Patterson, Elcen, Fee and Mason, Grinnell, Michigan, Superior are acceptable manufacturers.
 2. Support horizontal pipe with vertically adjustable malleable swivel ring or wrought steel clevis type hangers, suspended on threaded steel rods. Provide 2 nuts on rod for locking. Fee and Mason Fig. 199 and 239 clevis type for piping 2-1/2" and larger.
 3. In Equipment Rooms, hang piping in systems connection to motorized rotating equipment with spring type vibration isolation hangers.
 4. Use fabricated angle, Unistrut or B-Line trapeze hangers where several overhead pipes can be installed parallel at same elevation. Fasten each pipe firmly to hanger.
 5. Hanger locations not to exceed 2'-6" from change in piping direction. Space as follows:

1" and smaller	6'0" o.c.
1-1/2"	8'0" o.c.
2" - 2-1/2"	10'0" o.c.
3" - 4"	12'0" o.c.
5" and larger	15'0" o.c.

Hangers for plumbing piping as per UPC.
 6. Suspend hangers from mild steel rods sized as follows:

2" and smaller	3/8" dia. rod
2-1/2" - 3"	1/2" dia. rod
4" - 5"	5/8" dia. rod
6" and larger	3/4" dia. rod
 7. In concrete construction, use inserts or anchors capable of loads. When hanging from steel, use concentrically loading beam clamps. Eccentrically loading beam "C" clamps are prohibited. Double "C" clamps are allowed that secure from two sides. In all cases support hanger in a manner acceptable to structural engineer.
 8. Protect pipe covering at each support with steel protection saddles or rigid insulation inserts and minimum 18 ga. shields that will transmit the load of the pipe line directly to the support without damage to covering. Fabricated shields, Pipe Shields, Thermal Hangers, Insul-Shields, or Uni-Grip are acceptable, models as recommended by manufacturer.
 9. Support piping on roof by clamping to angle iron steel supports, or as detailed on Drawings.
 10. Install anchors and guides or suitable design and adequate strength for guidance of piping subjected to expansion and contraction due to temperature changes, with anchors securely attached to building frame.

WORKMANSHIP

A. Pipe Installation:

1. Before installation, thoroughly clean inside of all pipe, fittings, and valves of dirt, scale, sand and other foreign materials. Protect against entry of concrete, plaster, mortar, etc.

2. Make all offsets, changes in direction, branch connections and changes in size with fittings, using no bushings.
3. Unless specifically detailed otherwise, run piping concealed throughout finished portion of building, parallel with lines of the building.
4. Make connections to equipment so that weight of piping does not rest on equipment. Provide floor stands and/or hangers to carry piping weight. Make final connections to equipment so that equipment may be removed without disturbing piping. Provide unions in pipe 2" and smaller. Provide bolted flanges in pipe 2-1/2" and larger.
5. Pitch piping in conformance with codes and industry standards (e.g. ASHRAE).
6. Provide flexible connections at all equipment mounted on spring bases and as indicated on Drawings.

B. Pipe Fittings:

1. **Cutting:** Cut pipe with wheel cutters or saw, and carefully ream to remove all burrs. Make cuts clean and at right angle to axis of pipe. Cut pipe accurately to measurements determined at place of installation of Work and set into place without springing or forcing.
2. **Threaded joints:** Pipe threads shall be made in accordance with ANSI B2.1. Cut threads with sharp clean dies so that not more than three threads are left exposed on the pipe when the joint is made up. Ends of pipe nipples shall be chamfered on the outside. Ream out ends of threaded pipes full size with long taper reamer as to be partially bell-mouthed and perfectly smooth. Make up joints in threaded piping with Teflon base pipe compound completely covering the male thread, teflon tape optional, except makeup joints in cleanout plugs, and steam condensate piping with red lead and boiled linseed oil, or Acorn No. 3500 emulsified lead paste.
3. **Welded joints:** Make up welded joints in accordance with Chapter Five & Six, ANSI/ASME B31.1 Code for Pressure Piping, using arc welding. Defective or unsound welds will be corrected by removing and replacing welds, or as directed by Architect. Replace pipe or fittings which cannot be repaired satisfactorily with new at the Contractor's expense. Welding fittings shall be Tube-Line, Tube Turn, Midwest, Nibco or equal. Use welding elbows at all turns in welded piping. Use Weld-O-Lets and Thread-O-Lets where branch pipe size is less than 1/3 of main size. Use Weld Tees where branch is larger than 1/3 of main. Reduction in line size shall be by weld reducers. Weld joints with continuous welds on beveled pipe ends. Use certified welders qualified by industry standards.
4. **Solder joints:** Cut tubing with square ends, remove all burrs, fins, and dents, and resize if necessary. At each joint, mark tubing with scribe line one inch plus depth of socket, measured from end of tubing; clean tubing and socket with solvent, then clean with emery cloth. Coat tubing end with thin film of flux, insert tubing full depth into socket and twist to spread flux. Heat socket to correct temperature to melt solder, remove flame, apply solder to edge of socket or to solder hole, and completely fill joint holding joint rigidly in position during soldering and until solder has hardened. While joint is hot, remove excess solder and flux with cloth or brush. Solder tubing with 95-5 tin-antimony solder. Silver solder or Silvabrite 100 lead-free solder is acceptable at Contractor's option. Take care to prevent annealing of hard-drawn copper tubing when making connections.
5. **Flanged joints:** Bolt flanges in accordance with ANSI B-16.1, B-16.2 or B-15.5, as applicable using Neoprene gaskets.
6. **Cast iron joints:** Lay underground pipe in finished trenches, with spigot ends of bell and spigot pipe pointing in direction of flow. Place spigots of bell and spigot pipe firmly against bottoms of hubs. For bell and spigot soil pipe use factory preformed rubber gasket sealers with lubricant, installed per manufacturer's printed directions. For hubless pipe, tighten joint bands to coupling per manufacturer's specifications, using an approved torque wrench.

7. **Vitrified clay pipe joints: Use factory-formed interlocking plastic joints, Speed Seal or Wedge-Lock, assembled in accordance with manufacturer's printed directions.**

MECHANICAL SYSTEMS INSULATION

GENERAL

This Section valid only when considered in total with other Contract Documents. Cross references are for convenience of reader and their inclusion in or omission from any Section in no way limits its scope or intent of any Contract Document.

WORK SPECIFIED HEREIN

Insulation for piping, ductwork and associated mechanical equipment.

RELATED WORK: Specified in other Sections.

