

## SECTION 02 41 19 - SELECTIVE DEMOLITION

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions, apply to this Section.

#### 1.2 SUMMARY

- A. Section includes demolition and removal of selected elements indicated on Drawings in order to perform addition operations. The Owner will have first salvage rights on all items from existing building prior to demolition.
- B. Related Sections: Coordinate Work of this Section with work of other sections, including Division 01 Sections, as required to properly execute the work and as necessary to maintain satisfactory progress of the work.

#### 1.3 DEFINITIONS

- A. Remove: Detach items from existing construction and legally dispose of them off-site, unless indicated to be removed and salvaged or removed and reinstalled.
- B. Remove and Salvage: Detach items from existing construction and deliver them to Owner ready for reuse.
- C. Remove and Reinstall: Detach items from existing construction, prepare them for reuse, and reinstall them where indicated.
- D. Existing to Remain: Existing items of construction that are not to be removed and that are not otherwise indicated to be removed, removed and salvaged, or removed and reinstalled.

#### 1.4 SUBMITTALS

- A. Submit under provisions of Division 01 Section "Submittal Procedures".
- B. Qualification Data: For demolition firm and professional engineer.
- C. Schedule of Selective Demolition Activities: Indicate the following:
  - 1. Detailed sequence of selective demolition and removal work, with starting and ending dates for each activity. Ensure Owner's on-site operations are uninterrupted.
  - 2. Interruption of utility services. Indicate how long utility services will be interrupted.
  - 3. Coordination for shutoff, capping, and continuation of utility services.
  - 4. Locations of proposed dust- and noise-control temporary partitions and means of egress, including for other tenants affected by selective demolition operations.

5. Coordination of Owner's continuing occupancy of portions of existing building and of Owner's partial occupancy of completed Work.
  6. Means of protection for items to remain and items in path of waste removal from building.
- D. Inventory: After selective demolition is complete, submit a list of items that have been removed, salvaged, or recycled.

## 1.5 QUALITY ASSURANCE

- A. This Section outlines the minimum standards and requirements for this Project. Refer to the Drawings for additional requirements. Bring all conflicts and discrepancies to the attention of the Architect and do not start work until such conflicts and discrepancies are clarified and corrected.
- B. Demolition Firm Qualifications: An experienced firm that has specialized in demolition work similar in material and extent to that indicated for this Project.
- C. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.
- D. Standards: Comply with ANSI A10.6 and NFPA 241.
- E. Predemolition Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination". Review methods and procedures related to selective demolition including, but not limited to, the following:
1. Inspect and discuss condition of construction to be selectively demolished.
  2. Review structural load limitations of existing structure.
  3. Review and finalize selective demolition schedule and verify availability of materials, demolition personnel, equipment, and facilities needed to make progress and avoid delays.
  4. Review requirements of work performed by other trades that rely on substrates exposed by selective demolition operations.
  5. Review areas where existing construction is to remain and requires protection.

## 1.6 PROJECT CONDITIONS

- A. Owner will occupy portions of building immediately adjacent to selective demolition area. Conduct selective demolition so Owner's operations will not be disrupted.
1. Comply with requirements specified in Division 01 Section "Summary of Work".
- B. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.
- C. Notify Architect of discrepancies between existing conditions and Drawings before proceeding with selective demolition.

- D. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work.
  - 1. If materials suspected of containing hazardous materials are encountered, do not disturb; immediately notify Architect and Owner. Owner will remove hazardous materials under a separate contract.
- E. Storage or sale of removed items or materials on-site is not permitted.
- F. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.
  - 1. Maintain fire-protection facilities in service during selective demolition operations.

#### 1.7 WARRANTY

- A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during selective demolition, by methods and with materials so as not to void existing warranties.

#### PART 2 - PRODUCTS

Not Used

#### PART 3 - EXECUTION

#### 3.4 EXAMINATION

- A. Verify that utilities have been disconnected and capped.
- B. Survey existing conditions and correlate with requirements indicated to determine extent of selective demolition required.
- C. Inventory and record the condition of items to be removed and reinstalled and items to be removed and salvaged.
- D. When unanticipated mechanical, electrical, or structural elements that conflict with intended function or design are encountered, investigate and measure the nature and extent of conflict. Promptly submit a written report to Architect.
- E. Engage a professional engineer to survey condition of building to determine whether removing any element might result in structural deficiency or unplanned collapse of any portion of structure or adjacent structures during selective demolition operations.
- F. Survey of Existing Conditions: Record existing conditions by use of measured drawings.
- G. Perform surveys as the Work progresses to detect hazards resulting from selective demolition activities.

### 3.5 UTILITY SERVICES

- A. Existing Services: Maintain services indicated to remain and protect them against damage during selective demolition operations.
  - 1. Comply with requirements for existing services interruptions specified in Division 01 Section "Summary of Work".
- B. Service Requirements: Locate, identify, disconnect, and seal or cap off indicated utility services serving areas to be selectively demolished.
  - 1. Owner will arrange to shut off indicated services when requested by Contractor.
  - 2. Arrange to shut off indicated utilities with utility companies.
  - 3. If services are required to be removed, relocated, or abandoned, before proceeding with selective demolition provide temporary services that bypass area of selective demolition and that maintain continuity of services to other parts of building.
  - 4. Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit after bypassing.
    - a. Where entire wall is to be removed, existing services may be removed with removal of the wall.

### 3.6 PREPARATION

- A. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
  - 1. Comply with requirements for access and protection specified in Division 01 Section "Temporary Facilities and Controls".
- B. Temporary Facilities: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.
  - 1. Provide protection to ensure safe passage of people around selective demolition area and to and from occupied portions of building.
  - 2. Provide temporary weather protection, during interval between selective demolition of existing construction on exterior surfaces and new construction, to prevent water leakage and damage to structure and interior areas.
  - 3. Protect walls, ceilings, floors, and other existing finish work that are to remain or that are exposed during selective demolition operations.
  - 4. Cover and protect furniture, furnishings, and equipment that have not been removed.
  - 5. Comply with requirements for temporary enclosures, dust control, heating, and cooling specified in Division 01 Section "Temporary Facilities and Controls".
- C. Temporary Shoring: Provide and maintain shoring, bracing, and structural supports as required to preserve stability and prevent movement, settlement, or collapse of

construction and finishes to remain, and to prevent unexpected or uncontrolled movement or collapse of construction being demolished.

1. Strengthen or add new supports when required during progress of selective demolition.

### 3.7 SELECTIVE DEMOLITION, GENERAL

A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. The Owner will have first salvage rights on all items from existing building prior to demolition . Use methods required to complete the Work within limitations of governing regulations and as follows:

1. Proceed with selective demolition systematically, from higher to lower level. Complete selective demolition operations above each floor or tier before disturbing supporting members on the next lower level.
2. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping, to minimize disturbance of adjacent surfaces. Temporarily cover openings to remain.
3. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
4. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain fire watch and portable fire-suppression devices during flame-cutting operations.
5. Maintain adequate ventilation when using cutting torches.
6. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
7. Remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.
8. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
9. Dispose of demolished items and materials promptly.

B. Removed and Salvaged Items:

1. Clean salvaged items.
2. Pack or crate items after cleaning. Identify contents of containers.
3. Store items in a secure area until delivery to Owner.
4. Transport items to Owner's storage area designated by Owner or indicated on Drawings.
5. Protect items from damage during transport and storage.

C. Removed and Reinstalled Items:

1. Clean and repair items to functional condition adequate for intended reuse. Paint equipment to match new equipment.
2. Pack or crate items after cleaning and repairing. Identify contents of containers.

3. Protect items from damage during transport and storage.
4. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make item functional for use indicated.

### 3.8 SELECTIVE DEMOLITION PROCEDURES FOR SPECIFIC MATERIALS

- A. Concrete: Demolish in small sections. Cut concrete to a depth of at least 3/4 inch at junctures with construction to remain, using power-driven saw. Dislodge concrete from reinforcement at perimeter of areas being demolished, cut reinforcement, and then remove remainder of concrete indicated for selective demolition. Neatly trim openings to dimensions indicated.
- B. Masonry: Demolish in small sections. Cut masonry at junctures with construction to remain, using power-driven saw. Remove masonry between saw cuts.
- C. Concrete Slabs-on-Grade: Saw-cut perimeter of area to be demolished, then break up and remove.

### 3.9 DISPOSAL OF DEMOLISHED MATERIALS

- A. General: Except for items or materials indicated to be reused, salvaged, reinstalled, or otherwise indicated to remain Owner's property, remove demolished materials from Project site and legally dispose of them in an EPA-approved landfill.
  1. Do not allow demolished materials to accumulate on-site.
  2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
  3. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.
- B. Burning: Do not burn demolished materials.
- C. Disposal: Transport demolished materials off Owner's property and legally dispose in accordance with Division 01 Section "Construction Waste Management".

### 3.10 CLEANING

- A. Clean adjacent structures and improvements of dust, dirt, and debris caused by selective demolition operations. Return adjacent areas to condition existing before selective demolition operations began.

END OF SECTION

## SECTION 04 22 00 CONCRETE

### UNIT MASONRY

#### PART 1 - GENERAL

##### 1.1 SUMMARY

- A. Section includes concrete unit masonry required to complete the work.

##### 1.2 SUBMITTALS

- A. Product Data: Submit copies of manufacturer's specifications and instructions for reinforcing and accessory materials and proprietary materials as requested by Architect.
- B. Samples - Concrete Masonry Units (CMU):
  - 1. Submit 3 samples of each type of CMU unit. Select units to show the range of color and texture, which can be expected, in the finished Work.
    - a. Submit certification for fire rated units as specified.
  - 2. Submit full size sample of glazed CMU and full color brochure.

##### 1.3 QUALITY ASSURANCE

- A. Materials:
  - 1. Do not change source or brands of masonry mortar materials during the course of the Work.
  - 2. Obtain concrete masonry units (CMU) from one manufacturer, cured by one process and of uniform texture and color, for each type required for each continuous area and visually related areas.
- B. Fire-Rated Masonry: Comply with applicable requirements for materials and installation established by the American Insurance Association and other governing authorities.
  - 1. Submit certification that percent of solids of each CMU complies with Code requirements for hour ratings required.
- C. Regulatory Requirements: Comply with the applicable requirements of governing authorities and codes.
- D. Unit Masonry Standard: Comply with ACI 530.1/ASCE 6 "Specifications for Masonry Structures," except as otherwise specified.
- E. Coordination: Review installation procedures and coordinate with other Work that must be integrated with masonry.

#### 1.4 DELIVERY, STORAGE AND HANDLING

- A. Deliver masonry materials to project in undamaged condition.
- B. Store and handle masonry units off the ground, under cover, and in a dry location to prevent their deterioration or damage due to moisture, temperature changes, contaminants, corrosion, and other causes. If units become wet, do not place until units are in an air-dried condition.
- C. Store cementitious materials off the ground, under cover, and in dry location.
- D. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.
- E. Store masonry accessories including metal items to prevent corrosion and accumulation of dirt and oil.

### PART 2 - PRODUCTS

#### 2.1 MASONRY MATERIALS

- A. Concrete Block - Concrete Masonry Units (CMU):
  - 1. Size: Nominal face dimensions of 16" long x 8" high (15-5/8" x 7-5/8" actual), unless otherwise indicated.
  - 2. Special Shapes: Provide for lintels, corners, jambs, sash, control joints, headers, bonding and other special conditions.
  - 3. Hollow and Solid CMU: ASTM C 90, minimum net area compressive strength  $f'_m = 1500$  psi
  - 4. Weight: Provide light weight units producing dry unit weight of not more than 105 lbs per cubic foot except as acceptable for ground face units.
    - a. For ground face block, provide medium weight, or normal weight units using aggregate complying with ASTM C 33 or ASATM C 331 as required to match color and texture of Architect's selections to satisfaction of Architect
    - b. For ground face block, fill the ground surface with a cementitious grout having a minimum cured strength and durability equal to the block if required to obtain the soiling and cleanability requirements of ASTM C 744
  - 5. Exposed Faces:
    - a. Match texture of existing CMU.
    - b. Where ground faces are shown or scheduled, provide CMU with exposed faces matching the required color, texture and pattern.
    - c. Where ground faces are shown or scheduled, provide units having products standard factory applied having resistance to soiling and cleanability complying with ASTM C 744.
- B. Materials - Mortar and Grout:
  - 1. Portland Cement: ASTM C 150, Type I.



2. Masonry Cement: ASTM C 91.
  3. Lime: ASTM C 207, Type S.
  4. Aggregate for Mortar: Sand, ASTM C 144 or ASTM C 404, Size No. 2, except for joints 1/4" and less (if any) use aggregate graded with 100% passing the No. 16 sieve.
  5. Water: Clean, free of deleterious materials which would impair strength or bond.
  6. Aggregate for Grout: ASTM C 404.
- C. Reinforcing Bars: ASTM A 615, Grade 60.
- D. Continuous Wire Reinforcing:
1. Provide welded wire units prefabricated in straight lengths of not less than 10', with matching corner ("L") and intersection ("T") units. Fabricate from steel wire complying with ASTM A 82, with deformed continuous side rods conforming to ACI 530.1 and plain cross rods, with unit width of 1-1/2" to 2" less than thickness of wall or partition.
  2. Provide units fabricated as follows:
    - a. Ladder type fabricated with single pair of side rods and perpendicular cross rods spaced not more than 16" o.c.
  3. Wire: Fabricate with 9-gauge side and cross rods, unless otherwise indicated.
    - a. Provide zinc-coated (galvanized) wire ASTM A 641 Class 1 (0.40 oz.).
- E. Anchoring Devices: Where control joints occur and at intersecting walls, provide anchors 16" o.c. similar to Dur-O-Wall D/A 220 joint stabilizing anchor or Hohmann & Barnard style H or V # slip-set stabilizer
- F. Accessory Materials:
1. Bond Breaker Strips: 15 lb. asphalt impregnated building felt.
  2. Pre-Molded Control Joint Strips: Solid rubber or PVC strips with a minimum Shore A durometer hardness of 70, designed to maintain lateral stability in masonry wall.
  3. Compressible Filler: Expanded polyethylene.
- G. Steel Lintels: Fabricate from ASTM A-36 steel. Shop prime with one heavy coat of dust inhibitive, non-lead and non-chrome metal primer after fabrication.
- ## 2.2 MORTAR MIXES
- A. Comply with ASTM C 270, Proportion Specifications for Type "N" Mortar.
- B. Grout: Portland cement, sand, gravel and water, proportioned as required to provide a 28-day minimum compressive strength of 3000 psi.
- C. Mixing Mortar and Grout:
1. Combine and mix cement, lime, water and aggregates for a minimum of 5 minutes in a mechanical batch mixer. For mortar, add as much water as is required for workability. Mortar may be retempered by adding water and remixing, as required for workability. Do

not use mortar or grout which has begun to set or if more than 2-1/2 hours, has elapsed after initial mixing.

2. Mix grout to have a slump of 10" plus or minus 1" at time of placement.
3. Do not add air-entraining agents or other admixtures.

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances and other specific conditions, and other conditions affecting performance of unit masonry.
- B. Examine rough-in and built-in construction to verify actual locations of piping connections prior to installation.
- C. Start of work will evidence acceptance of conditions.

#### 3.2 INSTALLATION

- A. Tolerances: Erect masonry within the following tolerances from the specified dimensions:

1. Dimension of elements.

- |    |                               |                    |
|----|-------------------------------|--------------------|
| a. | In cross section or elevation | -1/4 in., +1/2 in. |
| b. | Mortar joint thickness        |                    |
|    | bed                           | +1/8 in.           |
|    | head                          | -1/4 in., +3/8 in. |
|    | collar                        | -1/4 in., +3/8 in. |
| c. | Grout space or cavity width   | -1/4 in., +3/8 in. |

2. Elements

- |    |  |  |
|----|--|--|
| a. | Variation from level:                              |  |
|    | bed joints   | +1/4 in. in 10ft.<br>+1/2 in. maximum                        |
|    | top surface of bearing walls                       | +1/4 in. in 10ft.<br>+1/2 in. maximum                        |
| b. | Variation from plumb                               | +1/4 in. in 10ft.<br>+3/8 in. in 20ft.<br>+1/2 in. maximum   |
| c. | True to a line                                     | +1/4 in. in 10ft.<br>+3/8 in. in 20ft.<br>+1/2 in. maximum   |
| d. | Alignment of columns and walls (bottom versus top) |  |
|    |  | +1/2 in. for bearing walls<br>+3/4 in. for non-bearing walls |

3. Location of elements
  - a. Indicated in plan +1/2 in. in 20ft.  
+3/4 in. maximum
  - b. Indicated in elevation +1/4 in. in story height  
+3/4 n. maximum
4. In placing of reinforcement (See Article 3.4E of ACT530.1).

B. Basic Requirements:

1. Comply with ACI 530.1 and this Specification.
2. Leave openings for equipment to be installed before completion of masonry work. After installation of equipment, complete masonry work to match Work immediately adjacent to the opening.
3. Cut masonry units using motor-driven saws to provide clean, sharp, unchipped edges. Cut units as required to provide required pattern and to fit adjoining Work neatly. Use full-size units without cutting wherever possible.
4. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint widths and to properly locate openings, movement type joints, returns and offsets. Avoid the use of less than half-size units at corners, jambs and wherever possible at other locations.
5. Lay up walls plumb and true (to comply with specified tolerances,) with courses level, accurately spaced and coordinated with other Work.
6. Where shown or scheduled, provide special units and bond.
7. Lay all other exposed masonry in the bond pattern matching existing.
8. Lay all other exposed masonry in the bond pattern shown or, if not shown, lay in running bond with vertical joint in each course centered on units in courses above and below (except in one - third running bond where required by unit size).
9. Lay concealed masonry with all units in a wythe bonded by lapping not less than 2". Bond and interlock each course of each wythe at corners. Do not use units with less than 4" horizontal face dimensions at corners or jambs.
10. At infills, remove existing to full units and tooth-in to maintain continuity of coursing.

C. Mortar Bedding and Jointing:

1. Lay units with full mortar coverage on horizontal and vertical face shells. Bed webs in mortar in starting course and in all courses of piers, columns and pilasters, and where adjacent to cells or cavities to be reinforced or filled with concrete or grout.
2. Maintain joint widths except for minor variations required to maintain bond alignment. If not shown, lay walls with 3/8" joints.
3. Tool exposed joints slightly concave, (except as otherwise shown) (and) (required to match existing.)
4. Cut joints flush for masonry walls, which are to be concealed or to be covered by other materials.
5. Remove masonry units disturbed after laying; clean and reset in fresh mortar. Do not pound corners at jambs to fit stretcher units which have been set in position. If adjustments are required, remove units, clean off mortar and reset in fresh mortar.

D. Built-In Work:

1. As the Work progresses, build in items specified under this and other Sections and as required to complete the Project. Fill in solidly with masonry around built-in items.
2. Fill space between hollow metal frames and masonry solidly with mortar.
3. Where built-in items are to be embedded in cores of hollow masonry units, place a layer of metal lath in the joint below and rod mortar or grout into core.
4. Fill cores in hollow units with grout minimum 3 courses (24") under bearing plates, beams, lintels, posts and similar items unless otherwise indicated.