- A. Building insulation in Thermal and Moisture Protection Division.
- B. Insulation for chiller evaporator(s) in Refrigeration Section.
- C. Underground insulated piping systems in Basic Materials & Methods Section.

MATERIALS

Manufacturers: CSG, Fiberglas, Knauf, Manville. Materials meeting UL & NFPA 90A fire hazard classification requirements.

- A. Pipe Insulation:
 - 1. One piece molded fiberglass insulation with fire retardant or all service jacket. Joints and seams tightly butted and lapped. Thickness 1" up to 4" dia. and 1-1/2" above 4" dia. except where noted otherwise. Cover fittings and valves with insulating cement, compressed blanket wrap, pipe insulation segments, or molded fiberglass fitting covers to thickness of adjoining insulation. Finish blanket or pipe segments with skim coat of insulating cement. Cover insulation on exposed fittings, etc., with fiberglass tape or 6 oz. canvas embedded in two coats of fire retardant mastic, or plastic fitting covers. Service as follows:
 - a. Domestic hot water piping.
 - b. Domestic hot water return (circulation) piping.
 - 2. Flexible closed cell foamed plastic pipe insulation, Armstrong Armaflex, Therma-Cel, or manufacturers named above, thickness noted. Fittings field-fabricated of nesting sizes, secured with adhesive. In return air plenums, use AP Armaflex with flame spread rating no greater than 25 and smoke developed rating no greater than 50. Service as follows:
 - a. Coil condensate pan drains, when exposed to view or above ceilings, 3/8" thick.
 - b. Refrigerant suction lines, 3/4" thick.
 - c. Domestic cold water, inside buildings, when exposed to view or above ceilings, 3/4" thick.
 - 3. Weatherproof outdoor insulation with weatherproof, UV resistant coating.
- B. Duct Insulation:
 - 1. Insulate all heating and air conditioning supply, return, and mixed air ducts and plenums with duct wrap or liner. Return air ducts must be lined.

2. Provide acoustical lining on all transfer ducts.
3. Duct sizes on Drawings are "clear inside." Increase sheet metal size accordingly for lined ductwork.
4. Lined ductwork insulated internally with semi-rigid glass fiber, thickness 1" and density 1-1/2 PCF. Exposed internal surface of a thick coat of black fire resistant coating to bind the surface fibers tightly to avoid any loose fiber and provide a smooth air flow surface. Materials shall have a mold, humidity, and erosion-resistant surface that meets the requirements of UL 181.
5. Wrapped ductwork covered with 1-1/2" thick, 3/4 PCF glass fiber blanket. Provide insulation with factory applied flame retardant foil scrim kraft vapor barrier.

WORKMANSHIP

- A. Apply pipe insulation over clean, dry surfaces after piping has been tested and proven tight. Fittings, valve bodies, etc., insulated to same thickness as adjoining pipe covering. Omit insulation at unions and flanges, and at those points bevel insulation neatly and finish as specified for fittings. All insulation installed in strict accordance with manufacturer's recommendations.
- B. Apply duct liner in cut-to-size pieces attached to the interior of the duct with fire-resistant adhesive. Top and bottom pieces to lap the side pieces, and, in addition, be secured with welded pins, adhered clips, metal, nylon or high impact plastic, and speed washers or welding cup-head pins on maximum 12 inch centers. Welded pins, cup-head pins or adhered clips are not to distort the duct, burn through or mar the finish or the surface of the duct. Pins and washers flush with the surface of the insulation, and all breaks and punctures of the insulation coating sealed with fire-resistant adhesive. All exposed edges at the duct ends, and at other joints where the insulation will be subject to erosion, coated with a heavy brush coat of fire-resistant adhesive, prior to forming duct through the sheet metal brake. Secure at top and bottom surfaces with welded pins or adhered slips as specified for cut-to-size pieces.
- C. Apply vapor barrier wrap over surfaces which have been wiped clean and dry. Provide 2" tab overlap on both longitudinal and transverse seams. Firmly butt edge of insulation together. Coat underside of the exposed adhesive and firmly press on. Staple with outward clinch staples. Seal staples and any breaks, cracks, and perforations with vapor barrier adhesive. Repair torn out sections of vapor barrier with foil-scrim-kraft vapor barrier tape cemented to insulation. On ducts 30" and more in width, secure insulation to bottom with adhesive and welded pins with washers or clips, cut off, and sealed with a vapor barrier adhesive.

0 - PLUMBING

GENERAL

This Section valid only when considered in total with other Contract Documents. Cross references are for convenience of reader and their inclusion in or omission from any Section in no way limits its scope or intent of any Contract Document.

WORK SPECIFIED HEREIN

- A. Complete domestic cold, hot and hot water return systems within and up to 5' outside the building or as shown on Drawings.
- B. Complete sanitary drainage waste and vent systems within and up to 5' outside the building or as shown on Drawings.
- C. All plumbing fixtures, equipment, specialties, drains, etc., shown, specified, scheduled, or otherwise indicated herein or on Plumbing Drawings, or required by local code, installed complete.
- D. Final water and drain connections to all fixtures, devices and equipment, including Owner-furnished equipment or special equipment specified under other Sections. (This includes equipment, direct and indirect drains, cold and hot water connection on Consultant Drawings). This DOES NOT include condensate drains from HVAC equipment.
- E. All motors and controls for plumbing systems as herein specified or shown on Drawings.

RELATED WORK: Specified in other Sections.

- A. Electrical power wiring (in DIVISION 16, ELECTRICAL).
- B. Motor starters and disconnects unless specified or shown otherwise (DIVISION 16, ELECTRICAL).

MATERIALS

- A. Miscellaneous materials as specified in General Provisions Section.
- B. Piping, accessories, and insulation as specified in Basic Materials & Methods and Mechanical Systems Insulation Sections.
- C. Manufacturers acceptable for general material categories are as follows: Water closets, urinals, lavatories and enameled sinks: American-Standard, Crane/UR, Eljier, Toto, Kohler. Stainless steel sinks: Elkay, Just, Kindred. Drains and plumbing specialties: Josam, J.R. Smith, Wade, Zurn, Watts. Closet seats: Beneke, Bemis, Church, Olsonite, Sperzel. Drinking fountains: Elkay, Halsey-Taylor, Haws, Sunroc, Oasis. Sink fittings: Chicago Faucet, T&S Brass, Grohe. A.D.A. insulation kits: Skal-Gard, Trubro "Handi-Lav," McGuire. Flush valves: Delaney, Sloan, Toto, Zurn. Mixing/shower valves: Leonard, Powers, Symmons.
- D. Traps above floor exposed or in cabinets, chromium plated cast brass, adjustable, with clean-out plug, installed with cast set-screw wall escutcheon and casing, all chrome plated. Faucets with removable trim units and chromium plated brass handles. Fixtures of the same type of one manufacturer. Trim polished chromium plated and of one manufacturer for each type. Provide loose key fixture stops, hand stops or valves ahead of all equipment or fixtures. Provide lavatory tailpieces with 3/4" inlet connections for condensate where shown. Provide adequate caulking under counter mounted sinks to insure against water leaking under rim from counter top. Self-rimming sinks shall be of a compression clip that engages underside of counter top with adjustment nut to secure sink to top of counter surface.
- E. Cleanouts:

1. **Wall Cleanout (WCO):** J.R. Smith 4530 C.O. tee, with round smooth stainless steel access cover, secured with vandalproof screw. Same size as pipe in which installed, 4" maximum.
2. **Floor Cleanout (FCO):** J.R. Smith 4020 C.O., with round scoriated nickel bronze cover. Same size as pipe in which installed, 4" maximum. Provide flange with flashing device when installed in floor slabs with waterproof membranes. Provide with carpet clamping frame when installed in carpeted floor areas.
3. **Surface Cleanout (SCO):** J.R. Smith 4250 cast iron C.O. with scoriated cover with lifting device.

F. Drains:

1. **Floor Drain (FD-1):** J.R. Smith 2010-A, cast iron body, nickel bronze top, vandalproof grate. Provide 6" diameter strainer unless indicated otherwise. Complete with P-trap. Provide clamping ring and flashing when installed above grade. Include trap primer model connection.

G. Hydrants and Bibbs:

1. **Wall Hydrant (WH-1):** Exposed, non-freeze, J.R. Smith 5609, anti-siphon, recessed box with cover, bronze polished face.

H. Miscellaneous Specialties:

1. **Shock Absorber:** J.R. Smith Hydrotrol Water Hammer Arrestor, sized per P.D.I. Standard WH201. Provide stainless steel vandal proof access panel of adequate size for maintenance/removal of device where concealed.
2. **Trap Primer:** Precision Prime-Rite automatic primer valve, all bronze and with fixed air gap assembly. Provide stainless steel vandal proof access panel of adequate size for maintenance/removal of where concealed. MIFAB M-500 Series approved equal.
3. **Vacuum Breaker Trap Primer:** Sloan VBF-72-A "TP" for use with exposed flushometers, complete with one-piece, chrome plated flush connection, flex-bond tube, diverter wall flange and fitting, chrome plated wall flange and fitting. Zurn approved substitute.

I. Water Closets and Urinals:

1. **Water Closet (WC-1),** floor-mounted, flush valve: Toto CT-705 , vitreous china, siphon jet, with TMT1HNC-32 water saver flush valve (max. 1.5 gallons per flush), SC514 white, solid plastic, open front, elongated contoured seat, less check hinge.
2. **Water Closet (WC-2),** floor-mounted, flush valve, Accessible "Hymont," vitreous china, siphon jet, with TMT1HNC-32 with water saver flush valve (max. 1.5 gallons per flush), and A.D.A. approved handle, SC514 white, solid plastic, open front, elongated seat, less check hinge.
3. **Water Closet (WC-3),** floor mounted, flush tank: Toto CST-7443 "Drake" tank type, vitreous china, siphon assisted, with tank fittings, angle stop, and SC514 white, solid plastic, closed front, elongated seat, with check hinge and cover (max. 1.5 gallons per flush).
4. **Urinal (UR-1),** wall-hung: Toto UT370 vitreous china, washout with TMU1HNC water saver flush valve (max. 1.0 gallons per flush), mount with floor to rim height as indicated on Architectural drawings.
5. **Urinal (U-2),** wall hung: Toto UT370 vitreous china, siphon jet, with TMU1HNC water saver flush valve (max. 1.0 gallons per flush), mount with floor to rim height as indicated on Architectural drawings.

J. Lavatories and Wash Fountains:

1. Lavatory (L-1), counter-mounted: Toto LT501 20" x 17", vitreous china, self-rimming, with Chicago 802A-665 self-closing faucet with 2.0 GPM aerator (.25 gallons per cycle), angle stops, grid drain and P-trap.
2. Lavatory (L-2), counter-mounted, Accessible: Crane 1-287V "Sonnet", 20" x 17", vitreous china, self-rimming with Chicago 802A-665 self-closing faucet with 2.0 GPM aerator (.25 gallons per cycle), angle stops, grid drain tailpiece, P-trap and provide McGuire insulated cover on P-trap, tailpiece, stops and supply per A.D.A. requirements.
3. Lavatory (L-3), wall hung, Accessible: Toto LT307, 20" x 18", vitreous china, with Chicago 802A-665, self-closing faucet with 2.0 GPM aerator (.25 gallons per cycle), angle stops, grid drain, P-trap and tailpiece. Provide J.R. Smith #700 carriers and McGuire insulated cover on tailpiece, P-trap, stops and supply per A.D.A. requirements. Mount with floor to rim height as indicated on Architectural Drawings.
4. Lavatory (L-4), counter-mounted: Just SL-1815-A-GR, 18" x 15" x 7-1/2" deep 18 gauge stainless steel, self-rimming with Chicago 895-320-E2605 faucet with wrist blade handles and 0.5 GPM aerator, angle stops, cup strainer, P-trap and gooseneck tailpiece.

K. Sinks:

1. Sink (S-1), counter-mounted: Just SL-2122-A-GR, 21" x 22" x 7-1/2" deep, 18 gauge stainless steel, self-rimming with Chicago No. 1100 faucet, 2.0 GPM aerator, crumb cup strainer, angle stops, tailpiece and P-trap.
2. Sink (S-2), counter-mounted, double compartment: Just DL-2133-A-GR, 21" x 33" x 7-1/2" deep, 18 gauge stainless steel, self-rimming, crumb cup strainer, Chicago No. 1100 faucet with 2.0 GPM aerator, tailpiece, angle stops and with In-Sink-Erator Model 333-SS ½ HP garbage disposal.
3. Sink, Bar Sink (S-3): Just SL-1515-A-GR, 15" x 15", 18 gauge stainless steel, counter mounted, self-rimming, Chicago No. 1895 gooseneck spout faucet, crumb cup strainer, angle stops, P-trap and tailpiece.
4. Mop Service Sink (MS-1), corner, floor-mounted: Williams MTB-2424, or equivalent Fiat, molded stone, 24" x 24" x 10" with T-15-VB faucet, T-40 S.S. mop hanger, T-35 hose and wall hook, vinyl bumper guard for 2 exposed sides, 20 gauge type 304 stainless steel splash panels. Provide silicone sealant between basin and all wall and floor surfaces per manufacturer's suggested installation.