E. Anchoring Masonry Work:

1. Anchor masonry to structural members where masonry abuts or faces such member to comply with the following:
  - a. Provide compressible filler not less than 1" in thickness between masonry and structural member.
  - b. Anchor masonry to structural members with metal ties embedded in masonry joints and attached to structure. Provide anchors with flexible tie sections.
  - c. Space anchors as shown but not more than 16" o.c.

F. Lintels:

1. Install steel lintels.
2. Provide masonry lintels where shown and wherever openings of more than 1'0" are shown without structural steel or other supporting lintels. Provide precast or formed-in-place masonry lintels. Thoroughly cure precast lintels before handling and installation. Temporarily support formed-in-place lintels.
  - a. Unless otherwise shown, provide one horizontal reinforcing bar for each 4" of wall thickness, of size number not less than the number of feet of opening width.
  - b. For hollow masonry unit walls, use specially formed U-shaped lintel units with reinforcing bars and filled with Type M mortar or concrete grout.
  - c. Provide 8" minimum bearing at each jamb.

### 3.3 REPAIR, POINTING

- A. Remove and replace masonry units which are loose, chipped, broken, stained or otherwise damaged, or if units do not match adjoining units as intended. Provide new units to match adjoining units and install in fresh mortar or grout, pointed to eliminate evidence of replacement.
- B. During the tooling of joints, enlarge voids or holes, except weep holes, and completely fill with mortar.
- C. Point up all joints at corners, openings and adjacent Work to provide a neat, uniform appearance, prepared for application of caulking or sealants.

### 3.4 CLEANING

- A. Cleaning Exposed, Concrete Masonry Surfaces: Wipe off excess mortar as the Work progresses. Dry brush at the end of each day's Work.

END OF SECTION

## SECTION 05 41 00 - COLD-FORMED METAL FRAMING

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions, apply to this Section.

#### 1.2 SUMMARY

- A. Section includes cold-formed metal framing, related accessories, and fasteners where indicated on Drawings, where required in lieu of metal drywall studs specified in Division 09 Section "Gypsum Board Assemblies" due to metal drywall stud height limitation or to support of heavier loads.
- B. Related Sections: Coordinate Work of this Section with work of other sections, including Division 01 Sections, as required to properly execute the work and as necessary to maintain satisfactory progress of the work.

#### 1.3 QUALITY ASSURANCE

- A. This Section outlines the minimum standards and requirements for this Project. Refer to the Drawings and other Specifications for additional requirements elsewhere in the Construction Documents. Bring all conflicts and discrepancies to the attention of the Architect, and do not start work until such conflicts and discrepancies are clarified and corrected.
- B. The following document governs the Work, except where more restrictive items are specified:
  - 1. AISI Design of Cold-Formed Steel Structural Members
- C. Welding Qualifications: Qualify welding processes and welding operators in accordance with AWS "Standard Qualification Procedure".

#### 1.4 SUBMITTALS

- A. Submit under provisions of Division 01 Section "Submittal Procedures".
- B. Product Data:
  - 1. Manufacturer's specifications and other data needed to prove compliance with specified requirements.
  - 2. Manufacturer's installation instructions.

C. LEED Submittal:

1. Product Data for Credit(s) MR 4.1 and MR 4.2: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content.
  - a. Include statement indicating costs for each product having recycled content.
2. Product Data for Credit MR 5.1 and MR 5.1: For each regional material, including its source.
  - a. Include statement indicating cost and the fraction by weight that is considered regional.

D. Shop Drawings: Indicate size, material, and finish. Show locations and installation procedures. Include details of joints, attachments, and clearances.

E. Welder Qualifications: Welding operators qualifications in accordance with AWS "Standard Qualification Procedure".

F. Supplementary Design Details: The general design is presumed adequate to permit compliance with the specified performance. Provide engineering calculations to supplement the general design. Calculations shall bear the seal of a Registered Professional Engineer, licensed in the State of Texas.

1.5 PRODUCT DELIVERY AND STORAGE

A. Protect metal framing units from rusting and damage. Deliver to the project site in manufacturer's unopened containers or bundles, fully identified with name, brand, type and grade. Store off the ground in a dry ventilated space or protect with suitable waterproof coverings.

PART 2 - PRODUCTS

2.1 APPROVED MANUFACTURERS

A. Products of any one (1) of the following manufacturers are approved for use on the Project, with Architect/Engineer approval. Other manufacturers must have a minimum of five (5) years experience manufacturing products meeting or exceeding the specifications and comply with Division 1 requirements regarding substitutions in order to be considered.

1. Aegis Metal Framing
2. ClarkDietrich Building Systems, Inc.
3. Dale/Incor
4. Fire Trak Corp.

5. Marino\WARE
6. MBA Metal Framing
7. SEMCO / Southeastern Metals, a Gibraltar Industries company
8. Steeler, Inc.
9. Super Stud Building Products, Inc.
10. The STEEL Network, Inc.
11. Telling Industries, LLC.
12. The STEEL Network, Inc.
13. Unimast Inc.

## 2.2 MATERIAL

- A. Basic System Components: With each type of metal framing required, provide manufacturer's standard steel top track, runner track (tracks), blocking, lintels, clip angles, shoes, reinforcements, fasteners, and accessories as recommended by manufacturer for the applications indicated, as needed to provide a complete metal framing system.
- B. Recycled Content of Steel Products: Provide products with an average recycled content of steel products so postconsumer recycled content plus one-half of preconsumer recycled content is not less than 10 percent.
- C. Provide members fabricated in accordance with ASTM A 653, Structural Steel, Grade 33, Zinc-Coated to G60.
  1. Steel Studs: Manufacturer's standard C-shaped steel studs, punched with stiffened flanges, complying with ASTM C995.
  2. Steel Track: Manufacturer's standard U-shaped steel track, unpunched, with unstiffened 1-1/4 inch flanges, complying with ASTM C995
  3. Steel Deflection Track: Manufacturer's standard 18 gauge deep-leg U-shaped steel track, unpunched, with unstiffened 2 inch flanges.
- D. Provide steel framing accessories of the same material and finish used for framing members, Grade 33. Accessories include bracing, bridging, blocking, gusset plates, diagonal strap bracing, kicker and knee braces indicated, or required to provide a complete steel framing system to withstand design loads indicated on the Structural Drawings.
- E. Anchorage and Fastenings: As approved by Architect/Engineer.
  1. Self-Drilling Self-Tapping Screws, Bolts, Nuts and Washers: Of type and size recommended by manufacturer to suit application, with hot-dip galvanized finish.
  2. Anchorage Devices: Power driven or powder actuated, drilled expansion bolts; or screws with sleeves.
  3. Welding: AWS D1.1

F. Finish:

1. Provide minimum G60 galvanized coating in accordance with ASTM A 653 and ASTM C 955.
2. Field touch-up paint: Inorganic zinc-rich primer.

2.3 MINIMUM DESIGN

- A. Provide exterior non-load bearing cold-formed framing capable of withstanding design loads indicated on Drawings.
- B. Limit horizontal deflection due to wind load to 1/240 of the wall height. Where masonry veneer occur, limit horizontal deflection due to wind load to 1/600 of the wall height.

PART 3 - EXECUTION

3.1 INSPECTION AND PREPARATION

- A. Prior to the start of installation of metal framing systems, meet at the Project site with the installers of other work including door and window frames and mechanical and electrical work. Review areas of potential interference and conflicts, and coordinate layout and support provisions for interfacing work.

3.2 FABRICATION

- A. General: Framing components may be prefabricated into panels prior to erection. Fabricate panels plumb, square, true to line and braced against racking with joints welded. Perform lifting of prefabricated panels in a manner to prevent damage or distortion in any members in the assembly.
- B. Fastenings: Attach similar components by welding. Attach dissimilar components by welding, bolting, or screw fasteners, as standard with the manufacturer. Wire tying of framing components is not permitted.

3.3 ERECTION

- A. General:
  1. Track Anchors: Install anchors maximum 4 feet-0 inches o.c.; design anchors and spacing to carry live, dead and wind loads.
  2. Track Splices: Provide channel inserts or weld track splices.
  3. Erection: Install members plumb, level, and in a true plane.
  4. Fastenings: Make assembly rigid and secure, with welds free of voids and burnouts.
- B. Install metal framing systems in accordance with stud manufacturer's printed instructions.



- C. Runner Tracks:
1. Install continuous tracks sized to match studs.
  2. Align tracks accurately to layout at base and tops of studs.
  3. Secure tracks as recommended by stud manufacturer, except do not exceed 24 inches o.c. for nail or power-driven fasteners, nor 16 inches o.c. for other types of attachment.
  4. Provide fasteners at corners and ends of tracks.
  5. Tracks shall be anchored to structural steel prior to installing sprayed on insulation.
  6. Provide Deflection Track (DT), at top of stud walls at floor or roof above, typically. Allow for 1/2 inch movement of primary structure. Do not attach studs directly to Deflection Track.
- D. Secure studs to top track and bottom runner track by means of approved self-drilling screws or welding at both inside and outside flanges of 14 gauge or heavier material. Screws and welds shall be of sufficient size to insure strength of connection. All welding shall comply with American Welding Society "Specification for Welding Sheet Steel in Structures".
- E. Set studs plumb, except as needed for diagonal bracing or required for non-plumb walls or warped surfaces and similar requirements.
- F. Where stud system abuts structural columns or walls, including masonry walls, anchor ends of stiffeners to supporting structure.
- G. Install supplementary framing, blocking and bracing in the metal framing system wherever walls or partitions are indicated to support fixtures, equipment, services, casework, heavy trim and furnishings, and similar work requiring attachment to the wall or partition. Where type of supplementary support is not otherwise indicated, comply with the stud manufacturer's recommendations and industry standards in each case, considering the weight or loading resulting from the item supported.
- H. Frame wall openings with extra studs, equal to the number of studs interrupted by wall openings, placed at each side of wall openings. Install runner tracks and jack studs above and below wall openings. Anchor tracks to jamb studs with shoes or by welding, and space jack studs same as full-height studs of the wall. Secure stud system all around to wall opening frame in the manner indicated.
- I. Install bracing/bridging in accordance with manufacturer's instructions and design conditions.
- J. Touch up field welds and damaged galvanized coating, except touch up of field cut studs is not required.

END OF SECTION

## SECTION 06 22 00 - FINISH CARPENTRY AND MILLWORK

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions, apply to this Section.

#### 1.2 SUMMARY

- A. Section includes all finish carpentry and millwork items including, but not limited to:
  - 1. Plastic laminate counters and countertops.
  - 2. Installation of:
    - a. Finish hardware
    - b. Plastic laminate faced wood doors
  - 3. It is the intent that Contractor performing work of this Section provide wood furring, blocking, shims, and hanging strips for installing finish carpentry and millwork items, unless concealed within other construction before finish carpentry and millwork installation. Items concealed within other construction shall be provided under Division 06 Section "Rough Carpentry".
- B. Related Sections: Coordinate Work of this Section with work of other sections, including Division 01 Sections, as required to properly execute the work and as necessary to maintain satisfactory progress of the work.

#### 1.3 SUBMITTALS

- A. Submit under provisions of Division 01 Section "Submittal Procedures".
- B. Product Data: For panel products, high-pressure decorative laminate, adhesive for bonding plastic laminate, fire-retardant-treated materials, cabinet hardware and accessories, and finishing materials and processes.
  - 1. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements.
- C. Shop Drawings: Show location of each item, dimensioned plans and elevations, large-scale details, attachment devices, and other components.
  - 1. Show details full size.
  - 2. Show locations and sizes of furring, blocking, and hanging strips, including concealed blocking and reinforcement specified in other Sections.
  - 3. Show locations and sizes of cutouts and holes for plumbing fixtures, faucets, soap dispensers, and other items installed in architectural woodwork.
- D. Samples for Initial Selection:

1. Plastic laminates.
2. PVC edge material.
3. Thermoset decorative panels.

E. Samples for Verification:

1. Plastic laminates, 8 by 10 inches, for each type, color, pattern, and surface finish, with 1 sample applied to core material and specified edge material applied to 1 edge.
2. Thermoset decorative-panels, 8 by 10 inches (200 by 250 mm), for each type, color, pattern, and surface finish, with edge banding on 1 edge.
3. Corner pieces as follows:
  - a. Cabinet-front frame joints between stiles and rails, as well as exposed end pieces, 18 inches high by 18 inches wide by 6 inches deep.
  - b. Miter joints for standing trim.
4. Exposed cabinet hardware and accessories, one unit for each type and finish.

F. Product Certificates: For each type of product, signed by product manufacturer.

G. Qualification Data: For Fabricator.

#### 1.4 QUALITY ASSURANCE

- A. This Section outlines the minimum standards and requirements for this Project. Refer to the Drawings for additional requirements. Bring all conflicts and discrepancies to the attention of the Architect and do not start work until such conflicts and discrepancies are clarified and corrected.
- B. Fabricator Qualifications: Shop that employs skilled workers who custom-fabricate products similar to those required for this Project and whose products have a record of successful in-service performance.
- C. Installer Qualifications: Fabricator of products.
- D. Source Limitations: Engage a qualified woodworking firm to assume undivided responsibility for production of interior architectural woodwork with sequence-matched wood veneers and transparent-finished wood doors that are required to be of same species as woodwork.
- E. Quality Standard: Unless otherwise indicated, comply with AWI's "Architectural Woodwork Quality Standards" for grades of interior architectural woodwork indicated for construction, finishes, installation, and other requirements.
- F. Fire-Test-Response Characteristics: Where fire-retardant materials or products are indicated, provide materials and products with specified fire-test-response characteristics as determined by testing identical products per test method indicated by UL, ITS, or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify with appropriate markings of applicable testing and inspecting agency in the form of separable paper label or, where required by authorities having jurisdiction, imprint on surfaces of materials that will be concealed from view after installation.

G. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

H.

1. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

I. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination".

#### 1.5 DELIVERY, STORAGE, AND HANDLING

A. Do not deliver woodwork until painting and similar operations that could damage woodwork have been completed in installation areas. If woodwork must be stored in other than installation areas, store only in areas where environmental conditions comply with requirements specified in "Project Conditions" Article.

#### 1.6 PROJECT CONDITIONS

A. Environmental Limitations: Do not deliver or install woodwork until building is enclosed, wet work is complete, and HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period.

B. Field Measurements: Where woodwork is indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication, and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

1. Locate concealed framing, blocking, and reinforcements that support woodwork by field measurements before being enclosed, and indicate measurements on Shop Drawings.

2. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating woodwork without field measurements. Provide allowance for trimming at site, and coordinate construction to ensure that actual dimensions correspond to established dimensions.

#### 1.7 COORDINATION

A. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of Work specified in other Sections to ensure that interior architectural woodwork can be supported and installed as indicated.

B. Hardware Coordination: Distribute copies of approved hardware schedule specified in Division 08 Section "Door Hardware" to fabricator of architectural woodwork; coordinate Shop Drawings and fabrication with hardware requirements.

### PART 2 - PRODUCTS

## 2.3 MATERIALS

- A. General: Provide materials that comply with requirements of AWI's quality standard for each type of woodwork and quality grade specified, unless otherwise indicated.

- B. Wood Products: Comply with the following:
1. Recycled Content of Medium-Density Fiberboard and Particleboard: Provide products with an average recycled content so postconsumer recycled content plus one-half of preconsumer recycled content is not less than 10 percent.
  2. Hardboard: AHA A135.4.
  3. Medium-Density Fiberboard: ANSI A208.2, Grade MD, made with binder containing no urea formaldehyde.
  4. Particleboard: ANSI A208.1, Grade M-2-Exterior Glue.
  5. Softwood Plywood: DOC PS 1, Medium Density Overlay.
- C. Thermoset Decorative Panels: Medium-density fiberboard finished with thermally fused, melamine-impregnated decorative paper complying with LMA SAT-1.
1. Manufacturer/Color/Finish: Provide thermoset decorative panels as indicated on the Drawings.
- D. High-Pressure Decorative Laminate: NEMA LD 3, grades as indicated or, if not indicated, as required by woodwork quality standard.
1. Manufacturer/Color/Finish: Provide high-pressure decorative laminates as indicated on the Drawings.

## 2.4 FIRE-RETARDANT-TREATED MATERIALS

- A. General: Where fire-retardant-treated lumber, plywood and medium-density fiberboard are indicated, use materials complying with requirements specified in Section 06300, Wood Treatment.
1. Do not use treated materials that do not comply with requirements of referenced woodworking standard or that are warped, discolored, or otherwise defective.
  2. Use fire-retardant-treatment formulations that do not bleed through or otherwise adversely affect finishes. Do not use colorants to distinguish treated materials from untreated materials.
  3. Identify fire-retardant-treated materials with appropriate classification marking of UL, U.S. Testing, Timber Products Inspection, or another testing and inspecting agency acceptable to authorities having jurisdiction.

## 2.5 CABINET HARDWARE AND ACCESSORIES

- A. General: Provide cabinet hardware and accessory materials associated with architectural cabinets, except for items specified in Division 8 Section "Finish Hardware".

- B. Butt Hinges: 2-3/4-inch, 5-knuckle steel hinges made from 0.095-inch-thick metal, and as follows:
  - 1. Semiconcealed Hinges for Flush Doors: BHMA A156.9, B01361.
  - 2. Semiconcealed Hinges for Overlay Doors: BHMA A156.9, B01521.
- C. Frameless Concealed Hinges (European Type): BHMA A156.9, B01602, 100 degrees of opening, self-closing.
- D. Back-Mounted Pulls: BHMA A156.9, B02011.
- E. Wire Pulls: Back mounted, solid metal, 4 inches (100 mm) long, 5/16 inch in diameter.
- F. Catches: Magnetic catches, BHMA A156.9, B03141; Push-in magnetic catches, BHMA A156.9, B03131; Roller catches, BHMA A156.9, B03071; Ball friction catches, BHMA A156.9, B03013.
- G. Adjustable Shelf Standards and Supports: BHMA A156.9, B04071; with shelf rests, B04081, or BHMA A156.9, B04102; with shelf brackets, B04112.
- H. Shelf Rests: BHMA A156.9, B04013; metal.
- I. Drawer Slides: BHMA A156.9, B05091.
  - 1. Heavy Duty (Grade 1HD-100 and Grade 1HD-200): Side mounted; full-extension type; zinc-plated steel ball-bearing slides.
  - 2. Box Drawer Slides: Grade 1HD-100; for drawers not more than 6 inches high and 24 inches wide.
  - 3. File Drawer Slides: Grade 1HD-100; for drawers more than 6 inches high or 24 inches wide.
  - 4. Pencil Drawer Slides: Grade 2; for drawers not more than 3 inches high and 24 inches wide.
  - 5. Keyboard Slides: Grade 1; for computer keyboard shelves.
  - 6. Trash Bin Slides: Grade 1HD-100; for trash bins not more than 20 inches high and 16 inches wide.
- J. Door Locks: BHMA A156.11, E07121.
- K. Drawer Locks: BHMA A156.11, E07041.
- L. Grommets for Cable Passage through Countertops: 1-1/4-inch OD, molded-plastic grommets and matching plastic caps with slot for wire passage. Color as selected by Architect from manufacturer's standard colors.
  - 1. Product: Subject to compliance with requirements, provide "OG series" by Doug Mockett & Company, Inc.
- M. Paper Slots: 12 inches, molded-plastic, paper-slot liner with 1/4-inch lip. Color as selected by Architect from manufacturer's standard colors.
  - 1. Product: Subject to compliance with requirements, provide "Model CP-2" by Doug Mockett & Company, Inc.