L. Drinking Fountains/Water Coolers:

1. Electric Water Cooler (EWC-1) Accessible: Haws HWBFA8F, wall hung, barrier free, stainless steel fountain top, steel cabinet, color by Architect, ARI certified for 8 GPH or 50°F water, 1/5 HP, 115 volts, U.L. Listed. See Architectural Drawings for mounting heights.
2. Electric Water Cooler (EWC-2) Accessible: Wall hung, barrier free split level with A.D.A. apron, Haws HWBFA8L stainless steel fountain top, steel cabinet, color by Architect, ARI certified for 8 GPH of 50°F water, 1/5 HP, 115 volts, UL listed. See Architectural Drawings for mounting heights.

M. Water Heating Equipment:

1. NSF approved, as manufactured by American/Champion, A.O. Smith, State, Ruud, Rheem or Lochinvar.
2. Water Heater, Electric: UL listed. Glass lined storage tank, 125 psi working pressure minimum, with magnesium anode rods and fiberglass insulation. Completely factory wired to terminal block with thermostat, high temperature cutoff and contactors. Provide ASME rated P&T relief valve, piped to drain. Minimum 3 year tank guarantee. Model, capacity, recovery and voltage indicated on Drawings.

3. **Hot Water Circulating Pump:** Bell & Gossett, Thrush, Taco, Armstrong, Dunham- Bush. In-line circulator of all bronze construction, size as indicated on Drawings. Pump shall be supported independent of piping.
4. **Thermal Expansion Tank:** Diaphragm-type pre-pressurized tank, with rigid polypropylene liner and heavy-duty diaphragm, size as indicated on drawings. Amtrol "Therm-X-Trol" or approved equal.

N. Backflow Protection:

1. **Vacuum Breakers:** Pressure or atmospheric type, suitable for indicated service, Cla-Val, Febco, Watts or equal.
2. **Water Pressure Reducing Valve:** Cash Acme E Series, Mueller, Wilkins, Watts. Bronze housing, brass internal parts, heat resistant disc and diaphragm, integral monel strainer screen.
3. **Reduced Pressure Type Backflow Preventer:** Beeco, Conbraco, Cla-Val, Crane, Lawler, Febco, Toro, or Watts, as approved by authorities. Full line size, serviceable without removing from line. Install with indirect waste funnel piped to drain.

WORKMANSHIP

- A. Conform to work procedures specified in General Provisions Section.
- B. Install piping systems and insulation as specified in Basic Materials & Methods and Mechanical Systems Insulation Sections.
- C. Confirm final connections to all fixtures and equipment prior to performing work.
- D. All self-rimming counter-mounted lavatories and sinks shall be provided with caulking between fixture and counter-top. In addition, provide caulking between faucets and faucet ledge where factory supplied gaskets are not available.
- E. **Water Piping:**
 1. Provide a water cutoff valve and a hose bibb drain on water supply line where it enters building. Provide cutoff valves to zone building as required and as indicated on Drawings. See Basic Materials & Methods Section.
 2. Provide a shock suppressor for flush valve operated fixtures where indicated on Drawings. Location and size shall conform to PDI and local code requirements. Stainless steel vandalproof access panels shall be provided for concealed units.
 3. Disinfect all lines with fluid chlorine or hypochlorite. Introduce sufficient chlorine to provide an initial concentration of 50 ppm. Disinfect for 24 hour period, opening and closing valves in system at various points during disinfection. Following chlorination, thoroughly flush complete system until replacement water is comparable in quality to water from the water supply system. Submit certification.
- F. **Waste and Vent Piping:**
 1. Slope all waste lines inside and outside building in accordance with requirements of governing plumbing code and local authority having jurisdiction, in flow direction shown on Drawings.
 2. Establish grade lines with surveyor's level. Verify location of all sewer taps before start of work and make necessary grade adjustments.
 3. Drain vent lines back to waste lines. Group roof vents where possible.

4. Locate cleanouts at a maximum of 100' intervals in accordance with the U.P.C. and as indicated on Drawings.
5. Flush piping clean with water after installation.
6. Install fixtures in accordance with manufacturer's recommendations.
7. Lavatory, urinal, drinking fountain and electric water cooler supports: Hang fixtures and supports or set with 1/4" bolts or screws of sufficient length to securely fasten the fixture to the backing or wall. Secure fixture hangers set against concrete or masonry walls with 5/16" bolts into "Tamp-In" type anchors, or 2-unit cinch anchors. Do not use wood plugs. For fixture hangers set against metal stud walls, secure to metal backing plates at the time the rough piping is installed, and use a steel plate 1/4" thick, and not less than 4" wide. Attach the plate to a stud at each end of the plate, and to each stud which it passes. At metal studs attach the plate by bolting with not less than two 1/4" U-bolts per stud with the bolts through the plate and around the flange of the stud or by welding with a 1/8" fillet weld across the full width of the flange at top and bottom of the plate.

G. Testing:

1. Complete and test pipe rough-in before insulation or any other finish work is applied. Covering of work before acceptance is prohibited.
2. Test water pipe systems at 100 psi minimum in presence of Engineer and prove to be tight. Use higher pressure when indicated, or where required for building height or by authorities having jurisdiction.
3. Test drainage systems in presence of Engineer to prove to be tight as per tests prescribed by the Uniform Plumbing Code and/or any other governing state or local code.
4. After completion, inspect and test all fixtures for adequate water pressure and flow, and make necessary adjustments. Cooperate with other trades in testing fixtures and equipment involving work under this Section.

AUTOMATIC SPRINKLER SYSTEM

GENERAL

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WORK SPECIFIED HEREIN

- A. Provide all labor, materials, and equipment necessary for a complete automatic fire sprinkler and wet standpipe system. Sprinkler system installation shall be approved by the City of Globe/Miami Fire Prevention Department and the State Fire Marshall, in accordance with the requirements of the National Fire Protection Association Standard for the Installation of Sprinkler Systems (NFPA 13). All equipment, devices, and components shall be either U.L. listed and/or FM approved.
- B. Prepare working plans and shop drawings: Working plans and shop drawings shall be sealed and signed by an Arizona registered professional engineer as required by local authorities having jurisdiction. Plans shall show all piping, sprinklers, hangers, earthquake bracing, roof construction and occupancy of each area, including ceiling and roof heights as required by NFPA 13. Indicate the sections to be shop welded and the type of weld fittings to be used. Submit shop drawings to the Arizona State Fire Marshall, Owners Insurance Underwriter and the City of Globe/Miami for review and approval prior to system installation. Approved shop drawings shall then be submitted to the Architect for review. When submitting shop drawings, include copies of water system test reports and all hydraulic calculations with system curves. Indicate locations of the water flows and pressure tests and show these test results as a basis for the calculations.
- C. At least one set of approved/certified documents with all required stamps of approval shall be maintained on-site and made available to City and State inspectors upon request during construction phase of work.
- D. The Contractor shall maintain on the site an accurate record of "as-built" drawings indicating all changes made to the system layout from that shown on the approved/certified drawings.
- E. If there is a conflict between the referenced standards, codes, or authorities having jurisdiction during design or installation; then it shall be the Contractor's responsibility to bring the conflict to the attention of the Architect/Owner immediately for resolution prior to commencement of any additional work. This conflict shall be resolved at no additional cost to the Owner.

SPRINKLER SYSTEM DESIGN

- A. The entire building shall be protected with an automatic fire sprinkler system. The sprinkler system shall be designed for light hazard occupancy in conformance with the general requirements of applicable sections of NFPA Standards, the specific requirements of the local fire prevention bureau, and the Owner's insurance agent. Refer to Drawings for riser locations and additional design information where indicated.
- B. The fire protection contractor providing sprinkler system design shall determine, prior to bid, the number of sprinkler heads anticipated in the design. If one hundred (100) or more heads are required, the contractor shall include in the bid a U.L. Listed monitoring panel, local pull station, local smoke detector (at the panel location), and an autodialer to supervise the flow and tamper switches of the sprinkler system as required by the local jurisdiction. These components must be included on the sprinkler system plans submitted to the Fire Marshall and local fire prevention department for approval.
 1. The fire sprinkler contractor shall coordinate with the mechanical contractor and provide all duct smoke detectors required by the mechanical plans.

2. If a monitoring panel is required, it shall include monitoring of duct smoke detectors, dampers and HVAC shut-down. The fire sprinkler contractor shall coordinate with the mechanical contractor for the number and location of all devices to be monitored prior to shop drawing submittal. Closing of any smoke damper or automatic shutdown of any HVAC unit shall be transmitted to the remote monitoring station as a trouble signal.
 3. Power wiring for all monitored devices and shut-down of HVAC equipment shall be part of the electrical contractor's work.
 4. Signal wiring, monitoring system and components shall be furnished by the fire sprinkler contractor.
- C. If required, the contractor's bid shall include a complete monitoring system, acceptable to the authority having jurisdiction, which reports to a constantly-attended location identified by the Owner's representative.
 - D. Not later than two weeks after receipt of Notice To Proceed, the contractor shall notify the Owner's representative that the system must report to a constantly-attended location, if it is required, and that the Owner must make arrangements for monitoring acceptable to the authority having jurisdiction.
 - E. All elevator hoistways and associated elevator equipment rooms shall be protected by a double interlocked, supervised pre-action fire sprinkler system. Pre-action system release control panel, and associated heat detectors are part of the fire sprinkler work, control panel shall be provided with auxiliary contacts as needed. Coordinate with fire alarm system contract.
 - F. Connect to the new fire line as shown on the Civil Engineering Drawings. Size fire line and alarm riser for the facility as shown on the Plumbing Drawings. Final size to be determined by hydraulic calculations.
 - G. All pipe sizes shall be based on Hydraulic sizing methods in accordance with the requirements of NFPA. Hydraulic calculations shall include a pressure loss through a future installation of a double check valve assembly at point of connection to City main if a backflow protection device is not required to be installed at time of construction by authorities having jurisdiction.
 - H. Wiring of waterflow switch, tamper switches and alarm bells is in Electrical Division. Coordinate with electrical engineer and electrical contractor.
 - I. Provide a permanently attached hydraulic data name plate at fire sprinkler system riser in accordance with the requirements of the City of Globe/Miami Fire Prevention Department and NFPA.

MATERIALS

- A. Miscellaneous materials as specified in General Provisions Section.
- B. Fire Sprinkler Heads:
 1. Grunau Liquidator LD or equal by Grinnell, Automatic, Central, Reliable, Viking, or Star, temperature and area of coverage ratings in accordance with NFPA 13.
 2. In interior finished spaces with suspended ceilings, provide recessed ceiling sprinkler head, chrome finish, 1/2" orifice, chrome ceiling plate.
 3. In interior finished spaces without suspended ceilings, provide sidewall sprinkler head, chrome finish, 1/2" orifice, chrome wall plate.
 4. In exterior soffits, provide pendent mount head, chrome finish, 1/2" orifice, pendent mount with prime coated ceiling plate painted to match ceiling.

5. In Janitor Closets, Electrical, Mechanical, and Storage Rooms without finished ceilings, provide upright or pendant mount, 1/2" orifice, plain bronze finish, upright or pendant mount. In the preceding areas with finished ceilings, provide similar head except with plain bronze finish and white ceiling plate.
6. In concealed spaces enclosed wholly or partly by combustible construction, provide pendant or upright sprinklers, solder-type head, 1/2" orifice, plain bronze finish.
7. In areas subject to freezing and temperatures cannot be reliably maintained at or above 40°F (4°C), use dry pendent or sidewall sprinkler heads. Use recessed, flush, extended, or adjustable type where applicable.
8. Sprinkler head cabinet: Provide spare sprinkler heads and sprinkler head wrench in a cabinet at an accessible location next to each valve. The number and types of spare heads shall be as required in NFPA 13 Section 2-2.7.