- N. Exposed Hardware Finishes: For exposed hardware, provide finish that complies with BHMA A156.18 for BHMA finish number indicated below as selected by Architect.
1. Dark, Oxidized, Satin Bronze, Oil Rubbed: BHMA 613 for bronze base; BHMA 640 for steel base; match Architect's sample.
  2. Bright Brass, Clear Coated: BHMA 605 for brass base; BHMA 632 for steel base.
  3. Satin Brass, Blackened, Bright Relieved, Clear Coated: BHMA 610 for brass base; BHMA 636 for steel base.
  4. Satin Chromium Plated: BHMA 626 for brass or bronze base; BHMA 652 for steel base.
  5. Bright Chromium Plated: BHMA 625 for brass or bronze base; BHMA 651 for steel base.
  6. Satin Stainless Steel: BHMA 630.
- O. For concealed hardware, provide manufacturer's standard finish that complies with product class requirements in BHMA A156.9.

## 2.6 MISCELLANEOUS MATERIALS

- A. Furring, Blocking, Shims, and Hanging Strips: Fire-retardant-treated softwood lumber as specified in Division 06 Section Rough Carpentry. Ensure lumber is kiln dried to less than 15 percent moisture content.
- B. Anchors: Select material, type, size, and finish required for each substrate for secure anchorage. Provide nonferrous-metal or hot-dip galvanized anchors and inserts on inside face of exterior walls and elsewhere as required for corrosion resistance. Provide toothed-steel or lead expansion sleeves for drilled-in-place anchors.
- C. Adhesives, General: Do not use adhesives that contain urea formaldehyde.
1. VOC Limits for Installation Adhesives and Glues: Use installation adhesives that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
    - a. Contact Adhesive: 250 g/L.
- D. Adhesive for Bonding Plastic Laminate: Unpigmented contact cement.
1. Adhesive for Bonding Edges: Hot-melt adhesive or adhesive specified above for faces.

## 2.7 FABRICATION, GENERAL

- A. Interior Woodwork Grade: Unless otherwise indicated, provide Premium-grade interior woodwork complying with referenced quality standard.
- B. Wood Moisture Content: Comply with requirements of referenced quality standard for wood moisture content in relation to ambient relative humidity during fabrication and in installation areas.

- C. Sand fire-retardant-treated wood lightly to remove raised grain on exposed surfaces before fabrication.
- D. Fabricate woodwork to dimensions, profiles, and details indicated. Ease edges to radius indicated for the following:
  - 1. Corners of Cabinets and Edges of Solid-Wood (Lumber) Members 3/4 Inch Thick or Less: 1/16 inch.
  - 2. Edges of Rails and Similar Members More Than 3/4 Inch Thick: 1/8 inch.
- E. Complete fabrication, including assembly, finishing, and hardware application, to maximum extent possible before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.
  - 1. Notify Architect seven (7) days in advance of the dates and times woodwork fabrication will be complete.
  - 2. Trial fit assemblies at fabrication shop that cannot be shipped completely assembled. Install dowels, screws, bolted connectors, and other fastening devices that can be removed after trial fitting. Verify that various parts fit as intended and check measurements of assemblies against field measurements indicated on Shop Drawings before disassembling for shipment.
- F. Shop-cut openings to maximum extent possible to receive hardware, appliances, plumbing fixtures, electrical work, and similar items. Locate openings accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Sand edges of cutouts to remove splinters and burrs.
  - 1. Seal edges of openings in countertops with a coat of varnish.

## 2.8 PLASTIC-LAMINATE CABINETS

- A. Grade: Premium, unless indicated otherwise.
- B. AWI Type of Cabinet Construction: As indicated.
- C. Reveal Dimension: As indicated.
- D. Laminate Cladding for Exposed Surfaces: High-pressure decorative laminate complying with the following requirements:
  - 1. Horizontal Surfaces Other Than Tops: Grade HGS.
  - 2. Postformed Surfaces: Grade HGP.
  - 3. Vertical Surfaces: Grade HGS.
  - 4. Edges: Grade HGS.
- E. Materials for Semiexposed Surfaces:



1. Surfaces Other Than Drawer Bodies: High-pressure decorative laminate, Grade VGS.
    - a. Edges of Plastic-Laminate Shelves: Self-edge matching laminate in color, pattern, and finish.
    - b. For semiexposed backs of panels with exposed plastic-laminate surfaces, provide surface of high-pressure decorative laminate, Grade VGS.
  2. Drawer Sides and Backs: Solid-hardwood lumber.
  3. Drawer Bottoms: Hardwood plywood.
- F. Concealed Backs of Panels with Exposed Plastic Laminate Surfaces: High-pressure decorative laminate, Grade BKL.
- G. Colors, Patterns, and Finishes: Provide materials and products that result in colors and textures of exposed laminate surfaces complying with the following requirements:
1. As indicated on Drawings, or if not indicated, as selected by Architect from laminate manufacturer's full range.
- H. Provide dust panels of 1/4-inch plywood or tempered hardboard above compartments and drawers, unless located directly under tops.

## 2.9 PLASTIC-LAMINATE COUNTERTOPS

- A. Grade: Premium, unless indicated otherwise.
- B. High-Pressure Decorative Laminate Grade: HGS.
- C. Colors, Patterns, and Finishes: Provide materials and products that result in colors and textures of exposed laminate surfaces complying with the following requirements:
1. As indicated on Drawings, or if not indicated, as selected by Architect from laminate manufacturer's full range.
- D. Edge Treatment: Same as laminate cladding on horizontal surfaces, unless indicated otherwise.
- E. Core Material: Medium-density fiberboard, unless indicated otherwise.
- F. Core Material at Sinks: Medium-density fiberboard made with exterior glue or exterior-grade plywood.
- G. Backer Sheet: Provide plastic-laminate backer sheet, Grade BKL, on underside of countertop substrate.

## 2.10 SHOP FINISHING

- A. Grade: Provide finishes of same grades as items to be finished.

- B. General: Finish architectural woodwork at fabrication shop as specified in this Section. Defer only final touchup, cleaning, and polishing until after installation.
- C. Shop Priming: Shop apply the prime coat including backpriming, if any, for transparent-finished items specified to be field finished. Refer to Division 9, Painting section for material and application requirements.
- D. Preparation for Finishing: Comply with referenced quality standard for sanding, filling countersunk fasteners, sealing concealed surfaces, and similar preparations for finishing architectural woodwork, as applicable to each unit of work.
  - 1. Backpriming: Apply one coat of sealer or primer, compatible with finish coats, to concealed surfaces of woodwork. Apply two coats to back of paneling and to end-grain surfaces. Concealed surfaces of plastic-laminate-clad woodwork do not require backpriming when surfaced with plastic laminate, backing paper, or thermoset decorative panels.

### PART 3 - EXECUTION

#### 3.3 PREPARATION

- A. Before installation, condition woodwork to average prevailing humidity conditions in installation areas.
- B. Before installing architectural woodwork, examine shop-fabricated work for completion and complete work as required, including removal of packing and backpriming.

#### 3.4 INSTALLATION

- A. Grade: Install woodwork to comply with requirements for the same grade specified in Part 2 for fabrication of type of woodwork involved.
- B. Assemble woodwork and complete fabrication at Project site to comply with requirements for fabrication in Part 2, to extent that it was not completed in the shop.
- C. Install woodwork level, plumb, true, and straight. Shim as required with concealed shims. Install level and plumb (including tops) to a tolerance of 1/8 inch in 96 inches.
- D. Scribe and cut woodwork to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.
- E. Fire-Retardant-Treated Wood: Handle, store, and install fire-retardant-treated wood to comply with chemical treatment manufacturer's written instructions, including those for adhesives used to install woodwork.
- F. Anchor woodwork to anchors or blocking built in or directly attached to substrates. Secure with countersunk, concealed fasteners and blind nailing as required for complete installation. Use fine finishing nails for exposed fastening, countersunk and filled flush with woodwork and matching final finish if transparent finish is indicated.

- G. Cabinets: Install without distortion so doors and drawers fit openings properly and are accurately aligned. Adjust hardware to center doors and drawers in openings and to provide unencumbered operation. Complete installation of hardware and accessory items as indicated.
1. Install cabinets with no more than 1/8 inch in 96-inch sag, bow, or other variation from a straight line.
  2. Maintain veneer sequence matching of cabinets with transparent finish.
  3. Fasten wall cabinets through back, near top and bottom, at ends and not more than 16 inches o.c.
    - a. Use No. 10 wafer-head screws sized for 1-inch penetration into wood framing, blocking, or hanging strips.
    - b. Use No. 10 wafer-head sheet metal screws through metal backing or metal framing behind wall finish.
    - c. Use toggle bolts through metal backing or metal framing behind wall finish.
- H. Countertops: Anchor securely by screwing through corner blocks of base cabinets or other supports into underside of countertop.
1. Install countertops with no more than 1/8 inch in 96-inch sag, bow, or other variation from a straight line.
  2. Secure backsplashes to tops with concealed metal brackets at 16 inches o.c. and to walls with adhesive.
  3. Calk space between backsplash and wall with sealant specified in Division 07 Section "Joint Sealants".
- I. Touch up finishing work specified in this Section after installation of woodwork. Fill nail holes with matching filler where exposed.
- J. Refer to Division 09 Sections for final finishing of installed architectural woodwork not indicated to be shop finished.

### 3.5 REPAIRING, ADJUSTING, AND CLEANING

- A. Repair damaged and defective woodwork, where possible, to eliminate functional and visual defects; where not possible to repair, replace woodwork. Adjust joinery for uniform appearance.
- B. Clean, lubricate, and adjust hardware.
- C. Clean woodwork on exposed and semi-exposed surfaces. Touch up shop-applied finishes to restore damaged or soil

END OF SECTION

## SECTION 07 21 00 - BUILDING INSULATION

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions, apply to this Section.

#### 1.2 SUMMARY

- A. Section includes building insulation materials, accessories, and related work, except for roof insulation specified in Division 07 roofing sections and sound insulation specified in Division 09 Section, "Gypsum Board Assemblies", and insulation materials specified as part of other sections.
- B. Related Sections: Coordinate Work of this Section with work of other sections, including Division 01 Sections, as required to properly execute the work and as necessary to maintain satisfactory progress of the work.

#### 1.4 PERFORMANCE REQUIREMENTS

- A. Plenum Rating: Provide glass-fiber insulation where indicated in ceiling plenums whose test performance is rated as follows for use in plenums as determined by testing identical products per "Erosion Test" and "Mold Growth and Humidity Test" described in UL 181, or on comparable tests from another standard acceptable to authorities having jurisdiction.
- B. Erosion Test Results: Insulation shows no visible evidence of cracking, flaking, peeling, or delamination of interior surface of duct assembly, after testing for 4 hours at 2500-fpm (13-m/s) air velocity.
- C. Mold Growth and Humidity Test Results: Insulation shows no evidence of mold growth, delamination, or other deterioration due to the effects of high humidity, after inoculation with *Chaetomium globosum* on all surfaces and storing for 60 days at 100 percent relative humidity in the dark.

#### 1.5 SUBMITTALS

- A. Submit under provisions of Division 01 Section "Submittal Procedures".
- B. Product Data: Submit manufacturer's specifications and installation instructions for each type of insulation required. Include data substantiating that the materials comply with specified requirements.

- C. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency for insulation products.

## 1.6 QUALITY ASSURANCE

- A This Section outlines the minimum standards and requirements for this Project. Refer to the Drawings for additional requirements. Bring all conflicts and discrepancies to the attention of the Architect and do not start work until such conflicts and discrepancies are clarified and corrected.
- B Source Limitations: Obtain each type of building insulation through one source from a single manufacturer.
- C Fire-Test-Response Characteristics: Provide insulation and related materials with the fire-test-response characteristics indicated, as determined by testing identical products per test method indicated below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify materials with appropriate markings of applicable testing and inspecting agency.
  - 1. Surface Burning Characteristic: ASTM E 84.
  - 2. Fire Resistance Ratings: ASTM E 119.
  - 3. Combustion Characteristics: ASTM E 136.
- D Obtain each type of building insulation from a single source with resources to provide products of consistent quality in appearance and physical properties without delaying progress of the Work.

## 1.7 DELIVERY, STORAGE, AND HANDLING

- A Protect insulation materials from physical damage and from deterioration by moisture, soiling, and other sources. Store inside and in a dry location. Comply with manufacturer's written instructions for handling, storing, and protecting during installation.

## 1.8 JOB CONDITIONS

- A Do not proceed with the installation of insulation until subsequent work which conceals the insulation is ready to be performed.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one (1) of the manufacturers specified, or Architect approved equal.

## 2.2 GLASS-FIBER BLANKET INSULATION

1. Unfaced, Glass-Fiber Blanket Insulation: ASTM C 665, Type I (blankets without membrane facing); consisting of fibers; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively; passing ASTM E 136 for combustion characteristics.
2. Where glass-fiber blanket insulation is indicated by the following thicknesses, provide blankets in batt or roll form with thermal resistances indicated:
  1. R-13.
3. Location: As indicated on Drawings.
4. Approved Product/Manufacturer: “Unfaced Formaldehyde-free Thermal Fiber Glass Insulation” manufactured by Johns Manville, or equal by one (1) of the following or Architect approved equal.
  1. Approved Manufacturers:
    - a. CertainTeed Corporation.
    - b. Guardian Fiberglass, Inc.
    - c. Knauf Fiber Glass.
    - d. Owens Corning.

## 2.3 EXTERIOR SHEATHING

- A. As specified in Division 06 Section, "Sheathing".

## 2.4 ROOF INSULATION

- A. As specified in Division 07 Section “Thermoplastic Polyolefin (TPO) Roofing”

## 2.5 SOUND (ATTENUATION) INSULATION

- A. As specified in Division 09 Section, "Gypsum Board Assemblies".

## 2.6 PENETRATION FIRESTOPPING

- A. As specified in Division 07 Section, "Penetration Firestopping".

## 2.7 MECHANICAL AND DUCT INSULATION

- A. As specified in Division 21, 22, and 23 Sections, as applicable.

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

A Examine substrates and conditions, with Installer present, for compliance with requirements of Sections in which substrates and related work are specified and for other conditions affecting performance.

1. Proceed with installation only after unsatisfactory conditions have been corrected.

#### 3.2 PREPARATION

A Clean substrates of substances harmful to insulation or vapor retarders, including removing projections capable of puncturing vapor retarders or of interfering with insulation attachment.

#### 3.3 INSTALLATION, GENERAL

1. Comply with insulation manufacturer's written instructions applicable to products and application indicated.
2. Install insulation that is undamaged, dry, and unsoiled and that has not been left exposed at any time to ice, rain, and snow.
3. Extend insulation in thickness indicated to envelop entire area to be insulated. Cut and fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.
4. Water-Piping Coordination: If water piping is located within insulated exterior walls, coordinate location of piping to ensure that it is placed on warm side of insulation and insulation encapsulates piping.
5. For preformed insulating units, provide sizes to fit applications indicated and selected from manufacturer's standard thicknesses, widths, and lengths. Apply single layer of insulation units to produce thickness indicated unless multiple layers are otherwise shown or required to make up total thickness.

#### 3.4 INSTALLATION GENERAL BUILDING INSULATION

1. Apply insulation units to substrates by method indicated, complying with manufacturer's written instructions. If no specific method is indicated, bond units to substrate with adhesive or use mechanical anchorage to provide permanent placement and support of units.
2. Install mineral-fiber insulation in cavities formed by framing members according to the following requirements:
  1. Use insulation widths and lengths that fill the cavities formed by framing members. If more than one length is required to fill cavity, provide lengths that will produce

- a snug fit between ends.
2. Place insulation in cavities formed by framing members to produce a friction fit between edges of insulation and adjoining framing members.
3. Maintain 3-inch clearance of insulation around recessed lighting fixtures.
4. Install eave ventilation troughs between roof framing members in insulated attic spaces at vented eaves.
5. For metal-framed wall cavities where cavity heights exceed 96 inches, support unfaced blankets mechanically.

### 3.5 PROTECTION

1. Protect installed insulation from damage due to harmful weather exposures, physical abuse, and other causes. Provide temporary coverings or enclosures where insulation is subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.

END OF SECTION



## SECTION 08 14 23 - FLUSH WOOD DOORS

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions, apply to this Section.

#### 1.2 SUMMARY

##### A. Section Includes:

1. Solid core doors with plastic laminate faces.
2. Factory finishing wood doors.
3. Factory fitting wood doors to frames and factory machining for hardware.
4. Light frames and glazing installed in wood doors.

##### B. Related Sections:

1. Division 08 Section "Hollow Metal Doors and Frames" for wood doors in steel frames.
2. Division 08 Section "Glazing" for glass view panels in wood doors.
3. Division 08 Section "Door Hardware" for door hardware for flush wood doors and wood frames.

##### C. Standards and References: Comply with the version year adopted by the Authority Having Jurisdiction.

1. ANSI A208.1 – Wood Particleboard.
2. Intertek Testing Service (ITS Warnock Hersey) - Certification Listings for Fire Doors.
3. NFPA 80 - Standard for Fire Doors and Fire Windows; National Fire Protection Association.
4. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies; National Fire Protection Association.
5. UL 10C - Positive Pressure Fire Tests of Door Assemblies; UL 1784 - Standard for Air Leakage Tests of Door Assemblies.
6. Window and Door Manufacturers Association - WDMA I.S.1-A Architectural Wood Flush Doors.

#### 1.3 SUBMITTALS

- A. Submit under provisions of Division 01 Section "Submittal Procedures".
- B. Product Data: For each type of door indicated. Include details of core and edge construction, louvers, trim for openings, and WDMA I.S.1-A or AWS classifications. Include factory finishing specifications.

- C. Door hardware supplier is to furnish templates, template reference number and/or physical hardware to the wood door supplier in order to prepare the doors and frames to receive the finish hardware items.
- D. Shop Drawings: Indicate location, size, and hand of each door; elevation of each kind of door; construction details not covered in Product Data; location and extent of hardware blocking; and other pertinent data.
  - 1. Indicate dimensions and locations of mortises and holes for hardware.
  - 2. Indicate dimensions and locations of cutouts.
  - 3. Indicate requirements for veneer matching.
  - 4. Indicate doors to be factory finished and finish requirements.
  - 5. Indicate fire protection ratings for fire rated doors.
- E. Samples for Initial Selection: For factory finished doors.
  - 1. Factory finishes applied to actual door face materials, approximately 8 by 10 inches, for each material and finish. For each wood species and transparent finish, provide set of three samples showing typical range of color and grain to be expected in the finished work.
  - 2. Corner sections of doors, 8 by 10 inches, with door faces and edges representing actual materials to be used.
    - a. Provide samples for each species of veneer and solid lumber required.
    - b. Finish veneer faced door samples with same materials proposed for factory finished doors.
  - 3. Frames for light openings, 6 inches long, for each material, type, and finish required.
- F. Warranty: Sample of special warranties.

#### 1.4 QUALITY ASSURANCE

- A. This Section outlines the minimum standards and requirements for this Project. Refer to the Drawings for additional requirements. Bring all conflicts and discrepancies to the attention of the Architect and do not start work until such conflicts and discrepancies are clarified and corrected.
- B. Source Limitations: Obtain flush wood doors through one source from a single manufacturer wherever possible.
- C. Quality Standard: In addition to requirements specified, comply with WDMA I.S.1-A, latest edition, "Industry Standard for Architectural Wood Flush Doors".
- D. Fire Rated Wood Doors: Doors complying with NFPA 80 that are listed and labeled by a

testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing at positive pressure according to NFPA 252 (neutral pressure at 40" above sill) or UL 10C (neutral pressure testing according to UL 10B where specified).

1. Smoke Control Door Assemblies: Comply with NFPA 105.
    - a. Smoke "S" Label: Doors to bear "S" label, and include smoke and draft control gasketing applied to frame and on meeting stiles of pair doors.
  2. Blocking: Indicate size and location of blocking in 45, 60 and 90 minute mineral core doors.
- E. Pre-Submittal Conference: Conduct conference in compliance with requirements in Division 01 Section "Project Management and Coordination" with attendance by representatives of Supplier, Installer, and Contractor to review proper methods and procedures for receiving, handling, and installing flush wood doors.

#### 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Comply with requirements of referenced standard and manufacturer's written instructions.
- B. Package pre-finished doors individually in plastic bags or cardboard cartons and wrap bundles of doors in plastic sheeting.
- C. Mark each door on top rail with opening number used on Shop Drawings.

#### 1.6 PROJECT CONDITIONS

- A. Environmental Limitations: Do not deliver or install doors until spaces are enclosed and weather tight, wet work in spaces is complete and dry, and HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.

#### 1.7 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace doors that fail in materials or workmanship within specified warranty period.
  1. Failures include, but are not limited to, the following:
    - a. Warping (bow, cup, or twist) more than 1/4 inch in a 42-by-84-inch section.
    - b. Telegraphing of core construction in wood face veneers exceeding 0.01 inch in a 3-inch span.
    - c. Telegraphing of core construction and delaminating of face in decorative laminate-faced doors.
  2. Warranty includes installation and finishing that may be required due to repair or replacement of defective doors.
  3. Warranty Period for Solid Core Interior Doors: Life of installation according to

manufacturer's written warranty.

## PART 2 - PRODUCTS

### 2.1 DOOR CONSTRUCTION - GENERAL

- A. WDMA I.S.1-A Performance Grade: Extra Heavy Duty; Aesthetic Grade: Custom.
- B. Fire Rated Doors: Provide construction and core as needed to provide fire ratings indicated.
  - 1. Category A Edge Construction: Provide fire rated door edge construction with intumescent seals concealed by outer stile (Category A) at 45, 60, and 90 minute rated doors. Comply with specified requirements for exposed edges.
  - 2. Pairs: Provide fire retardant stiles that are listed and labeled for applications indicated without formed steel edges and astragals. Provide stiles with concealed intumescent seals. Comply with specified requirements for exposed edges.
    - a. Where required or specified, provide formed steel edges and astragals with intumescent seals. Finish steel edges and astragals with baked enamel.

### 2.2 CORE CONSTRUCTION

- A. Particleboard Core Doors:
  - 1. Particleboard: Wood fiber based materials complying with ANSI A208.1 Particleboard standard. Grade LD-2.
  - 2. Adhesive: Fully bonded construction using Polyurethane (PUR) glue.
  - 3. Blocking: When through-bolted hardware is not used, provide wood blocking in particleboard core doors as follows:
    - a. 5-inch (125-mm) top-rail blocking, in doors indicated to have closers.
    - b. 5-inch (125-mm) mid-rail blocking, in doors indicated to have exit devices.
  - 1) Optional Cores for Blocking: Provide doors with either glued-wood-stave or structural-composite-lumber core instead of particleboard core for doors indicated to receive closers and exit devices.

### 2.3 PLASTIC LAMINATE FACED WOOD DOORS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Eggers Industries: Premium
  - 2. Graham: GPD
  - 3. Marshfield: Signature
- B. Interior Solid Core Doors:
  - 1. Color: As selected by Architect.
  - 2. Vertical Edges: Matching laminate as faces.

3. Horizontal Edges: Solid wood or structural composite material meeting the minimum requirements per WDMA section P-1, Performance Standards for Architectural Wood Flush Doors.

## 2.4 LIGHT FRAMES AND GLAZING

- A. Wood Beads for Light Openings in Wood Doors up to and including 20-minute rating:
  1. Wood Species: Same species as door faces.
  2. Profile: Manufacturer's standard lipped profile. At wood core doors with 20-minute fire protection ratings, provide wood beads and metal glazing clips approved for such use.
- B. Metal Frames for Light Openings in Fire Rated Doors over 20-minute rating: Manufacturer's standard frame formed of 0.048-inch-thick, cold rolled steel sheet; with baked enamel or powder coated finish; and approved for use in doors of fire protection rating indicated.
- C. Glazing: Comply with installation requirements in Division 08 Section "Glazing" and with the flush wood door manufacturer's written instructions.

## 2.5 FABRICATION

- A. Factory fit doors to suit frame opening sizes indicated. Comply with clearance requirements of referenced quality standard for fitting unless otherwise indicated.
  1. Comply with requirements in NFPA 80 for fire rated doors.
- B. Factory machine doors for hardware that is not surface applied. Comply with final hardware schedules, door frame Shop Drawings, DHI A115-W series standards, and hardware templates.
  1. Coordinate with hardware mortises in metal frames to verify dimensions and alignment before factory machining.
  2. Metal Astragals: Factory machine astragals and formed steel edges for hardware for pairs of fire rated doors.
- C. Openings: Cut and trim openings through doors in factory.
  1. Light Openings: Trim openings with moldings of material and profile indicated.
  2. Glazing: Comply with applicable requirements in Division 08 Section "Glazing."
- D. Electrical Raceways: Provide flush wood doors receiving electrified hardware with concealed wiring harness and standardized Molex™ plug connectors on both ends to accommodate up to twelve wires. Coordinate connectors on end of the wiring harness to plug directly into the electrified hardware and the through wire transfer hardware or wiring harness specified in hardware sets in Division 08 "Door Hardware". Wire nut connections are not acceptable.

## 2.6 FACTORY FINISHING

- A. General: Comply with referenced quality standard for factory finishing. Complete fabrication, including fitting doors for openings and machining for hardware that is not surface applied, before finishing.
  - 1. Finish faces, all four edges, edges of cutouts, and mortises. Stains and fillers may be omitted on top and bottom edges, edges of cutouts, and mortises.

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Examine doors and installed door frames before hanging doors.
  - 1. Verify that frames comply with indicated requirements for type, size, location, and swing characteristics and have been installed with level heads and plumb jambs.
  - 2. Reject doors with defects.

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- B. Proceed with installation only after unsatisfactory conditions have been corrected.

#### 3.2 INSTALLATION

- A. Hardware: For installation, see Division 08 Section "Door Hardware."
- B. Installation Instructions: Install doors to comply with manufacturer's written instructions and the referenced quality standard, and as indicated.
  - 1. Install fire rated doors in corresponding fire rated frames according to NFPA 80.
- C. Factory Fitted Doors: Align in frames for uniform clearance at each edge.
- D. Factory Finished Doors: Restore finish before installation if fitting or machining is required at Project site.

#### 3.3 ADJUSTING

- A. Operation: Re-hang or replace doors that do not swing or operate freely.
- B. Finished Doors: Replace doors that do not comply with requirements. Doors may be repaired or refinished if work complies with requirements and shows no evidence of repair or refinishing.

END OF SECTION

## SECTION 09 22 16 - NON-STRUCTURAL METAL FRAMING

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including the General and Supplementary Conditions, apply to this Section.

#### 1.2 SUMMARY

- A. Section includes non-load-bearing steel framing members for interior framing systems including partition walls, except where load bearing cold-formed metal framing specified in Division 05 Section "Cold-Formed Metal Framing" is required for load or height limitations of drywall framing such as tiled walls.
- B. Related Sections: Coordinate Work of this Section with work of other sections, including Division 01 Sections, as required to properly execute the work and as necessary to maintain satisfactory progress of the work.
  - 1. Related Sections include:
    - a. Division 05 Section "Cold-Formed Metal Framing".
    - b. Division 07 Section "Joint Sealants".
    - c. Division 09 Section "Gypsum Board Assemblies".

#### 1.3 PERFORMANCE REQUIREMENTS

- A. Steel Framing: Metal thickness indicated are minimum thickness selected to meet structural design criteria for non-structural, interior partitions. Where metal framing manufacturer's published Product Data recommends a greater thickness for the condition indicated, provide metal framing in recommended thickness.
  - 1. Lateral Load: 5 lbs/sq. ft.
  - 2. Maximum Allowable Deflection for Typical Partitions: L/240.

#### 1.4 SUBMITTALS

- A. Submit under provisions of Division 01 Section "Submittal Procedures".
- B. Product Data: For each type of product indicated.
- C. LEED Submittal:
  - 1. Product Data for Credit(s) MR 4.1 and MR 4.2: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content.
    - a. Include statement indicating costs for each product having recycled content.

2. Product Data for Credit MR 5.1 and MR 5.1: For each regional material, including its source.
  - a. Include statement indicating cost and the fraction by weight that is considered regional.

## 1.5 QUALITY ASSURANCE

- A. This Section outlines only minimum standards and requirements. Refer to the Drawings and other sections of the specifications for additional requirements. Bring all conflicts and discrepancies to the attention of the Architect and do not start work until such conflicts and discrepancies are clarified and corrected.
- B. Fire-Test-Response Characteristics: For fire-resistance-rated assemblies that incorporate non-load-bearing steel framing, provide materials and construction identical to those tested in assembly indicated according to ASTM E 119 by an independent testing agency.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Products of any one (1) of the following manufacturers are approved for use on the Project, with Architect/Engineer approval. Other manufacturers must have a minimum of five (5) years experience manufacturing products meeting or exceeding the specifications and comply with Division 01 requirements regarding substitutions to be considered.
  1. ClarkDietrich Building Systems, Inc.
  2. Fire Trak Corp.
  3. Marino\WARE
  4. The STEEL Network, Inc.

### 2.2 NON-LOAD-BEARING STEEL FRAMING, GENERAL

- A. Framing Members, General: Comply with ASTM C 754 for conditions indicated.
  1. Steel Sheet Components: Comply with ASTM C 645 requirements for metal, unless otherwise indicated.
  2. Protective Coating: ASTM A 653, G60, unless otherwise indicated.

### 2.2 SUSPENSION SYSTEM COMPONENTS

- A. Tie Wire: ASTM A 641, Class 1 zinc coating, soft temper, 16 gauge diameter wire, or double strand of 18 gauge diameter wire.
- B. Wire Hangers: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 16 gauge diameter.
- C. Carrying Channels: Cold-rolled, commercial-steel sheet with a base-metal thickness of 16 gauge and minimum 1/2-inch- wide flanges.



1. Depth: 2-1/2 inches, unless otherwise indicated.

D. Furring Channels (Furring Members):

1. Cold-Rolled Channels: 16 gauge bare-steel thickness, with minimum 1/2-inch-wide flanges, 3/4 inch deep.
2. Steel Studs: ASTM C 645.
  - a. Minimum Base-Metal Thickness: 22 gauge, unless otherwise indicated.
  - b. Depth: As indicated on Drawings.
3. Hat-Shaped, Rigid Furring Channels: ASTM C 645, 7/8 inch deep.
  - a. Minimum Base Metal Thickness: 26 gauge, unless otherwise indicated.

2.3 STEEL FRAMING FOR FRAMED ASSEMBLIES

A. Steel Studs and Runners: ASTM C 645.

1. Minimum Base-Metal Thickness: 25 gauge.
2. Depth: As indicated on Drawings.

B. Slip-Type Head Joints: Where indicated, provide single long-leg runner system complying with ASTM C 645 top runner with 2-inch- deep flanges in thickness not less than indicated for studs, installed with studs friction fit into top runner and with continuous bridging located within 12 inches of the top of studs to provide lateral bracing.

C. Firestop Tracks: Top runner manufactured to allow partition heads to expand and contract with movement of the structure while maintaining continuity of fire-resistance- rated assembly indicated; in thickness not less than indicated for studs and in width to accommodate depth of studs.

1. Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following, or Architect approved equal in accordance with Paragraph 2.1:
  - a. Fire Trak Corp.; Fire Trak.
  - b. Metal-Lite, Inc.; The System.

D. Flat Strap and Backing Plate: Steel sheet for blocking and bracing in length and width indicated.

1. Minimum Base-Metal Thickness: As indicated on Drawings.

E. Cold-Rolled Channel Bridging: 16 gauge bare-steel thickness, with minimum 1/2-inch-wide flanges.

1. Depth: 1-1/2 inches.

2. Clip Angle: Not less than 1-1/2 by 1-1/2 inches, 14 gauge thick, galvanized steel.

#### 2.4 AUXILIARY MATERIALS

- A. General: Provide auxiliary materials that comply with referenced installation standards.
  1. Fasteners for Metal Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel members to substrates.
- B. Isolation Strip at Exterior Walls: Provide one of the following:
  1. Asphalt-Saturated Organic Felt: ASTM D 226, Type I (No. 15 asphalt felt), nonperforated.
  2. Foam Gasket: Adhesive-backed, closed-cell vinyl foam strips that allow fastener penetration without foam displacement, 1/8 inch thick, in width to suit steel stud size.

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Examine areas and substrates, with Installer present, and including welded hollow-metal frames, cast-in anchors, and structural framing, for compliance with requirements and other conditions affecting performance.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

#### 3.2 PREPARATION

- A. Suspended Assemblies: Coordinate installation of suspension systems with installation of overhead structure to ensure that inserts and other provisions for anchorages to building structure have been installed to receive hangers at spacing required to support the Work and that hangers will develop their full strength.

#### 3.3 INSTALLATION, GENERAL

- A. Installation Standard: ASTM C 754, except comply with framing sizes and spacing indicated.
  1. Gypsum Board Assemblies: Also comply with requirements in ASTM C 840 that apply to framing installation.
- B. Install supplementary framing, and blocking to support fixtures, equipment services, heavy trim, or similar construction.
- C. Install bracing at terminations in assemblies.
- D. Do not bridge building control and expansion joints with non-structural steel framing members. Frame both sides of joints independently.

### 3.4 INSTALLING SUSPENSION SYSTEMS

- A. Install suspension system components in sizes and spacings indicated on Drawings, but not less than those required by referenced installation standards for assembly types and other assembly components indicated.
- B. Isolate suspension systems from building structure where they abut or are penetrated by building structure to prevent transfer of loading imposed by structural movement.
- C. Suspend hangers from building structure as follows:
  - 1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structural or suspension system.
    - a. Splay hangers only where required to miss obstructions and offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
  - 2. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with locations of hangers required to support standard suspension system members, install supplemental suspension members and hangers in the form of trapezes or equivalent devices.
    - a. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced installation standards.
  - 3. Wire Hangers: Secure by looping and wire tying, either directly to structures or to inserts, eye screws, or other devices and fasteners that are secure and appropriate for substrate, and in a manner that will not cause hangers to deteriorate or otherwise fail.
  - 4. Do not attach hangers to steel deck.
  - 5. Do not connect or suspend steel framing from ducts, pipes, or conduit.
- D. Fire-Resistance-Rated Assemblies: Wire tie furring channels to supports.
- E. Installation Tolerances: Install suspension systems that are level to within 1/8 inch in 12 feet measured lengthwise on each member that will receive finishes and transversely between parallel members that will receive finishes.

### 3.5 INSTALLING FRAMED ASSEMBLIES

- A. Where studs are installed directly against exterior masonry walls or dissimilar metals at exterior walls, install isolation strip between studs and exterior wall.
- B. Install studs so flanges within framing system point in same direction.

1. Space studs for single-layer application at 16 inches o.c., unless otherwise indicated.
- C. Install tracks (runners) at floors and overhead supports. Extend framing full height to structural supports or substrates above suspended ceilings, except where partitions are indicated to terminate at suspended ceilings. Continue framing around ducts penetrating partitions above ceiling.
1. Slip-Type Head Joints: Where framing extends to overhead structural supports, install to produce joints at tops of framing systems that prevent axial loading of finished assemblies.
  2. Fire-Resistance-Rated Partitions: Install framing to comply with fire-resistance-rated assembly indicated and support closures and to make partitions continuous from floor to underside of solid structure.
    - a. Firestop Track: Where indicated, install to maintain continuity of fire-resistance-rated assembly indicated.
- D. Installation Tolerance: Install each framing member so fastening surfaces vary not more than 1/8 inch from the plane formed by faces of adjacent framing.

END OF SECTION

## SECTION 09 25 00 - GYPSUM BOARD ASSEMBLIES

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions, apply to this Section.

#### 1.2 SUMMARY

- A. Section Includes:
  - 1. Interior gypsum wallboard.
  - 2. Tile backing panels
  - 3. Edge trim.
  - 4. Acoustical sealant.
  - 5. Acoustical insulation.
  - 6. Tape and joint treatment.
- B. Related Sections: Coordinate Work of this Section with work of other sections, including Division 01 Sections, as required to properly execute the work and as necessary to maintain satisfactory progress of the work.

#### 1.3 DEFINITIONS

- A. Gypsum Board Terminology: Refer to ASTM C 11 and GA-505 for definitions of terms for gypsum board assemblies not defined in this Section or in other referenced standards.

#### 1.4 SUBMITTALS

- A. Submit under provisions of Division 01 Section "Submittal Procedures".
- B. Product Data: For each type of product indicated.
  - 1. Include manufacturers' product data for adhesives used to laminate gypsum board panels to substrates.
    - a. Shop Drawings: Show locations, fabrication, and installation of control and expansion joints including plans, elevations, sections, details of components, and attachments to other units of Work.
- C. Samples: For the following products:
  - 1. Trim Accessories: Full-size sample in 12-inch- long length for each trim accessory indicated.

#### 1.5 QUALITY ASSURANCE

- A. This Section outlines only minimum standards and requirements. Refer to the Drawings and other sections of the specifications for additional requirements. Bring all conflicts and

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discrepancies to the attention of the Architect and do not start work until such conflicts and discrepancies are clarified and corrected.

- B. Fire-Test-Response Characteristics: For gypsum board assemblies with fire-resistance ratings, provide materials and construction identical to those tested in assembly indicated according to ASTM E 119 by an independent testing and inspecting agency acceptable to authorities having jurisdiction.
  - 1. Fire-Resistance-Rated Assemblies: Indicated by design designations from UL's "Fire Resistance Directory".
- C. Sound Transmission Characteristics: For gypsum board assemblies with STC ratings, provide materials and construction identical to those tested in assembly indicated according to ASTM E 90 and classified according to ASTM E 413 by a qualified independent testing agency.
  - 1. STC-Rated Assemblies: Indicated by design designations from GA-600, "Fire Resistance Design Manual".
- D. Drywall/Steel Framed Systems Standards: Comply with the recommendations of United States Gypsum Company Systems Folder SA-923, Latest edition except where more stringent requirements are indicated in the contract documents.
- E. Application and Finishing of Gypsum wall Board: Comply with Gypsum Association publications GA-201, GA-216 and these specifications.
- F. Gypsum Board Finish Levels: Finish gypsum board walls and ceilings to levels indicated below and according to ASTM C 840. Refer to finish schedule for ceiling types, tile finishes and paint sheen.
  - 1. Level 1: Ceiling plenum areas, concealed areas, and where indicated.
  - 2. Level 2: Walls and ceilings that are substrate for tile.
  - 3. Level 3: Behind open jointed wall panel systems.
  - 4. Level 4: Walls and ceilings to receive Flat or Eggshell paint finish.
  - 5. Level 5: Walls to receive Semi-Gloss or Gloss paint finish and where indicated.
- G. Gypsum Board Finish Mockups: Before finishing gypsum board assemblies, install mockups of at least 100 sq. ft. in surface area to demonstrate aesthetic effects and qualities of materials and execution.
  - 1. Install mockups for the following applications:
    - a. Surfaces with texture finishes.
    - b. Surfaces indicated to receive non-textured paint finishes.
    - c. Surfaces indicated to receive textured paint finishes.
  - 2. Simulate finished lighting conditions for review of mockups.
  - 3. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.
  - 4.