C. Valves and Accessories:

1. Valves shall be plainly marked with the name or registered trademark of the manufacturer and size of the valve, including UL and/or FM identification mark.
2. Tamper switches: Switches designed specifically for detecting closure of water supply valves. Coordinate voltage with fire alarm panel supplier. Provide tamper switch on fire alarm riser shut-off valve.
3. O.S. and Y valves: Kennedy iron body bronze mounted, double disk with parallel seats, UL approved with wire seal, or approved equal.
4. Butterfly valves: Grinnell IWU-LUG ductile iron body with stainless steel stem, aluminum bronze disc, phenolic ring and Buna H seat, or approved equal.
5. Check valves: Kennedy 125 for piping 2-1/2" through 3" screwed ends, or 126 for piping 2-1/2" through 8" flanged ends, cast iron body bronze mounted with bronze disc, or approved equal.
6. Alarm valve: Grinnell Model F200 or F2001, or approved equal. Provide basic trimmings consisting of materials for the external bypass, gauges and main drain connections. Provide alarm trimmings consisting of water motor and pressure switch connections.
7. Waterflow detector: Grinnell Model WFD, or approved equal, vane-type waterflow sensor with built-in pneumatic retard device and automatic reset feature. Sensor complete with two single-pole double-throw snap action switches which may be wired for either normally-open or normally-closed contact operation.
8. Alarm bells: Provide 10" diameter water motor-driven or electric alarm bell on exterior of building. Viking, Reliable, Grinnell, Star. Discharge from water motor shall be piped to grade.
9. Fire department connection(s) shall be provided in accordance with requirements of all authorities having jurisdiction. Provide with check valve. Approved automatic drip shall be required only where FDC is not remotely located.

D. Pipe and Fittings:

1. Cast iron underground piping: Ductile iron pressure water pipe, Class 150, centrifugally cast, cement lined, AWWA C-151, ANSI A-21.51, tar coated, with mechanical joint fittings, or with slip-on joints with rubber rings where approved by authorities. Provide new pipe and fittings with the weight and class painted on the inside of each pipe. Every pipe and fitting shall be cleaned of all debris, stone and dirt, and inspected for cracks and holes before being laid. Protect against entry of concrete, plaster, mortar, etc.

2. **Cast iron riser piping:** Provide cast iron riser piping to sprinkler system to above floor level, and connect to steel piping by means of flange and spigot piece. Piping for inside building, above ground, provide black steel pipe, conforming to ASTM A-120, ANSI B.35 or welded wrought iron pipe conforming to ASTM A 72.
3. **Sprinkler pipe of the welded and seamless type,** conforming to latest ASTM A53 or ASTM A135 Schedule 40 specifications. Pipe used in welded or roll grooved (rolled or cut) systems shall have a minimum pipe wall thickness in accordance with Schedule 40. Note: Use of thin wall piping not allowed.
4. **Sprinkler pipe couplings and changes of direction shall be accomplished by the use of fittings suitable for use in sprinkler systems as defined in Article 3-13 of NFPA 13.** Bushings or mechanical locking-type (push-on) fittings shall not be used unless written approval is obtained from the Architect.
5. **Sprinkler piping that is exposed to the weather, or used in a corrosive atmosphere shall be galvanized.**
6. **Piping subject to freezing shall be protected as required by NFPA 13 Section 4-6.4.**
7. **Provide and install pipe sleeves where piping penetrates floors and walls. After the piping has been installed, fill the vacant space between sleeve and pipe with approved sealant compound.**
8. **Provide floor, wall and ceiling escutcheon flanges on all exposed places where pipe penetrates walls, ceilings, or floors.**

WORKMANSHIP

- A. **Quality Assurance:** Installation of fire protection piping, equipment, specialties, accessories, and repair and servicing of equipment shall be performed only by a qualified installer. The term qualified means experienced in such work (experienced shall mean having a minimum of 5 previous projects similar in size and scope to this project), familiar with all precautions required and has complied with all the requirements of the authorities having jurisdiction. Installer shall be licensed with the State and Local authorities having jurisdiction. Submit evidence of such qualifications to the Owner and Architect with submission of bid.
- B. **Conform to work procedures specified in General Provisions Section.**
- C. **Location:** In general, sprinkler piping shall be installed at maximum height throughout the building. Offset piping as required to clear mechanical ductwork, HVAC/plumbing piping, building structure, etc. The mechanical and electrical systems installation (equipment, ductwork, diffusers, piping, light fixtures, etc.) shall have priority over space within the building. Conceal piping above ceilings. Any piping installed in such a manner (other than specifically required by code) to block access to mechanical equipment and or access to ceilings through acoustical lay-in-tiles shall be relocated at contractor's expense.
- D. **Groove joints:** Pipe joined with mechanical grooved couplings shall be joined by a listed combination of couplings, gaskets and grooves. When grooves are cut or rolled on the pipe they shall be dimensionally compatible with the coupling.
- E. **Pipe contraction and expansion:** Install in such a manner that its contraction and expansion will not do any damage to the pipes, the connected equipment or the Building. Install offsets, swing joints, expansion joints, etc., as required to prevent excessive strains in the pipe work. All supports shall be installed to permit the materials to contract and expand freely without putting any strain or stress on any part of the system. Provide anchors as necessary.

- F. **Piping supports:** All sprinkler piping must be substantially supported from building structure and only approved type hangers shall be used. No chains, wire, or perforated band iron will be permitted for hangers. Hangers below concrete construction shall be supported by means of inserts, power driven studs, expansion cases or Phillips-type shells of sufficient strength to support 1" through 5" size sprinkler piping. Sprinkler lines under ducts shall not be supported from ductwork but shall be supported from the building structure with trapeze hangers where necessary or from steel angles supporting ductwork in accordance with NFPA 13. Provide an inspectors test and drain fitting at end of line on all new systems.
- G. **Earthquake protection:** Provide flexible couplings in feed mains and cross mains and approved sway bracing for feed mains and cross mains in accordance with NFPA 13.
- H. **Flushing connections:** Provide flushing connections in cross mains as specified in NFPA 13.
- I. **Sprinkler head installation:** Sprinklers shall be installed per the requirements of NFPA 13 with regard to ducts, obstructions, and partitions. Sprinkler heads located 7'-0" or less above finished floor elevation shall be provided with approved guards. Sprinkler heads shall be located symmetrically about light fixtures, ceiling tiles, air conditioning diffusers and grilles. Architect shall have the right to require adjustments in sprinkler head locations based on aesthetic considerations. If such adjustments result in an increase of up to 10% in the number of sprinkler heads and/or lineal feet or piping necessary to meet NFPA requirements, the heads and piping shall be installed at no additional cost to the Owner.
- J. **Testing of underground pipe:** Test all underground pipe for a period of two hours at a hydrostatic pressure of 200 psi in accordance with NFPA 13. Leakage shall not exceed quantities indicated. Tests shall be made before the trench in which pipe is laid is backfilled. All underground piping shall be thoroughly flushed in accordance with the requirements of NFPA 13. The flush test must be witnessed by a proper authority. Notify the Architect 24 hours in advance regarding time of tests.
- K. **Testing overhead pipe:** Test all overhead sprinkler piping for a period of two hours, at a hydrostatic pressure in accordance with NFPA 13. All piping, valves, etc., shall be watertight. Notify Architect 24 hours in advance regarding time of tests.
- L. **Leak damage:** Assume responsibility during the installation and testing periods of the sprinkler system for any damage to the building and its contents caused by leakage of the fire protection equipment. Pay for the necessary replacements or repairs to work of others damaged by such leakage.
- M. **Freeze protection:** All wet sprinkler system piping, equipment, valves, etc. not located/installed inside of the building insulation system so that the building heating system will prevent piping from freezing shall be protected from freezing in accordance with the requirements of N.F.P.A.
- N. **Coordination:** Where connection or interlock of electrical and mechanical systems is required with the fire protection system and such connection or interlock is not specifically detailed under the mechanical or electrical subcontractor's work, it shall then be the responsibility of the fire protection subcontractor to provide all components, wire, conduit and labor for the connection or interlock. This includes, but is not limited to, tamper switches, flow switches, and deluge valves.