## 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials in original packages, containers, or bundles bearing brand name and identification of manufacturer or supplier.
- B. Store materials inside under cover and keep them dry and protected against damage from weather, direct sunlight, surface contamination, corrosion, construction traffic, and other causes. Stack gypsum panels flat to prevent sagging.

## 1.7 PROJECT CONDITIONS

- A. Environmental Limitations: Comply with ASTM C 840 requirements or gypsum board manufacturer's written recommendations, whichever are more stringent.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following or Architect approved equal. Other manufacturers must produce equal products meeting or exceeding the specifications and comply with Division 01 requirements regarding substitutions to be considered.

#### 1. Gypsum Board and Related Products:

- a. American Gypsum Co.
- b. CertainTeed Corp.
- c. Georgia-Pacific Gypsum LLC
- d. National Gypsum Company (Gold Bond)
- e. Temple-Inland, a part of Georgia-Pacific

#### 2. Gypsum Board Trim Products:

- a. Fry Reglet Corp.
- b. Gordon, Inc., Interior Specialties Division
- c. MM Systems Corporation.
- d. Pittcon

### 2.2 STEEL SUSPENDED CEILING AND SOFFIT FRAMING

- A. As specified in Division 09 Section "Non-Structural Metal Framing" and Division 05 Section "Cold-Formed Metal Framing" for over height or heavier installations.
- B. Grid Suspension System for Interior Ceilings: ASTM C 645, direct-hung system composed of main beams and cross-furring members that interlock.
  - 1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following, or Architect approved equal in accordance with Paragraph 2.1:

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- a. Armstrong World Industries, Inc.; Furring Systems/Drywall.
- b. USG Interiors, Inc.; Drywall Suspension System.

2.3 STEEL PARTITION AND SOFFIT FRAMING

- A. As specified in Division 09 Section "Non-Structural Metal Framing" and Division 05 Section "Cold-Formed Metal Framing" for over height or heavier installations.

2.4 INTERIOR GYPSUM WALLBOARD

- A. Panel Size: Provide in maximum lengths and widths available that will minimize joints in each area and correspond with support system indicated.

- B. Fire Resistant Rated Gypsum Board:

1. Type X:

- a. Panel complies with Type X requirements of ASTM C 1396
- b. Core: Fire-resistance rated gypsum core.
- c. Long Edges: Tapered
- d. Thickness: 5/8 inch
- e. Size: 48 inches by longest practical length to minimize joints.
- f. Approved Product: Sheetrock Firecode Type X Gypsum Panels manufactured by USG or Architect approved equal in accordance with Paragraph 2.1.
- g. Location: As indicated on Drawings.

- C. High Impact Gypsum Board:

1. Panel complies with requirements of ASTM C 1396

- a. Core: Fire-resistance rated gypsum core, with additives to enhance mold/mildew resistance, surface indentation resistance, impact resistance and moisture and mold resistant
- b. Embedded fiberglass mesh
- c. Long Edges: Tapered
- d. Thickness: 5/8 inch
- e. Surface Abrasion Resistance: Classification Level 1 in accordance with ASTM C 1629
- f. Indentation Resistance: Classification Level 1 in accordance with ASTM C 1629.
- g. Soft Body Impact Resistance: Classification Level 3 in accordance with ASTM C 1629
- h. Hard Body Impact Resistance: Classification Level 3 in accordance with ASTM C 1629.
- i. Mold/Mildew Resistance: 10 when tested in accordance with ASTM D 3273.
- j. Size: 48 inches by longest practical length to minimize joints
- k. Approved Product: Fiberock Interior Panels, VHI manufactured by USG or Architect approved equal in accordance with Paragraph 2.1.
- l. Location: As indicated on Drawings.



## 2.5 TILE BACKING PANELS

### A. Cementitious Backer Units:

1. Compliance: Exceeds ANSI A118.9 test methods and specifications for cementitious backer units (CBU) and ANSI A108.11 for interior installation of CBU. Exceeds ASTM C 1325 standards for non-asbestos fiber-mat reinforced cementitious backer units
2. Thickness: 5/8 inch.
3. Size: 48 inches by longest practical length to minimize joints
4. Approved Product: Durock Cement Board manufactured by USG or Architect approved equal in accordance with Paragraph 2.1.
5. Location: As indicated on Drawings behind tile.

## 2.6 TRIM ACCESSORIES

### A. Interior Trim, Typical: ASTM C 1047.

1. Material: Galvanized or aluminum-coated steel sheet, rolled zinc, or paper-faced galvanized steel sheet.
2. Shapes:
  - a. Cornerbead: Use at outside corners.
  - b. Bullnose Bead: Use at outside corners.
  - c. LC-Bead (J-Bead): Use at exposed panel edges.
  - d. L-Bead: Use where indicated.
  - e. U-Bead: Use where indicated.
  - f. Expansion (Control) Joint: Use where indicated.
  
  - g. Curved-Edge Cornerbead: With notched or flexible flanges; use at curved openings.

### B. Interior Trim, Special: Extruded accessories of profiles and dimensions indicated.

1. Material: Aluminum, prepainted.
2. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following or Architect approved equal in accordance with Paragraph 2.1:
  - a. Hanging Track.
  - b. Wall Reveals.
  - c. Wall/Ceiling Reveal.
  - d. Fabric Tuck Reveal.
  - e. Ceiling Trim.
  - f. Ceiling Transition.
  - g. Partition Closure.
3. Manufacturers: Subject to compliance with requirements, provide products by one of the following or Architect approved equal in accordance with Paragraph 2.1:

(PWE)Teague Administration Building Interior Renovations  
City of Houston – General Services Department Design and  
Construction Division

- a. Fry Reglet Corp.
  - b. Gordon, Interior Specialties Division
  - c. MM Systems Corporation.
  - d. Pittcon
4. Aluminum: Alloy and temper with not less than the strength and durability properties of ASTM B 221, alloy 6063-T5.
  5. Finish: As scheduled or specified above.

## 2.7 JOINT TREATMENT MATERIALS

- A. General: Comply with ASTM C 475.
- B. Joint Tape:
  1. Interior Gypsum Wallboard: Paper.
  2. Tile Backing Panels: As recommended by panel manufacturer.
- C. Joint Compound for Interior Gypsum Wallboard: For each coat use formulation that is compatible with other compounds applied on previous or for successive coats.
  1. Prefilling: At open joints, rounded or beveled panel edges, and damaged surface areas, use setting-type taping compound.
  2. Embedding and First Coat: For embedding tape and first coat on joints, fasteners, and trim flanges, use setting-type taping compound.
    - a. Use setting-type compound for installing paper-faced metal trim accessories.
  3. Fill Coat: For second coat, use setting-type, sandable topping compound.
  4. Finish Coat: For third coat, use setting-type, sandable topping compound.
  5. Skim Coat: For final coat of Level 5 finish, use setting-type, sandable topping compound.
- D. Joint Compound for Tile Backing Panels:
  1. Tile Backing Panel: As recommended by manufacturer.

## 2.8 ACOUSTICAL SEALANT

- A. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following: or Architect approved equal in accordance with Paragraph 2.1:
  1. Acoustical Sealant for Exposed and Concealed Joints:
    - a. Pecora Corp.; AC-20 FTR Acoustical and Insulation Sealant.
    - b. United States Gypsum Co.; SHEETROCK Acoustical Sealant.
  2. Acoustical Sealant for Concealed Joints:

(PWE)Teague Administration Building Interior Renovations  
City of Houston – General Services Department Design and  
Construction Division

- a. Ohio Sealants, Inc.; Pro-Series SC-170 Rubber Base Sound Sealant.
  - b. Pecora Corp.; BA-98.
  - c. Tremco, Inc.; Tremco Acoustical Sealant.
- B. Acoustical Sealant for Exposed and Concealed Joints: Nonsag, paintable, nonstaining, latex sealant complying with ASTM C 834 that effectively reduces airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.
- C. Acoustical Sealant for Concealed Joints: Nondrying, nonhardening, nonskinning, nonstaining, gunnable, synthetic-rubber sealant recommended for sealing interior concealed joints to reduce airborne sound transmission.

## 2.9 AUXILIARY MATERIALS

- A. General: Provide auxiliary materials that comply with referenced installation standards and manufacturer's written recommendations.
- B. Laminating Adhesive: Adhesive or joint compound recommended for directly adhering gypsum panels to continuous substrate.
- C. Fastening Adhesive:
1. Wood: ASTM C 557.
  2. Steel: Adhesive recommended for attaching panels to steel framing.
- D. Steel Drill Screws: ASTM C 1002, unless otherwise indicated.
1. Use screws complying with ASTM C 954 for fastening panels to steel members from 0.033 to 0.112 inch thick.
  2. For fastening tile backer panels, use screws of type and size recommended by panel manufacturer.
- E. Isolation Strip at Exterior Walls:
1. Asphalt-Saturated Organic Felt: ASTM D 226, Type I (No. 15 asphalt felt), nonperforated.
  2. Foam Gasket: Adhesive-backed, closed-cell vinyl foam strips that allow fastener penetration without foam displacement, 1/8 inch thick, in width to suit steel stud size.
- F. Sound Attenuation Blankets: ASTM C 665, Type I (blankets without membrane facing) produced by combining thermosetting resins with mineral fibers manufactured from glass, slag wool, or rock wool.
1. Fire-Resistance-Rated Assemblies: Comply with mineral-fiber requirements of assembly.
    - a. Fire Hazard Classification:
      - 1) Maximum Flame Spread Index: 25
      - 2) Maximum Smoke Developed Index: 50

- G. Acoustics Putty Pads: Designed to maintain the performance of acoustically rated walls with penetrations such as electrical outlets, HVAC ducts, water hookups, and cables. Easy to use acoustical putty on release paper for use around junction boxes. Wrap all boxes in acoustically rated walls in order to maintain the highest STC ratings. Each pad is 6 inches x 8 inches x 1/8 inch thick. Approved Product: ATC Acoustics Putty Pads manufactured by ATS Acoustics, or Architect approved equal in accordance with Paragraph 2.1.

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Examine areas and substrates, with Installer present, and including welded hollow-metal frames, cast-in anchors, and structural framing, for compliance with requirements and other conditions affecting performance. Proceed with installation only after unsatisfactory conditions have been corrected.

#### 3.2 PREPARATION

- A. Suspended Ceilings: Coordinate installation of ceiling suspension systems with installation of overhead structure to ensure that inserts and other provisions for anchorages to building structure have been installed to receive ceiling hangers at spacing required to support ceilings and that hangers will develop their full strength.

1. Furnish concrete inserts and other devices indicated to other trades for installation in advance of time needed for coordination and construction.

#### 3.3 INSTALLING STEEL FRAMING, GENERAL

- A. As specified in Division 09 Section "Non-Structural Metal Framing" and Division 05 Section "Cold-Formed Metal Framing" for over height or heavier installations.
- B. Install supplementary framing, blocking, and bracing at terminations in gypsum board assemblies to support fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, or similar construction. Comply with details indicated and with gypsum board manufacturer's written recommendations or, if none available, with United States Gypsum's "Gypsum Construction Handbook".
- C. Isolate steel framing from building structure at locations indicated to prevent transfer of loading imposed by structural movement.
1. Isolate ceiling assemblies where they abut or are penetrated by building structure.
  2. Isolate partition framing and wall furring where it abuts structure, except at floor. Install slip-type joints at head of assemblies that avoid axial loading of assembly and laterally support assembly.
    - a. Use deep-leg deflection track where indicated.
    - b. Use proprietary deflection track where indicated.
    - c. Use proprietary firestop track where indicated.
- D. Do not bridge building control and expansion joints with steel framing or furring members. Frame both sides of joints independently.

### 3.4 INSTALLING STEEL SUSPENDED CEILING AND SOFFIT FRAMING

- A. Suspend ceiling hangers from building structure as follows:
1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structural or ceiling suspension system. Splay hangers only where required to miss obstructions and offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
  2. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with the location of hangers required to support standard suspension system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards.
  3. Secure wire hangers by looping and wire-tying, either directly to structures or to inserts, eyescrews, or other devices and fasteners that are secure and appropriate for substrate, and in a manner that will not cause them to deteriorate or otherwise fail.
  4. Secure angle hangers to structure, including intermediate framing members, by attaching to inserts, eyescrews, or other devices and fasteners that are secure and appropriate for structure and hanger, and in a manner that will not cause hangers to deteriorate or otherwise fail.
  5. Do not support ceilings directly from permanent metal forms. Furnish cast-in-place hanger inserts that extend through forms.
  6. Do not attach hangers to steel deck tabs.
  7. Do not attach hangers to steel roof deck. Attach hangers to structural members.
  8. Do not connect or suspend steel framing from ducts, pipes, or conduit.
- B. Installation Tolerances: Install steel framing components for suspended ceilings so members for panel attachment are level to within 1/8 inch in 12 feet measured lengthwise on each member and transversely between parallel members.
- C. Sway-brace suspended steel framing with hangers used for support.
- D. For exterior soffits, install cross bracing and framing to resist winduplift.
- E. Wire-tie furring channels to supports, as required to comply with requirements for assemblies indicated.
- F. Install suspended steel framing components in sizes and spacings indicated, but not less than that required by the referenced steel framing and installation standards.
1. Wire Hangers: 48 inches o.c.
  2. Carrying Channels (Main Runners): 48 inches o.c.
  3. Furring Channels (Furring Members): 16 inches o.c.
- G. Grid Suspension System: Attach perimeter wall track or angle where grid suspension system meets vertical surfaces. Mechanically join main beam and cross-furring members to each other and butt-cut to fit into wall track.

### 3.5 INSTALLING STEEL PARTITION AND SOFFIT FRAMING

- A. As specified in Division 09 Section "Non-Structural Metal Framing" and Division 05 Section "Cold-Formed Metal Framing" for over height or heavier installations.

### 3.6 APPLYING AND FINISHING PANELS, GENERAL

- A. Gypsum Board Application and Finishing Standards: ASTM C 840 and GA-216.
- B. Install acoustics putty pads at electrical boxes and other penetrations at sound rated walls before installing sound attenuation blankets.
- C. Install sound attenuation blankets before installing gypsum panels.
- D. Install ceiling board panels across framing to minimize the number of abutting end joints and to avoid abutting end joints in the central area of each ceiling. Stagger abutting end joints of adjacent panels not less than one framing member.
- E. Install gypsum panels with face side out. Butt panels together for a light contact at edges and ends with not more than 1/16 inch of open space between panels. Do not force into place.
- F. Locate edge and end joints over supports, except in ceiling applications where intermediate supports or gypsum board back-blocking is provided behind end joints. Do not place tapered edges against cut edges or ends. Stagger vertical joints on opposite sides of partitions. Do not make joints other than control joints at corners of framed openings.
- G. Attach gypsum panels to steel studs so leading edge or end of each panel is attached to open (unsupported) edges of stud flanges first.
- H. Attach gypsum panels to framing provided at openings and cutouts.
- I. Do not attach gypsum panels across the flat grain of wide-dimension lumber, including floor joists and headers. Float gypsum panels over these members using resilient channels, or provide control joints to counteract wood shrinkage.
- J. Form control and expansion joints with space between edges of adjoining gypsum panels.
- K. Cover both faces of steel stud partition framing with gypsum panels in concealed spaces (above ceilings, etc.), except in chases braced internally.
  - 1. Unless concealed application is indicated or required for sound, fire, air, or smoke ratings, coverage may be accomplished with scraps of not less than 8 sq. ft. in area.
  - 2. Fit gypsum panels around ducts, pipes, and conduits.
  - 3. Where partitions intersect open concrete coffers, concrete joists, and other structural members projecting below underside of floor/roof slabs and decks, cut gypsum panels to fit profile formed by coffers, joists, and other structural members; allow 1/4- to 3/8-inch- wide joints to install sealant.
- L. Isolate perimeter of non-load-bearing gypsum board partitions at structural abutments, except floors. Provide 1/4- to 1/2-inch- wide spaces at these locations, and trim edges with U-bead edge trim where edges of gypsum panels are exposed. Seal joints between edges

and abutting structural surfaces with acoustical sealant.

- M. Floating Construction: Where feasible, including where recommended in writing by manufacturer, install gypsum panels over wood framing, with floating internal corner construction.
- N. STC-Rated Assemblies: Seal construction at perimeters, behind control and expansion joints, and at openings and penetrations with a continuous bead of acoustical sealant. Install acoustical sealant at both faces of partitions at perimeters and through penetrations. Comply with ASTM C 919 and manufacturer's written recommendations for locating edge trim and closing off sound-flanking paths around or through gypsum board assemblies, including sealing partitions above acoustical ceilings.
- O. Space fasteners in gypsum panels according to referenced gypsum board application and finishing standard and manufacturer's written recommendations.
  - 1. Space screws a maximum of 12 inches o.c. for vertical applications.
- P. Space fasteners in panels that are tile substrates a maximum of 8 inches o.c.

### 3.7 PANEL APPLICATION METHODS

- A. Single-Layer Application:
  - 1. On ceilings, apply gypsum panels before wall/partition board application to the greatest extent possible and at right angles to framing, unless otherwise indicated.
  - 2. On partitions/walls, apply gypsum panels horizontally (perpendicular to framing), unless otherwise indicated or required by fire-resistance-rated assembly, and minimize end joints.
    - a. Stagger abutting end joints not less than one framing member in alternate courses of board.
    - b. At stairwells and other high walls, install panels horizontally, unless otherwise indicated or required by fire-resistance-rated assembly.
  - 3. On Z-furring members, apply gypsum panels vertically (parallel to framing) with no end joints. Locate edge joints over furring members.
- B. Multilayer Application on Ceilings: Apply gypsum board indicated for base layers before applying base layers on walls/partitions; apply face layers in same sequence. Apply base layers at right angles to framing members and offset face-layer joints 1 framing member, 16 inches minimum, from parallel base-layer joints, unless otherwise indicated or required by fire-resistance-rated assembly.
- C. Multilayer Application on Partitions/Walls: Apply gypsum board indicated for base layers and face layers vertically (parallel to framing) with joints of base layers located over stud or furring member and face-layer joints offset at least one stud or furring member with base-layer joints, unless otherwise indicated or required by fire-resistance-rated assembly. Stagger joints on opposite sides of partitions.
  - 1. Z-Furring Members: Apply base layer vertically (parallel to framing) and face layer either vertically (parallel to framing) or horizontally (perpendicular to framing) with vertical joints offset at least one furring member. Locate edge joints of base

layer over furring members.

- D. Single-Layer Fastening Methods: Apply gypsum panels to supports with steel drill screws.
- E. Multilayer Fastening Methods: Fasten base layers and face layers separately to supports with screws.
- F. Laminating to Substrate: Where gypsum panels are indicated as directly adhered to a substrate (other than studs, joists, furring members, or base layer of gypsum board),

comply with gypsum board manufacturer's written recommendations and temporarily brace or fasten gypsum panels until fastening adhesive has set.

G. Curved Surfaces:

- 1. Install panels horizontally and unbroken, to the extent possible, across curved surface plus 12-inch- long straight sections at ends of curves and tangent to them.
- 2. Wet gypsum panels on surfaces that will become compressed where curve radius prevents using dry panels. Comply with gypsum board manufacturer's written recommendations for curve radii, wetting methods, stacking panels after wetting, and other preparations that precede installing wetted gypsum panels.
- 3. On convex sides of partitions, begin installation at one end of curved surface and fasten gypsum panels to studs as they are wrapped around curve. On concave side, start fastening panels to stud at center of curve and work outward to panel ends. Fasten panels to framing with screws spaced 12 inches o.c.
- 4. For double-layer construction, fasten base layer to studs with screws 16 inches o.c. Center gypsum board face layer over joints in base layer, and fasten to studs with screws spaced 12 inches o.c.
- 5. Allow wetted gypsum panels to dry before applying joint treatment.
- 6. Provide control joints as recommended by manufacturer, or as shown on drawings.

### 3.8 INSTALLING TRIM ACCESSORIES

- A. General: For trim with back flanges intended for fasteners, attach to framing with same fasteners used for panels. Otherwise, attach trim according to manufacturer's written instructions.
- B. Control Joints: Install control joints at locations indicated on Drawings.

### 3.9 FINISHING GYPSUM BOARD ASSEMBLIES

- A. General: Treat gypsum board joints, interior angles, edge trim, control joints, penetrations, fastener heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for decoration. Promptly remove residual joint compound from adjacent surfaces.
- B. Prefill open joints, rounded or beveled edges, and damaged surface areas.
- C. Apply joint tape over gypsum board joints, except those with trim having flanges not intended for tape.
- D. Gypsum Board Finish Levels: Finish panels to levels indicated below, according to ASTM C 840, for locations indicated:



1. Level 1: Embed tape at joints in ceiling plenum areas, concealed areas, and where indicated.
2. Level 2: Embed tape and apply separate first coat of joint compound to tape, fasteners, and trim flanges where panels are substrate for tile and where indicated.
3. Level 3: Embed tape and apply separate first and fill coats of joint compound to tape, fasteners, and trim flanges where indicated.
4. Level 4: Embed tape and apply separate first, fill, and finish coats of joint compound to tape, fasteners, and trim flanges at panel surfaces that will be exposed to view, unless otherwise indicated.
5. Level 5: Embed tape and apply separate first, fill, and finish coats of joint compound to tape, fasteners, and trim flanges, and apply skim coat of joint compound over entire surface where indicated.

### 3.10 FIELD QUALITY CONTROL

- A. Above-Ceiling Observation: Architect will conduct an above-ceiling observation before installing gypsum board ceilings and report deficiencies in the Work observed. Do not proceed with installation of gypsum board to ceiling support framing until deficiencies have been corrected.
  1. Notify Architect seven days in advance of date and time when Project, or part of Project, will be ready for above-ceiling observation.
  2. Before notifying Architect, complete the following in areas to receive gypsum board ceilings:
    - a. Installation of 80 percent of lighting fixtures, powered for operation.
    - b. Installation, insulation, and leak and pressure testing of water piping systems.
    - c. Installation of air-duct systems.
    - d. Installation of air devices.
    - e. Installation of mechanical system control-air tubing.
    - f. Installation of ceiling support framing.

END OF SECTION

## SECTION 09 51 13 - ACOUSTICAL PANEL CEILINGS

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions, apply to this Section.

#### 1.2 SUMMARY

- A. Section includes acoustical panels and exposed suspension systems and perimeter trim for ceilings indicated on Drawings.
- B. Related Sections: Coordinate Work of this Section with work of other sections, including Division 01 Sections, as required to properly execute the work and as necessary to maintain satisfactory progress of the work.

#### 1.3 REFERENCES

- A. ASTM International (ASTM)
  - 1. C423, Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method
  - 2. C635, Standard Specification for the Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings
  - 3. C636, Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels
  - 4. D3273, Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber
  - 5. D3274, Standard Test Method for Evaluating Degree of Surface Disfigurement of Paint Films by Fungal or Algal Growth, or Soil and Dirt Accumulation
  - 6. D5116, Standard Guide for Small-Scale Environmental Chamber Determinations of Organic Emissions From Indoor Materials/Products
  - 7. E84, Standard Test Method for Surface Burning Characteristics of Building Materials
  - 8. E119, Standard Test Methods for Fire Tests of Building Construction and Materials
  - 9. E1264, Standard Classification for Acoustical Ceiling Products
  - 10. E1414, Standard Test Method for Airborne Sound Attenuation Between Rooms Sharing a Common Ceiling Plenum
- B. Ceilings & Interior Systems Construction Association (CISCA)
  - 1. Ceiling Systems Installation Handbook
- C. Collaborative for High-Performance Schools (CHPS)

1. Indoor air quality emission testing of materials.
- D. Underwriters Laboratories (UL)
1. Fire Resistance Directory
    - a. Listed Fire-resistance-rated, acoustical tile ceilings are indicated by design designations
- E. Warnock Hersey (WHI)
1. Certification Listings

## 1.5 SUBMITTALS

- A. Submit under provisions of Division 01 Section "Submittal Procedures".
- B. Product Data: For each type of product indicated.
- C. Coordination Drawings: Submit reflected ceiling plans that are coordinated with mechanical, electrical and security work at acoustical ceilings. Show ceiling suspension members, method of anchorage of hangers and ceiling mounted work including light fixtures and air diffusers, grilles, speakers, sprinklers, access panels, and special moldings
- D. Samples:
1. 6 inch x 6 inch minimum samples of each tile type, pattern, and color required.
  2. Set of 12 inch long samples of suspension system members.
  3. Set of 12 inch long samples of exposed moldings and perimeter trim for each color and system type required.
- E. Certificates: Submit manufacturers certificates of acoustical ceiling units and suspension systems attesting that their products comply with specification requirements and warranties

## 1.6 DELIVERY, STORAGE, AND HANDLING

- A. All materials shall be delivered in their original unopened packages and stored in an enclosed shelter providing protection from damage and exposure to the elements.
- B. Storage:
1. Panels: Storage time of materials at the job site should be as short as possible, and environmental conditions should be as near as possible to those specified for occupancy (see Paragraph 1.7 below). Excess humidity during storage can cause expansion of material and possible warp, sag, or poor fit after installation. Chemical changes in the mat and/or coatings can be aggravated by excess humidity and cause discoloration during storage, even in unopened cartons. Cartons should be removed from pallets and stringers to prevent distortion of material. Long-term (6-12 months) storage under uncontrolled environmental conditions should be

- 2. avoided.
- 2. Suspension System: Store in manner that will prevent warping, scratches, or damage of any kind.
- C. Handling: Handle in such manner to ensure against racking, distortion, or physical damage of any kind.
- D. Damaged or deteriorated materials should be removed from the premises. Immediately before installation, to stabilize tile and panels, store them at a location where temperature and humidity conditions duplicate those ambient during installation and anticipated for occupancy.

#### 1.7 ENVIRONMENTAL CONDITIONS

- A. Installation of acoustical panels shall not begin until building is enclosed, permanent heating and cooling equipment is in operation, and residual moisture from plaster, concrete, or terrazzo work has dissipated.

#### 1.8 QUALITY ASSURANCE

- A. This Section outlines the minimum standards and requirements for this Project. Refer to the Drawings for additional requirements. Bring all conflicts and discrepancies to the attention of the Architect and do not start work until such conflicts and discrepancies are clarified and corrected.
- B. Single Source Responsibility: To obtain combined warranty for the Donn Brand suspension system and the acoustical panel, color match or ceiling panel and suspension system compatibility, all acoustical panel and suspension system components shall be produced and supplied by one manufacturer. Materials supplied by more than one manufacturer are not acceptable.
- C. Subcontractor qualifications: Installer shall have successful experience in the installation of suspended ceiling systems on projects with requirements similar to requirements specified.
- D. Requirements of regulatory agencies: Codes and regulations of authorities having jurisdiction.
- E. Source quality control:
  - 1. Test reports: Manufacturer will provide test certification for minimum requirements as tested in accordance with applicable industry standards and/or to meet performance standards specified by various agencies.
  - 2. Changes from system: System performance following any substitution of materials or change in assembly design must be certified by the manufacturer.
  - 3. All ceiling panel cartons must contain UL label for acoustical compliance.
  - 4. All suspension system cartons must contain UL label for load compliance per ASTM C635.
- F. Preinstallation Conference: Conduct conference at Project site to comply with

requirements in Division 01 Section, "Project Management and Coordination".

## 1.9 PROJECT CONDITIONS

- A. Environmental requirements for interior installation: Building shall be enclosed with windows and exterior doors in place and glazed, and roof watertight before installation of ceiling system and related ceiling components.
- B. Coordination with other work:
  - 1. General: Coordinate with other work supported by or penetrating through the ceiling, including mechanical and electrical work and partition systems.
  - 2. Mechanical work: Ductwork above ceiling shall be complete and permanent heating and cooling systems operating to climate conditions prior to installation of ceiling components.
  - 3. Electrical work: Installation of conduit above ceiling shall be complete before installation of ceiling components.
  - 4. Fire protection work: Fire protection lines and/or equipment occurring above ceiling shall be completed and tested before ceiling components are installed.
- C. Protection:
  - 1. Personnel: Follow good safety and industrial hygiene practices during handling and installing of all products and systems, with personnel to take necessary precautions and wear appropriate personal protective equipment as needed. Read material safety data sheets and related literature for important information on products before installation. Contractor to be solely responsible for all personal safety issues during and subsequent to installation; architect, specifier, owner, and manufacturer will rely on contractor's performance in such regard.
  - 2. Protect completed work above ceiling system from damage during installation of ceiling components.

## PART 2 - PRODUCTS

### 2.1 ACOUSTICAL PANELS

- A. Acoustical Panels: As scheduled on Drawings.

### 2.2 METAL SUSPENSION SYSTEM FOR ACOUSTICAL PANEL CEILING

- A. Components: Main runners and cross tees, base metal and end detail, fabricated from commercial quality steel complying with ASTM A 366 or A 625. Main runners and cross tees are double web steel construction with exposed flange design. Exposed surfaces chemically cleansed, protective coated, capped prefinished steel in baked-on enamel paint.
  - 1. Structural Classification: ASTM C 635 Intermediate duty
  - 2. Color: White
  - 3. Exposed Grid Surface Width: 15/16 inch.

B. Approved Product/Manufacturer: "Prelude XL 15/16 Exposed Tee System" manufactured  
ACOUSTICAL PANEL CEILINGS 09 51 13 - 4  
Prozign Architects, Inc.; Project No. 1449.15  
City of Houston – WBS No.S-000020-0007

by Armstrong World Industries, Inc., or Architect approved equal in accordance with Paragraph 2.1.

- C. Accessories: (As indicated or required)
  - 1. Hanger Wire: Galvanized carbon steel in accordance with ASTM A641, soft temper, prestretched, with a yield stress load of at least five (5) times the design load, but not less than 12 gauge in diameter.
  - 2. Perimeter moldings.
  - 3. Hold down clips.

## 2.3 PERIMETER TRIM

- A. Materials:
  - 1. Trim Channel: Extruded aluminum, alloy 6063.
  - 2. Hanging Clip: Commercial quality aluminum.
  - 3. T-Bar Connector Clip: Commercial quality aluminum.
  - 4. Splice Plate: Galvanized steel.
- B. Surface Finish: Factory-applied baked polyester paint finish; White.
- C. Configurations/Sizes: As indicated or required.
  - 1. Straight 120 x 3/16 x 2 inches.
  - 2. Outside Corner 12 x 3/16 x 2 inches.
  - 3. Inside Corner 12 x 3/16 x 2 inches.
- D. Accessories: As recommended by manufacturer for a complete installation.
- E. Location: At ACT 2 where indicated on Drawings.
- F. Approved Product/Manufacturer: Axiom Interlude Trim manufactured by Armstrong World Industries, Inc., or Architect approved equal in accordance with Paragraph 2.1.

## 2.4 ACOUSTICAL SEALANT

- A. Products: Subject to compliance with requirements, provide one of the following:
  - 1. Acoustical Sealant for Exposed and Concealed Joints:
    - a. Pecora Corporation; AC-20 FTR Acoustical and Insulation Sealant.
    - b. USG Corporation; SHEETROCK Acoustical Sealant.
  - 2. Acoustical Sealant for Concealed Joints:
    - a. OSI Sealants, Inc.; Pro-Series SC-175 Rubber Base Sound Sealant.
    - b. Pecora Corporation; BA-98.
    - c. Tremco, Inc.; Tremco Acoustical Sealant.

## PART 3 - EXECUTION

### 3.1 GENERAL

- A. Standard for Ceiling Suspension System Installations: Comply with ASTM C636.
- B. Standard for Ceiling Suspension Systems Requiring Seismic Restraint: Comply with ASTM E 580.
- C. CISCA Ceilings Systems Handbook.

### 3.2 INSPECTION

- A. Examine areas to receive ceiling panels for conditions that will adversely affect installation. Provide written report of discrepancies.
- B. Do not start work until unsatisfactory conditions have been corrected.
- C. Work to be concealed: Verify work above ceiling is complete and installed in manner that will not affect layout and installation of ceiling panels.
- D. Beginning of installation shall signify acceptance of conditions in areas to receive ceiling panels.
- E. Fire-rating requirements: Construction above fire-rated assembly shall meet requirements of UL Design specified in Part 2, Products.

### 3.3 PREPARATION

- A. Field dimensions must be verified prior to installation.

### 3.4 INSTALLATION

- A. Standard reference: Install ceiling panels and suspension system, including necessary hangers, grillage, splines, and other supporting hardware, in accordance with ASTM C636, CISCA Ceiling Systems Handbook, (UL Design) and any applicable code requirement.
- B. Manufacturer's reference: Install ceiling panels in exposed grid systems, supported on all edges, in accordance with manufacturer's warranty.
- C. Drawing reference: Install ceiling panels in accordance with approved shop drawings.
- D. Hanger Wires:
  - 1. Spacing: Space hanger wires on main tees not more than 48 inches o.c. a maximum of 48 inches o.c., attaching hangers directly to the structure above, or as required to support loads.
  - 2. Limitations: Do not support wires from mechanical and/or electrical equipment, piping or other equipment occurring above ceiling.

- E. Accessories: Install accessories as applicable to meet project requirements.
- F. Install edge moldings and trim of type indicated at perimeter of acoustical ceiling area and where necessary to conceal edges of acoustical tiles.
- G. Install suspension system runners so they are square and securely interlocked with one another. Remove and replace dented, bent, or kinked members.
- H. Install acoustical tiles in coordination with suspension system.
  - 1. Fit adjoining tile to form flush, tight joints. Scribe and cut tile for accurate fit at borders and around penetrations through tile.
  - 2. Remove and replace any damaged tiles.
- I. Lighting Fixtures:
  - 1. All light fixtures shall be mechanically attached to the suspension system per NEC 410-16 (two per fixture unless the fixture is independently supported).
  - 2. Support of rigid lay-in (Type G) or can light fixtures:
    - a. Each fixture less than 10 lbs. shall have a single wire (wire may be slack) attached from the fixture to structure.
    - b. Each fixture that weighs between 10 and 56 lbs. shall have two wires (wires may be slack) attached at diagonal corners of the fixture to structure.
    - c. Each fixture greater than 56 lbs. shall be directly supported to structure by approved hangers.
    - d. Pendant light fixtures shall be directly supported from structure with 9-gauge wire (or approved alternative).
- J. Air Terminals:
  - 1. Air terminals less than 20 lbs. shall be positively attached to the suspension system
  - 2. Air terminals that weigh between 20 and 56 lbs. shall be mechanically attached to the suspension system. Two slack wires shall be attached from the housing to structure.
  - 3. Air terminals in excess of 56 lbs. shall be directly supported to structure by approved hangers.

### 3.5 CLEANING

- A. Suspension System: Remove panel material and perform any necessary cleaning maintenance with non-solvent based commercial cleaner.
- B. Immediately remove any corrosive substances or chemicals that would attack painted finishes (i.e. wallpaper adhesives).
- C. Touch up all minor scratches and spots, as acceptable, or replace damaged sections when touch-up is not permitted.
- D. Painting: Repainting of suspension member shall be with a high-quality solvent base



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enamel paint and applied as recommended by paint manufacturer. Ceiling panels may be touched-up by spraying a thinned, non-bridging vinyl-acrylic flat wall paint. The type of paint selected and the method of application can alter the acoustical performance and fire

ratings of any acoustical product. Therefore, USG Interiors, Inc. cannot guarantee that the field-painted panels will match the published performance.

- E. Remove all debris resulting from work of this Section.

END OF SECTION

## SECTION 09 65 00 - RESILIENT FLOORING AND BASE

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions, apply to this Section.

#### 1.2 SUMMARY

- A. Section Includes:
  - 1. Resilient vinyl composition (VCT) flooring adhesive attached with accessories in locations indicated on Drawings.
  - 2. Rubber flooring adhesive attached with accessories in locations indicated on Drawings.
  - 3. Resilient (rubber) base adhesive attached in locations indicated on Drawings.
- B. Related Sections: Coordinate Work of this Section with work of other sections, including Division 01 Sections, as required to properly execute the work and as necessary to maintain satisfactory progress of the work.

#### 1.4 SUBMITTALS

- A. Submit under provisions of Division 01 Section "Submittal Procedures".
- B. Product Data:
  - 1. Manufacturer's specifications and other data needed to prove compliance with specified requirements.
  - 2. Manufacturer's installation instructions.
- C. Samples: Actual sample of each specified material.

#### 1.4 QUALITY ASSURANCE

- A. This Section outlines the minimum standards and requirements for this Project. Refer to the Drawings for additional requirements. Bring all conflicts and discrepancies to the attention of the Architect and do not start work until such conflicts and discrepancies are clarified and corrected.

### PART 2 - PRODUCTS

#### 2.1 ACCEPTABLE MANUFACTURERS

- A. Manufacturers named are basis of Specification. Other manufacturers must have a minimum of five (5) years experience manufacturing products meeting or exceeding the

- B. specifications and comply with Division 01 requirements regarding substitutions to be considered.