PROJECT COMPLETION/CLOSEOUT

- A. **Operation and Maintenance Manual:**
 - 1. Upon completion of the installation and final inspections/approvals of work, the Contractor shall provide the Architect and Owner with a looseleaf manual containing:
 - a. A detailed description of the system.
 - b. A detailed description of routine maintenance required or recommended or as would be provided under a maintenance schedule and detailed maintenance instructions for each type of device installed.
 - c. Manufacturer's data sheets and installation manuals/instructions for all equipment installed.

- d. A list of recommended spare parts.
 - e. Service Directory.
 - f. Record "As-Built" drawings consisting of one (1) set of reproducible mylar "record" drawings and two (2) additional sets of blueline "record" drawings shall be delivered to the Owner. Contractor shall coordinate this with Architect.
2. **Guarantee Period:** The Contractor shall guarantee in writing all materials and workmanship for a period of two years beginning with the date of substantial completion. The contractor shall be responsible during the design, installation, testing and guarantee period for any damage caused by defects in work, materials, or equipment.
 3. **Emergency Service:** During the warranty period, the Contractor shall provide emergency repair service for the entire automatic sprinkler system. This service shall be provided on a 24-hour per day, 7 day per week basis. Coordinate details with Owner's representative.

AIR DISTRIBUTION

GENERAL

This Section valid only when considered in total with other Contract Documents. Cross references are for convenience of reader and their inclusion in or omission from any Section in no way limits the scope or intent of any Contract Document.

WORK SPECIFIED HEREIN

- A. Complete air distribution system as shown on Drawings.
- B. Complete heating, ventilating and air conditioning system as shown on Drawings.

RELATED WORK: Specified in other Sections.

- A. Electric power wiring and starters (in ELECTRICAL Division).

MATERIALS: Miscellaneous materials and insulation as specified in General Provisions and Mechanical Systems Insulation Sections.

- A. Fans: Submit clearly outside of unstable air range, with adjustment available to increase or decrease RPM. Isolate all fans and motors to prevent noise carryover from and to ducts.
 - 1. Roof exhauster: Acme, Exit-Aire, Greenheck, Jenn, Loren-Cook, Carnes, Peerless, Penn, or Power Line, spun aluminum cover, aluminum non-overloading wheel, direct or adjustable belt drive as indicated, motor out of air stream, with permanently lubricated bearings, AMCA certified. Install integral disconnect switch, birdscreen and backdraft dampers. Furnish insulated factory fabricated mounting curbs.
 - 2. Ceiling fan: Acme, Breidert, Greenheck, Loren-Cook, Carnes, Penn Zephyr, or Power Line, acoustically insulated, centrifugal wheel, integral grille, removable motor and fan, backdraft damper, AMCA certified. Install with pitched roof jack, flat roof cap, or wall cap as indicated or suitable for the application. Provide integral unit mounted speed controller.
- B. Ductwork:
 - 1. Low pressure, constructed from new hot dipped galvanized sheet iron or steel, ASTM A-120, in accordance with Uniform Mechanical Code (UMC) SMACNA Standards for gauge and reinforcement, Tables 1-3 thru 1-9. Construct and erect ductwork in accordance with the latest issues of UMC SMACNA Standards and ASHRAE Guide. Comply in fabrication of joints, seams, bracing, reinforcing, hangers, fittings, housings and casings, special applications. Classify ductwork in accordance with SMACNA Table 1-1 and UMC. Seal ductwork in accordance with SMACNA Table 1-2 and UMC.
 - 2. In general, on vertical risers and other duct runs where the method of support specified above is not applicable, support by substantial angle brackets designed to meet field conditions and installed to allow for duct expansion.
 - 3. All ductwork shall have all joints and seams neatly closed for appearance as well as tightness. Ductwork on positive and negative systems 2" or less static pressure shall have a maximum leakage loss not exceeding 10% of total system cfm.
 - 4. Install metal factory fabricated turning vanes in all right angle bends in the ductwork, except that elbows having centerline radii of 1-1/2" times the greater duct dimension may omit turning vanes.