## 2.2 MATERIALS

1. Vinyl Composition Tile Flooring (VCT):
  - a. Material: As scheduled on the Drawings.
  - b. Color: As selected by Architect from manufacturer's full range.
  - c. Manufacturer: As scheduled on the Drawings.
  - d. Location: As indicated on Drawings.
2. Rubber Flooring:
  - a. Material: As scheduled on the Drawings.
  - b. Color: As selected by Architect from manufacturer's full range.
  - c. Manufacturer: As scheduled on the Drawings
  - d. Location: As indicated on Drawings
3. Rubber Base:
  1. Material: Rubber, unless indicated otherwise.
  2. Type: Straight or Cove as indicated.
  3. Manufacturer: As scheduled on the Drawings.
  4. Height: 4 inches, unless indicated otherwise.
  5. Color: As selected by Architect from manufacturer's full range.
  6. Location: As indicated on Drawings.
4. Joining and Edge Finish Moldings:
  1. Usage: For use at flooring terminations with other flooring.
    - a. Type: Tapered or bullnose edge, as required to provide juncture at edge of adjacent floor surfaces.
    - b. Size: One (1) inch wide by 1/8 inch thick or as applicable to the type of flooring and condition.
    - c. Material: Rubber or vinyl as recommended by flooring manufacturer to suit application.
    - d. Color(s): As selected by Architect from manufacturer's available colors.
    - e. Burke Mercer Flooring Products, a Division of Burke Industries, Inc., Johnsonite, Division of Duramax, Inc., or Architect approved equal.
5. Adhesive:
  1. Flooring: As recommended and approved by flooring manufacturer to suit application.
  2. Base: As recommended and approved by base manufacturer to suit application.
6. Floor Leveling Underlayment: Refer to Division 03 Section "Self Leveling Underlayment".
7. Other Materials: Provide other materials, not specifically described, but required for a complete and proper installation.

## 2.3 EXTRA STOCK

- A. Deliver to the Owner for his use:
  - 1. Two percent (2%) or one (1) unopened carton of each color and pattern of flooring selected, whichever is greater.
  - 2. Two percent (2%) or one (1) unopened carton of each color, type, and size base selected, whichever is greater.
  - 3. One (1) gallon container of each type adhesive used for flooring and base.

## PART 3 - EXECUTION

### 3.1 SURFACE CONDITIONS

- A. Examine the areas and conditions under which Work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.
- B. The flooring, adhesive, and room temperature must be kept at a minimum temperature of 65 degrees F or warmer for at least 48 hours before, during, and 48 hours after installation.
- C. Install flooring only after the jobsite has been cleaned and cleared of other trade apparatus that may damage a finished flooring installation.

### 3.2 PREPARATION

- A. By General Contractor:
  - 1. Verify substrates are smooth, level, at required finish elevation, and without more than 1/8 inch in 10 feet-0 inch variation from level or slopes shown on the drawings.
  - 2. Level substrates by grinding high spots or filling low spots with cementitious subfloor filler as required.
  - 3. Broom clean or vacuum the surfaces to be covered, and inspect the substrates.
- B. By Flooring Contractor:
  - 1. Verify substrates are smooth, level, at required finish elevation, and are ready to receive resilient flooring and base.
  - 2. Bring discrepancies to the attention of the Architect and do not proceed until such discrepancies are corrected.
  - 3. Conduct moisture test - maximum allowable amount of moisture emission from floor is 3.0 pounds per 1,000 sq. ft. in 24 hour period.
  - 4. Starting Work indicates acceptance of existing conditions.

### 3.3 INSTALLATION

- A. General:

1. Install materials only after finishing operations, including painting, have been completed and after permanent heating and cooling system is operating.
2. Verify that moisture content of concrete slabs, building air temperature, and relative humidity are within the limits recommended by the manufacturers of the materials used.

B. Installing Resilient Flooring:

1. Install flooring fully adhered in compliance with the manufacturer's instructions.
2. Always check the cartons to assure the pattern number is correct and that the shade and lot numbers are the same on all cartons. To minimize shade variation, mix and install flooring from several different cartons.
3. Butt units tightly to vertical surfaces, nosings, edgings, and thresholds.
4. Scribe as necessary around obstructions and to produce neat joints.
5. Place flooring tightly laid, even, and in straight parallel lines.
6. Extend units into toe spaces, door reveals, and in closets and similar spaces.
7. Lay units from center marks established with principal walls, discounting minor offsets, so that units at opposite edges of the room are of equal width.
8. Adjust as necessary to avoid use of cut widths less than 3 inches wide at edge of space.
9. Lay units square to axes of the room or space.
10. Place joining and edge finish mouldings, including reducer strips tightly butted to units and secured with adhesive, providing at all unprotected edges unless otherwise shown.

C. Installing Base:

1. Install base where shown on the Drawings in accordance with manufacturer's instructions.
2. Use factory-preformed exterior corners, and factory preformed or job-mitered interior corners.

3.4 CLEANING AND PROTECTING

- A. Remove excess adhesive and other blemishes from exposed surfaces, using neutral cleaner recommended by the manufacturer of the resilient materials.

END OF SECTION

SECTION 09 67 00 FLUID APPLIED FLOORING  
FOR CONCRETE

Part 1 GENERAL

1.1 SECTION INCLUDES

- A. Fluid-applied flooring for Concrete

1.2 RELATED SECTIONS

- A. Section 03 35 00 - Concrete Finishes
- B. Section 03 01 00 - Maintenance of Concrete
- C. Section 09 60 00 - Floor Treatments
- D. Section 09 96 00 - High-Performance Coatings

1.3 REFERENCES

- A. SSPC-SP 1 - Solvent Cleaning
- B. SSPC-SP 2 - Hand Tool Cleaning
- C. SSPC-SP 3 - Power Tool Cleaning
- D. SSPC-SP 13 / NACE No. 6 Surface Preparation for Concrete
- E. ASTM F1869 - Moisture Test by use of Calcium Chloride
- F. ASTM D4258 - Standard Practice for Cleaning Concrete
- G. ASTM D4259 - Standard Practice for Abrading Concrete
- H. ASTM D4260 - Standard Practice for Etching Concrete
- I. ASTM D4263 - Plastic Sheet Method for Checking Moisture in Concrete
- J. ICRI # 03732

#### 1.4 SUBMITTALS

- A. Submit under provisions of Section 01 33 00, Submittal Procedures.
- B. Product Data: Manufacturer's data sheets on each paint and coating product should include:
  - 1 Product characteristics
  - 2 Surface preparation instructions and recommendations
  - 3 Primer requirements and finish specification
  - 4 Storage and handling requirements and recommendations
  - 5 Application methods
  - 6 Cleanup information
- C. Selection Samples: Submit a complete set of color chips that represent the full range of manufacturer's color samples available.
- D. Coating Maintenance Manual: upon conclusion of the project, the Contractor or paint manufacture/supplier shall furnish a coating maintenance manual, such as Sherwin-Williams "Custodian Project Color and Product Information" report or equal. Manual shall include an Area Summary with finish schedule, Area Detail designating where each product/color/finish was used, product data pages, Material Safety Data Sheets, care and cleaning instructions, touch-up procedures, and color samples of each color and finish used.

#### 1.5 MOCK-UP

Include a mock-up if the project size and/or quality warrant taking such a precaution. The following is one example of how a mock-up on a large project might be specified. When deciding on the extent of the mock-up, consider all the major different types of painting on the project.

- A. Finish surfaces for verification of products, colors, & sheens
- B. Finish area designated by Architect
- C. Provide samples that designate prime & finish coats
- D. Do not proceed with remaining work until the Architect approves the mock-up samples

#### 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Delivery: Deliver manufacturer's unopened containers to the work site. Packaging shall bear the manufacturer's name, label, and the following list of information:
  - 1 Product name, and type (description)
  - 2 Application & use instructions
  - 3 Surface preparation
  - 4 VOC content
  - 5 Environmental handling
  - 6 Batch date
  - 7 Color number
- B. Storage: Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction. Store materials in an area that is within the acceptable temperature range, per manufacturer's instructions. Protect from freezing.
- C. Handling: Maintain a clean, dry storage area, to prevent contamination or damage to the coatings.

## 1.7 PROJECT CONDITIONS

- A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not apply coatings under environmental conditions outside manufacturer's absolute limits.

## Part 2 PRODUCTS

### 2.1 MANUFACTURERS

- A. Acceptable Manufacturer:  
The Sherwin-Williams Company  
101 Prospect Avenue NW  
Cleveland, OH 44115  
Tel: (800) 321-8194  
Fax: (216) 566-1392  
www.sherwin-williams.com
- B. Substitutions: Requests for substitutions will be considered in accordance with provisions of Section 01 60 00 Product Requirements.  
When submitting request for substitution, provide complete product data specified above under Submittals, for each substitute product.

### 2.2 APPLICATION/SCOPE

- A. Use this article to define the scope of painting if not fully defined in a Finish Schedule or on the drawings. This article must be carefully edited to reflect the surfaces actually found on the project. In some cases, it may be enough to use the first paragraph that says, in effect, "paint everything" along with a list of items not to paint, without exhaustively defining all the different surfaces and items that must be painted.
- B. If the project involves repainting some but not all existing painted surfaces, be sure to indicate the extent of the repainting.
- C. The descriptions of each system can also be used to further refine the definition of what is to be coated.
- D. Surfaces to Be Coated:  
  
Concrete Floors: Light Industrial Duty  
Concrete Floors: Moderate Duty  
Concrete Floors: Severe Duty



## 2.3 SCHEDULE INDEX

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## 2.3 SCHEDULE

### A Light Industrial Duty: (Is Generally Considered For Industrial Foot Traffic & handcarts)

#### 1 Acrylic Primer / Acrylic System

1st Coat: ArmorSeal® Tread-Plex® Primer, B90W110  
 (1.5 - 2.0 mils dry)

2nd Coat: ArmorSeal Tread-Plex, B90 Series  
 (1.5 - 2.0 mils dry per coat)

3rd Coat: ArmorSeal Tread-Plex, B90 Series  
 (1.5 - 2.0 mils dry per coat) (optional)

#### Alternate

1st Coat: ArmorSeal Tread-Plex, B90 Series  
 (1.5 - 2.0 mils dry)

2nd Coat: ArmorSeal Tread-Plex, B90 Series  
 (1.5 - 2.0 mils dry per coat)

3rd Coat: ArmorSeal Tread-Plex, B90 Series  
 (1.5 - 2.0 mils dry per coat) (optional)

#### 2 Water Based Epoxy Primer / Water Based Epoxy System

1st Coat: ArmorSeal Floor-Plex® 7100 Primer, B70W410  
 (1.5 - 2.0 mils dry)

2nd Coat: ArmorSeal Floor-Plex 7100 Water Based Epoxy, B70-400 Series  
 (1.5 - 2.0 mils dry per coat)

3rd Coat: ArmorSeal Floor-Plex 7100 Water Based Epoxy, B70-400 Series  
 (1.5 - 2.0 mils dry per coat) (optional)

#### Alternate

1st Coat: ArmorSeal Water Based Epoxy Primer/Sealer Clear, B70VQ10  
 (2.0 – 3.0 mils dry per coat)

2nd Coat: ArmorSeal Floor-Plex 7100 Water Based Epoxy, B70-400  
 (1.5 - 2.0 mils dry per coat)

3rd Coat: ArmorSeal Floor-Plex 7100 Water Based Epoxy, B70-400  
 (1.5 - 2.0 mils dry per coat)(optional)

#### 3 Water Based Epoxy Primer / Water Based Urethane System

- 1st Coat: ArmorSeal Floor-Plex 7100 Primer, B70W410  
(1.5 - 2.0 mils dry)
- 2nd Coat: ArmorSeal 1K Water Based Urethane Floor Enamel, B65-775 Series  
(2.0 - 4.0 mils dry per coat)
- 3rd Coat: ArmorSeal 1K Water Based Urethane Floor Enamel, B65-775 Series  
(2.0 - 4.0 mils dry per coat) (optional)

**4 Epoxy System**

- 1st Coat: ArmorSeal 1000 HS Epoxy, B67-2000 Series  
(3.0 - 5.0 mils dry per coat)
- 2nd Coat: ArmorSeal 1000 HS Epoxy, B67-2000 Series  
(3.0 - 5.0 mils dry per coat)
- 3rd Coat: ArmorSeal 1000 HS Epoxy, B67-2000 Series (optional)  
(3.0 - 5.0 mils dry per coat)

**B Moderate Industrial Duty: (Is Generally Considered For Wheeled Carts, Frequent Cleaning/Rinsing, Occasional Spills, And Moderate Abrasion)**

**1 Water Based Epoxy Primer / Water Based Epoxy System**

- 1st Coat: ArmorSeal Floor-Plex 7100 Primer, B70W410  
(1.5 - 2.0 mils dry)
- 2nd Coat: ArmorSeal Floor-Plex 7100 Water Based Epoxy, B70-400 Series  
(1.5 - 2.0 mils dry per coat)
- 3rd Coat: ArmorSeal Floor-Plex 7100 Water Based Epoxy, B70-400 Series  
(1.5 - 2.0 mils dry per coat) (optional)

**Alternate**

- 1st Coat: ArmorSeal WB Epoxy Primer/Sealer Clear, B70VQ10  
(2.0 - 3.0 mils dry per coat)
- 2nd Coat: ArmorSeal Floor-Plex 7100 Water Based Epoxy, B70-400 Series  
(1.5 - 2.0 mils dry per coat)
- 3rd Coat: ArmorSeal Floor-Plex 7100 Water Based Epoxy, B70-400 Series  
(1.5 - 2.0 mils dry per coat) (optional)

**2 Epoxy Primer / Self-Leveling Epoxy System**

- 1st Coat: ArmorSeal 33 Epoxy Primer/Sealer, B58-33 Series  
(7.0 - 8.0 mils dry)
- 2nd Coat: ArmorSeal 650 SL/RC Self-Leveling Epoxy, B58-650 Series  
(10.0 - 30.0 mils dry per coat)

**3 Epoxy Primer / Self-Leveling Epoxy Decorative Quartz System**

- 1st Coat: ArmorSeal 33 Epoxy Primer/Sealer, B58-33 Clear  
(10.0 mils wft, broadcast to excess with color quartz)
- 2nd Coat: ArmorSeal 33 Epoxy Primer/Sealer, B58-33 Clear  
(24.0 mils wft, broadcast to excess with color quartz)
- 3rd Coat: ArmorSeal 650 SL/RC Clear Self-Leveling Epoxy, B58-650 Clear  
(15 mils wft)
- 4th Coat: ArmorSeal 650 SL/RC Clear Self-Leveling Epoxy, B58-650 Clear  
(8 mils wft)

**4 Water Based Epoxy Primer / Water Based Urethane System**

- 1st Coat: ArmorSeal Floor-Plex 7100 Primer, B70W410  
(1.5 - 2.0 mils dry)
- 2nd Coat: ArmorSeal 1K Water Based Urethane Floor Enamel, B65-775 Series  
(2.0 - 4.0 mils dry per coat)
- 3rd Coat: ArmorSeal 1K Water Based Urethane Floor Enamel, B65-775 Series  
(2.0 - 4.0 mils dry per coat) (optional)

**B Moderate Industrial Duty: (Is Generally Considered For Wheeled Carts, Frequent Cleaning/Rinsing, Occasional Spills, And Moderate Abrasion)**

**5 Epoxy System**

- 1st Coat: ArmorSeal 1000 HS Epoxy, B67-2000 Series  
(3.0 - 5.0 mils dry per coat)
- 2nd Coat: ArmorSeal 1000 HS Epoxy, B67-2000 Series  
(3.0 - 5.0 mils dry per coat)
- 3rd Coat: ArmorSeal 1000 HS Epoxy, B67-2000 Series (optional)  
(3.0 - 5.0 mils dry per coat)

**6 Epoxy / Moisture Cure Urethane System**

- 1st Coat: ArmorSeal 1000 HS Epoxy, B67-2000 Series  
(1.5 - 2.0 mils dry)
- 2nd Coat: ArmorSeal Rexthane™ I MCU, B65-60 Series  
(2.0 - 3.0 mils dry per coat)
- 3rd Coat: ArmorSeal Rexthane I MCU, B65-60 Series  
(2.0 - 3.0 mils dry per coat) (optional)

**Alternate**

- 1st Coat: ArmorSeal Floor-Plex 7100 Primer, B70W410  
(1.5 - 2.0 mils dry)
- 2nd Coat: ArmorSeal Rexthane I MCU, B65-60 Series  
(2.0 - 3.0 mils dry per coat)
- 3rd Coat: ArmorSeal Rexthane I MCU, B65-60 Series  
(2.0 - 3.0 mils dry per coat) (optional)

**C Severe Industrial Duty: (Is Generally Considered for Heavy Vehicle Traffic, Heavy Abrasion Areas, & Frequent Cleaning/Rinsing.)**

**1 Epoxy Primer / Self-Leveling Epoxy System**

- 1st Coat: ArmorSeal 33 Epoxy Primer/Sealer, B58-33 Series  
(7.0 - 8.0 mils dry)
- 2nd Coat: ArmorSeal 650 SL/RC Self-Leveling Epoxy, B58-650 Series  
(10.0 - 30.0 mils dry per coat)

**2 Epoxy Primer / Self-Leveling Epoxy Decorative Quartz System**

- 1st Coat: ArmorSeal 33 Epoxy Primer/Sealer, B58-33 Clear (10.0 mils wft, broadcast to excess with color quartz)
- 2nd Coat: ArmorSeal 33 Epoxy Primer/Sealer, B58-33 Clear (24.0 mils wft, broadcast to excess with color quartz)
- 3rd Coat: ArmorSeal 650 SL/RC Clear Self-Leveling Epoxy, B58-650 Clear (15 mils wft)
- 4th Coat: ArmorSeal 650 SL/RC Clear Self-Leveling Epoxy, B58-650 Clear (8 mils wft)

**C Severe Industrial Duty: (Is Generally Considered for Heavy Vehicle Traffic, Heavy Abrasion Areas, & Frequent Cleaning/Rinsing.)**

**3 Epoxy / Moisture Cure Urethane System**

- 1st Coat: ArmorSeal 1000 HS Epoxy, B67-2000 Series  
(1.5 - 2.0 mils dry)
- 2nd Coat: ArmorSeal Rexthane® I MCU, B65-60 Series  
(2.0 - 3.0 mils dry per coat)
- 3rd Coat: ArmorSeal Rexthane I MCU, B65-60 Series  
(2.0 - 3.0 mils dry per coat) (optional)

**Alternate**

- 1st Coat: ArmorSeal Floor-Plex 7100 Primer, B70W410  
(1.5 - 2.0 mils dry)
- 2nd Coat: ArmorSeal Rexthane I MCU, B65-60 Series  
(2.0 - 3.0 mils dry per coat)

3rd Coat: ArmorSeal Rexthane I MCU, B65-60 Series  
(2.0 - 3.0 mils dry per coat) (optional)

**4** Moisture Cure Urethane System

1st Coat: ArmorSeal Rexthane I MCU, B65-60 Series  
(2.0 - 3.0 mils dry per coat)

2nd Coat: ArmorSeal Rexthane I MCU, B65-60 Series  
(2.0 - 3.0 mils dry per coat)

3rd Coat: ArmorSeal Rexthane I MCU, B65-60 Series  
(2.0 - 3.0 mils dry per coat) (optional)

**5** Epoxy/Polyurethane

1st Coat: ArmorSeal 1000 HS Epoxy, B67-2000 Series  
(1.5 - 2.0 mils dry)

2nd Coat: ArmorSeal H.S Polyurethane, B65-220 Series  
(2.0 - 3.0 mils dry per coat)

3rd Coat: ArmorSeal H.S Polyurethane, B65-220 Series  
(2.0 - 3.0 mils dry per coat) (optional)

**2.4 MATERIALS - GENERAL REQUIREMENTS**

**A** Paints and Coatings - General:

- 1 Unless otherwise indicated, provide factory-mixed coatings. When required, mix coatings to correct consistency in accordance with manufacturer's instructions before application. Do not reduce, thin, or dilute coatings or add materials to coatings unless such procedure is specifically described in manufacturer's product instructions.

**B** Primers:

- 1 Where the manufacturer offers options on primers for a particular substrate, use primer categorized as "best" by the manufacturer.