5. Install access doors in ductwork where indicated and wherever else required for ready access to operating parts of any kind. Doors approximately 12" x 12", with brass hinges and sash type fasteners. Insulated access doors in insulated duct same as duct.
 6. Provide flexible connections, Ventifabrics or Duro Dyne, of 4" width, neoprene coated glass fabric in all connections between equipment and duct casings, and where shown on Drawings. Where flexible connections are exposed to sunlight or weather, provide Hypalon coated glass fabric. No rigid or metal to metal contact acceptable.
 7. Make centerline radius of curves, bends, offsets, branch connections, etc., equal to width of duct or larger, even if drawn simplified as mitered.
 8. Provide takeoff connections for branch ducts, ceiling, outlets, registers, etc., as indicated on Drawings, unless radius fittings are used.
 9. All duct sizes shown are clear inside dimensions. Allow for thickness of insulation when fabricating ductwork.
- C. Dampers: Manual volume control dampers in rectangular ducts, opposed blade Young 817 Series, or similar by Airstream, Dowco, Duro Dyne, Ruskin, or Ventlok, with operator side mounted, key operated. Where not readily accessible, Young 817A damper with 90 degree operation and expansion as required by the ceiling finish. Where not accessible to ready view, clearly mark at regular "No Flo" and "Full Open".
1. In round ducts, manual dampers single blade type with Young 453 operator attached to side of duct.
- D. Combination Fire/Smoke Dampers:
1. Ruskin, Phillips, Safe Aire, Pottorff, Cesco, in accordance with NFPA-90A and U.L. 555S for leakage class II, "Dynamic" type damper.
 2. Damper complete with electrical fuse link, factory-installed U.L. Listed electric actuator, shunt type motor, and two position indicator switches linked directly to damper blade. Actuator rated at 120V.
 3. Fuse link permits damper operation under normal conditions and automatically locks damper in closed position when duct temperatures exceed 165°F.
 4. Install damper assembly per manufacturer's instructions to insure a U.L. installation. Provide access door clearly labelled "Fire/Smoke Damper Here".
 5. Install per manufacturer's instructions to insure a UL installation.
- E. Flexible Duct: Thermaflex II Type M-KE, for low pressure, and M-KH for high pressure, or equivalent Genflex, factory fabricated assembly, spiral construction, fiberglass blanket insulation, and mylar sheath. Connectors listed by Underwriter's Laboratories, Inc. for Class I ducts and complying with NFPA 90-A. Flexible duct suitable for 1-1/2 times the duct pressure at the connection.
1. Install with a minimum of bends, and extended straight where possible. Maximum run eight feet. Minimum bend radius of one and one-half times the diameter of the duct measured from the centerline. All joints and connections sealed and connected to sheet metal collars with worm drive clamps.
- F. Air Outlets: Registers, grilles and diffusers, Barber-Colman, EAP, Carnes, Krueger, T&B, or Titus, factory fabricated, baked enamel finish unless noted otherwise, type and material scheduled. Provide dampers on all outlets except grilles.

1. Provide quiet and effective performance in accordance with certified data of the manufacturer and as indicated on the Drawings. Submit a schedule of all registers, grilles and diffusers, indicating the location, types, specified air quantity, pressure drop, and N.C. rating. After the system is in operation, if excessive noises are noticeable in the ventilated spaces due to improper operation of outlet, reinstall at no additional cost to the Owner.
 2. On flanged outlets, provide sponge rubber gasket between flanges and wall or ceiling.
 3. Support ceiling outlets from ductwork or directly from building structural system, and not from ceiling support system.
- G. Split System Heat Pump:
1. Manufacturers: BDP, Carrier, Climatrol, Lennox, ICP Commercial, Trane, York, or McQuay.
 - a. Equipment shipped completely assembled, precharged, and wired internally ready for field connections. System test operated by manufacturer at the factory before shipment.
 - b. Outdoor unit:
 - 1) Refrigerant system with reversing valve, check valve, liquid line service valve, vapor service valve, refrigerant test valve and separate driers in heating and cooling circuits.
 - 2) Compressors resiliently mounted, with built-in 3-mode crankshaft lubrication, crankcase heater, discharge temperature limiter, current and temperature sensing motor overloads, guaranteed for 5 years for parts and service. Cooling system protected by high and low pressure switches and a five-minute compressor timed-off cycle controller.
 - 3) Include temperature sensing elements on outdoor coil to initiate defrost cycle only when required, controls to terminate cycle when defrosting heating load on heat pump as long as possible without energizing auxiliary heaters.
 - 4) Coils of nonferrous construction with aluminum fins mechanically bonded to seamless tubes.
 - 5) Fans direct-driven with inherent protection devices.
 - 6) Casing of heavy gauge galvanized steel with baked enamel finish. Service access by removable side panels. Include outdoor coil guard.
 - c. Indoor units:
 - 1) Coil construction similar to outdoor unit pan.
 - 2) Filter 2" throwaway type. Replace just prior to final balancing.
 - 3) Blower statically and dynamically balanced. Multi-speed motor resiliently mounted.
 - 4) Electric heater open-coil nichrome wire type, UL listed with entire indoor unit as an assembly, subfused in accordance with NEC. Heater equipped with automatic reset thermal cutoffs and supplemental thermal factory assembled with all controls installed and wired.
 - 5) Cabinet construction similar to outdoor unit casing, with fiberglass insulation lining.

- d. Provide 7-day programmable room thermostat with manual cycle selection switch and fan "on-auto" switch, two-stage heating and single stage cooling. Wiring between thermostat and indoor and outdoor units is included under this Section.
- e. Install refrigerant piping between indoor and outdoor units in accordance with manufacturer's recommendation.

WORKMANSHIP

- A. Coordinate with others to provide necessary holes, slots, chases, etc. to accommodate ductwork as work progresses. If structural difficulties prevent the installation of the work as shown on Drawings, make variations therefrom only as directed by Architect, with no change in Contract amount. Cut structural members only where permitted by Architect and Structural Engineer.
- B. Make deviations from indicated roof openings only with permission of Architect and Structural Engineer.
- C. Rough-in work shall proceed as rapidly as general construction of building will permit.
- D. Run all ductwork parallel to building elements. Conceal all ductwork in walls, floors, ceilings, chases, unless otherwise shown or noted on Drawings. Install work accurately to fit the rough-in drawings of cooling equipment, etc., into which it connects.
- E. Locate ducts out of the way of all doors, windows, service areas, access holes, access spaces, etc.
- F. Install equipment to operate without objectionable vibration or noise.
- G. Unless otherwise approved, ducts shall conform accurately the dimensions indicated and be straight and smooth on the inside, with joints neatly finished. Anchor ducts securely to the structural slab or framing in the building. Construct and install ducts as to be completely free from vibration under all conditions of operation.
- H. Construct duct openings at outlets so that plaster or paint will not crack, chip or peel beyond flange.
- I. Protect all exposed belt drives with a substantial guard.
- J. Repair or replace damaged work of other trades caused while installing air conditioning work.
- K. Install duct mounted smoke detectors furnished in Electrical Work, Division 16. Unit shut down interlock wiring in this work.
- L. Instructions and Manuals: After all balance work has been completed in a satisfactory manner, instruct Owner in proper operation and maintenance of air conditioning system and leave it in first class operating condition for Owner's use. Provide a typewritten set of instructions for starting, running and stopping. Furnish complete operating instruction, control and wiring diagrams, manuals, parts lists, warranty codes, and any other manufacturer's literature covering all equipment as described in General Provisions Section. During construction carefully collect and preserve all such literature. Instructions shall include installing Contractor's name, address and telephone number to be called for service.