**2.5 ACCESSORIES:**

**A** Coating Application Accessories:

- 1 Provide all primers, sealers, cleaning agents, cleaning cloths, sanding materials, and clean-up materials required, per manufacturer's specifications.

**Part 3 EXECUTION**

**3.1 EXAMINATION**

- A** Do not begin application of coatings until substrates have been properly examined and prepared. Notify Architect or Specifier of unsatisfactory conditions before proceeding.

- B** If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

- C** Proceed with work only after conditions have been corrected, and approved by all parties, otherwise application of coatings will be considered as an acceptance of surface conditions.

- D** Previously Painted Surfaces: Verify that existing painted surfaces do not contain lead based paints, notify Architect immediately if lead based paints are encountered.

*(Specifier Note: Verify the existence of lead based paints on the project. Buildings constructed after 1978 are less likely to contain lead based paints. If lead based paints are suspected on the project, all removal must be done in accordance with the EPA Renovation, Repair and Painting and all applicable state and local regulations. State and local regulations may be more strict than those set under the federal regulations. Verify that Owner has completed a Hazardous Material Assessment Report for the project prior to issuing of Drawings. Concluding that no lead based paints were found on project site, delete paragraph regarding lead based paints.)*

### 3.2 SURFACE PREPARATION

**WARNING!** Removal of old paint by sanding, scraping or other means may generate dust or fumes that contain lead. Exposure to lead dust or fumes may cause brain damage or other adverse health effects, especially in children or pregnant women. Controlling exposure to lead or other hazardous substances requires the use of proper protective equipment, such as a properly fitted respirator (NIOSH approved) and proper containment and cleanup. For more information, call the National Lead Information Center at 1-800-424-LEAD (in US) or contact your local health authority. Removal must be done in accordance with EPA Renovation, Repair and Painting Rule and all related state and local regulations. Care should be taken to follow all state and local regulations which may be more strict than those set under the federal RRP Rule.

- A Proper product selection, surface preparation, and application affect coating performance. Coating integrity and service life will be reduced because of improperly prepared surfaces. Selection and implementation of proper surface preparation ensures coating adhesion to the substrate and prolongs the service life of the coating system.
  
- B Selection of the proper method of surface preparation depends on the substrate, the environment, and the expected service life of the coating system. Economics, surface contamination, and the effect on the substrate will also influence the selection of surface preparation methods.
  
- C Surface must be clean, dry, and in sound condition. Remove all oil, dust, grease, dirt, loose rust, and other foreign material to ensure adequate adhesion.
  
- D Poured Concrete
  - 1 New  
For surface preparation, refer to SSPC-SP13/NACE 6/ICRI # 03732. Surfaces must be clean, dry, sound and offer sufficient profile to achieve adequate adhesion. Minimum substrate cure is 28 days at 75°F. Remove all form release agents, curing compounds, salts, efflorescence, laitance, and other foreign matter by sandblasting, shotblasting, mechanical scarification, or suitable chemical means. Refer to ASTM D4260. Rinse thoroughly to achieve a final pH between 8.0 and 10.0. Allow to dry thoroughly prior to coating.
  
  - 2 Old  
Surface preparation is done in much the same manner as new concrete, however, if the concrete is contaminated with oils, grease, chemicals, etc., they must be removed by cleaning with a strong detergent. Refer to ASTM D4258. Form release agents, hardeners, etc. must be removed by sandblasting, shotblasting, mechanical scarification, or suitable chemical means. If surface deterioration presents an unacceptably rough surface, ArmorSeal 5020 Floor Resurfacer is recommended to patch and resurface damaged concrete.
  
- E Previously Painted Surfaces  
If in sound condition, clean the surface of all foreign material. Smooth, hard or glossy coatings and surfaces should be dulled by abrading the surface. Apply a test area, allowing paint to dry one week before testing adhesion. If adhesion is poor, or if this product attacks the previous finish, removal of the previous coating may be necessary. If paint is peeling or badly weathered, clean surface to sound substrate and treat as a new surface as above.
  
- F Fill all cracks, voids, bug holes and joints with appropriate filler or ArmorSeal Crack Filler, ArmorSeal Joint Sealant, or ArmorSealExpresspatch.
  
- G Always follow the ASTM methods listed below:
  - 1 ASTM F1869 Moisture Test by use of Calcium Chloride
  - 2 ASTM D4258 Standard Practice for Cleaning Concrete.
  - 3 ASTM D4259 Standard Practice for Abrading Concrete.
  - 4 ASTM D4260 Standard Practice for Etching Concrete.

- 5 ASTM D4263 Plastic Sheet Method for Checking Moisture in Concrete.
- 6 SSPC-SP 13/Nace 6 Surface Preparation of Concrete
- 7 ICRI # 03732 Surface Preparation of Concrete

**3.3 INSTALLATION**

- A Apply all coatings and materials with the manufacturer's specifications in mind. Mix and thin coatings according to manufacturer's recommendation.
- B Do not apply to wet or damp surfaces.
  - 1 Wait at least 28 days before applying to new concrete or masonry. Or follow manufacturer's procedures to apply appropriate coatings prior to 28 days.
  - 2 Test new concrete for moisture content.
- C Apply coatings using methods recommended by manufacturer.
- D Uniformly apply coatings without runs, or sags, without brush marks, and with consistent sheen.
- E Apply coatings at spreading rate required to achieve the manufacturer's recommended dry film thickness.
- F Inspection: The coated surface must be inspected and approved by the Architect or Engineer just prior to the application of each coat.

**3.4 PROTECTION**

- A Protect finished coatings from damage until completion of project.
- B Touch-up damaged coatings after substantial completion, following manufacturer's recommendation for touch up or repair of damaged coatings. Repair any defects that will hinder the performance of the coatings.

**3.5 SCHEDULES**

END OF SECTION
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(FRP) PART 1 GENERAL

1.1 SUMMARY

A. Section Includes: Special wall surfaces, including fiberglass reinforced plastic panels.

B. Related Sections: Section(s) related to this section include:

1.2 REFERENCES

A. General: Standards listed by reference, including revisions by issuing authority, form a part of this specification section to extent indicated. Standards listed are identified by issuing authority, authority abbreviation, designation number, title or other designation established by issuing authority. Standards subsequently referenced herein are referred to by issuing authority abbreviation and standard designation

B. ASTM International:

1. ASTM D2583 Standard Test Method for Indentation Hardness of Rigid Plastics by Means of a Barcol Impressor.
2. ASTM D5420 Standard Test Method for Impact Resistance of Flat, Rigid Plastic Specimen by Means of a Striker Impacted by a Falling Weight (Gardner Impact).
3. ASTM E84 Standard Test Method for Surface Burning Characteristics of Building Materials.

1.3 SYSTEM DESCRIPTION

A. Performance Requirements: Provide fiberglass reinforced plastic (FRP) panels which have been manufactured and installed to maintain performance criteria stated by manufacturer without defects, damage or failure.

1.4 SUBMITTALS

A. General: Submit listed submittals in accordance with Conditions of the Contract and Division 1 Submittal Procedures Section.

B. Product Data: Submit product data, including manufacturer's SPEC-DATA. product sheet, for specified products.

C. Samples: Submit selection and verification samples for finishes, colors and textures. Submit 2 samples of each type of panel, trim and fastener.

D. Quality Assurance Submittals: Submit the following:

1. Test Reports: Certified test reports showing compliance with specified

2 performance characteristics and physical properties

E.

1. Certificates: Product certificates signed by manufacturer certifying materials comply with specified performance characteristics, criteria and physical requirements.
2. Manufacturer's installation instructions. Submit manufacturer's Installation Guide #6211.

## 1.5 QUALITY ASSURANCE

A. Qualifications:

1. Installer Qualifications: Installer should be experienced in performing work of this section and should have specialized in installation of work similar to that required for this project.
2. Manufacturer Qualifications: Manufacturer should be capable of providing field service representation during construction and should be capable of approving application method.

B. Delivery: Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact. Package sheets on skids or pallets for shipment to project site.

C. Storage and Protection: Store materials protected from exposure to harmful weather conditions and at temperature and humidity conditions recommended by manufacturer. Store panels indoors in a dry place at the project site.

D. Handling: Remove foreign matter from face of panel by using a soft bristle brush, avoiding abrasive action.

## 1.6 PROJECT CONDITIONS

A. Environmental Requirements:

1. Installation shall not begin until building is enclosed, permanent heating and cooling equipment is in operation, and residual moisture from plaster, concrete or terrazzo work has dissipated.
2. During installation, and for not less than 48 hours before, maintain an ambient temperature and relative humidity within limits required by type of adhesive used and recommendation of adhesive manufacturer.
3. Provide ventilation to disperse fumes during application of adhesive as recommended by adhesive manufacturer.



B. Field Measurements: Verify actual measurements/openings by field measurements before fabrication; show recorded measurements on shop drawings. Coordinate field measurements and fabrication schedule with construction progress to avoid construction delays.

## 1.7 WARRANTY

A. Manufacturer's Warranty: Submit, for Owner's acceptance, manufacturer's standard warranty document executed by authorized company official. Manufacturer's warranty is in addition to, and not a limitation of, other rights Owner may have under Contract Documents.

1. Warranty Period: 10 years commencing on Date of Substantial Completion.

## PART 2 PRODUCTS

### 2.1 FIBERGLASS REINFORCED PLASTIC (FRP) PANELS

A. Manufacturer: Kemlite Company, Inc.

1. Contact: Joliet Sales Office, PO Box 2429, Joliet, IL 60434; Telephone: (800) 435-0080, (815) 467-8600; Fax: (815) 467-8666; E-mail: kemlitesales@kemlite.com; Web site: [www.glasbord.com](http://www.glasbord.com).

B. Proprietary Product(s)/System(s): Kemlite Fiberglass Reinforced Plastic (FRP) Panels.

1. Kemply Panels:

a. FRP Face: Fire-X Glasbord.

b. Color: 85 white.

c. Moldings: Provide harmonizing PVC (polyvinyl chloride) moldings, 85 white.

e. Rivets: 85 white.

2. Surfaseal Surface Protection: Provide manufacturer.s proprietary Surfaseal surface protection for fiberglass reinforced plastic (FRP) panels.

3. Division Bars, Corner Trim: Panel manufacturer.s standard length extruded vinyl pieces; longest length possible to eliminate end joints.

4. Fasteners: Noncorrosive drive rivets.

### FIBERGLASS REINFORCED PLASTIC PANELS(FRP)

## 2.2 MANUFACTURED UNITS

### A. Kemlite Kemply Fiberglass Laminated Wall Panel with Surfaseal Surface Protection:

1. Wall Panel: Manufacturer's standard factory laminated panel with specified substrate and specified skin (single or double sided as indicated); size shall be 4 feet × 8 feet (1.2 × 2.4 m).

2. Wall Panel Substrate:

a. Plywood Substrate: 3/8 inch (9.5 mm) BCX-Fir

3. Wall Panel Skin:

a. Class A Skin: 0.09 inch (2.3 mm) embossed Fire-X Glasbord.

## 2.3 ACCESSORIES

A. Adhesive: Provide panel adhesive as recommended by panel manufacturer.

## 2.4 RELATED MATERIALS

A. Related Materials: Refer to other sections listed in Related Sections paragraph herein for related materials.

## 2.5 SOURCE QUALITY

A. Source Quality: Obtain fiberglass reinforced plastic (FRP) panels from a single manufacturer. Provide panels and molding only from manufacturer specified to ensure warranty and color harmonization of accessories.

## PART 3 EXECUTION

### 3.1 MANUFACTURER'S INSTRUCTIONS

A. Compliance: Comply with manufacturer's product data, including product technical bulletins, product catalog installation instructions and product carton instructions for installation.

### 3.2 EXAMINATION

A. Site Verification of Conditions: Verify that substrate conditions, which have been previously installed under other sections, are acceptable for product installation in accordance with manufacturer's instructions.

#### FIBERGLASS REINFORCED PLASTIC PANELS(FRP)

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1. Examine backup surfaces to determine that corners are plumb and straight, surfaces are smooth, uniform, clean and free from foreign matter, nails are countersunk and joints and cracks are filled flush and smooth with the adjoining surface.
2. Do not begin installation until backup surfaces are in satisfactory condition.

### 3.3 PREPARATION

A. Surface Preparation: Repair or patch all existing or new gypsum board finishes to provide smooth, secure, plumb and true surfaces on which panels are to be installed.

### 3.4 INSTALLATION

A. Fiberglass Reinforced Panel (FRP) Installation:

1. Cut and drill panels with carbide tipped saw blades or drill bits, or cut with snips.
2. Install panels with manufacturer's recommended gap for panel field and corner joints.
3. Pre-drill fastener holes in panels with 1/8 inch (3.2 mm) oversize.
4. For trowel type and application of adhesive, follow adhesive manufacturer's recommendations.
5. Use products acceptable to panel manufacturer and install FRP system in accordance with panel manufacturer's printed instructions. Comply with panel manufacturer's Installation Guide #6211.

### 3.6 CLEANING

A. Cleaning: Remove temporary coverings and protection of adjacent work areas. Repair or replace products that have been installed and are damaged. Clean installed products in accordance with manufacturer's instructions prior to Owner's acceptance. Remove construction debris from project site and legally dispose of debris.

1. Remove any adhesive or excessive sealant from panel face using solvent or cleaner recommended by panel manufacturer.

### 3.7 PROTECTION

A. Protection: Protect installed product and finish surfaces from damage during construction.

END OF SECTION

## SECTION 09 91 00 - PAINTING

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions, apply to this Section.

#### 1.2 SUMMARY

- A. Section Includes:
  - 1. Surface preparation of paints and stains on exterior and interior substrates indicated on Drawings.
  - 2. Application of paints and stains to interior and exterior surfaces indicated on Drawings.
- B. Related Sections: Coordinate Work of this Section with work of other sections, including Division 01 Sections, as required to properly execute the work and as necessary to maintain satisfactory progress of the work.

#### 1.3 DEFINITIONS

- A. Conform to definitions of terms in ASTM D16 in interpreting requirements of this Section.

#### 1.4 SUBMITTALS

- A. Submit under provisions of Division 01 Section "Submittal Procedures".
- B. Material lists. Give the supplier's name, product name, number and generic description of each proposed product and its use. Provide product data sheets and MSDS sheets for each product. Include VOC content.
- C. Samples. Submit full range of colors, patterns, textures and finishes available for selection, including the following:
  - 1. Color Chips: Provide complete duplicate sets of color chips for color selection.
  - 2. Small Applied Samples: Provide pieces of actual material on which paint will occur with minimum dry mil thickness of specified paint. Provide painted 12 inch x 12 inch actual gypsum wallboard samples with approved textures for Architect's approval. Approved samples will become standard for which all work will be judged.
  - 3. Sheen Samples: Provide full range of varying sheens when sheens are controllable by intermixing.

- C. Installed Samples. Provide large size samples for approval. Approved samples may be left in place as part of the work.
- D. One room and/or area, as selected by the Architect, shall be painted with materials specified or accepted and applied directly from container, unthinned. After acceptance by Architect, room and/or area shall be standard of quality of entire project.
- E. Certification:
  - 1. Furnish a letter certifying that materials submitted are truly equivalent or better than those called out in the finish schedule.
  - 2. Furnish certification by the manufacturer that products supplied comply with local regulations controlling use of volatile organic compounds (VOCs).

#### 1.5 RESPONSIBILITY OF COORDINATION

- A. Coordinate the work specified herein with the following work:
  - 1. Provide information to preceding trades for proper preparation of substrate.
  - 2. Inspect substrate before proceeding to verify proper preparation.
  - 3. Notify Architect of any item to receive paint which may not be covered by a scheduled finish type. Architect will furnish appropriate specification.

#### 1.6 QUALITY ASSURANCE

- A. This Section outlines the minimum standards and requirements for this Project. Refer to the Drawings for additional requirements. Bring all conflicts and discrepancies to the attention of the Architect and do not start work until such conflicts and discrepancies are clarified and corrected.
- B. Materials:
  - 1. Delivery and Storage: Products shall be delivered to jobsite in unopened containers bearing manufacturer's labels intact and legible at time of use. Storage shall be in designated areas away from excessive heat and open flames and in accordance with manufacturer's recommendations.
  - 2. Quality or Grade:
    - a. Paints and coatings shall be the manufacturer's highest professional quality material of types specified and shall be applied directly from containers in which material is purchased, except where thinning is recommended by manufacturer and approved by Architect to suit intended use, i.e. painting acoustical tile or panels without destroying their acoustical properties.
    - b. Primers and other undercoat paints shall be those produced by same manufacturer as finish coats.
    - c. Thinners shall be those recommended by paint manufacturer's printed

instructions.

3. Equipment:

- a. Spray Equipment: Shall be the type recommended for the application and shall be maintained clean and in proper working order.
- b. Brushes, Rollers, etc.:
  - 1) Shall be new of the various sizes and types recommended for each application.
  - 2) Shall be properly cleaned and stored in accordance with manufacturer's instructions at the end of each days' use.
  - 3) Shall be replaced as often as necessary to attain the best finish quality in the Work.

4. Application:

- a. Applicator:
  - 1) Shall be person(s) or entity specializing in application of paints and coatings of types specified with minimum five (5) years experience.
  - 2) Shall provide Owner and Architect a notarized certification that paint used is as specified.
- b. Application:
  - 1) Shall not proceed on surfaces which are not suitable to be painted, until such surfaces have been corrected. Notify Architect in writing of which surfaces need to be corrected and their locations. Surfaces shall be corrected by the responsible trades. Surfaces not suitable for painting shall include, but not be limited to:
    - a) Damaged surfaces.
    - b) Oily, greasy, dusty or excessively soiled surfaces.
    - c) Non-dressed welds which will be exposed to view.
    - d) Lack of touch-up where specified.
    - e) Rusted or excessively deteriorated shop-prime painted surfaces.
  - 2) Number of coats of each of several finishes shall be in accordance with detailed specifications, which will produce first quality finish if properly applied. If number of coats specified fails to produce a finish acceptable to Architect, this Contractor shall apply additional coat or coats at his own expense until acceptable finish is achieved

1.7 PRODUCT HANDLING

- A. Store only approved materials at the jobsite, and store only in a suitable and designated area restricted to the storage of paint materials and related equipment.

- B. Temperature in the storage area shall be between 40 degrees F and 110 degrees F. Open and mix all materials in the storage area.
- C. Use all means necessary to protect materials before, during, and after application and to protect the installed work and materials of all other trades.
- D. Apply water-base paints only when temperature of surfaces to be painted and surrounding air temperatures are between 50 degrees F and 90 degrees F, unless otherwise permitted by paint manufacturer's printed instructions.
- E. Apply solvent-thinned paints only when temperature of surfaces to be painted and surrounding air temperatures are between 45 degrees F and 95 F, unless otherwise permitted by paint manufacturer's printed instructions.
- F. Do not paint in snow, rain, fog or mist, or when relative humidity exceeds 85 percent, or to damp or wet surfaces, unless otherwise permitted by paint manufacturer's printed instructions. Painting may be continued during inclement weather if areas and surfaces to be painted are enclosed and heated within temperature limits specified by paint manufacturer during application and drying periods.

## 1.8 WARRANTY

- A. The undertaking of a painting subcontract will indicate that the subcontractor will warrant the work specified herein for two years against becoming unserviceable or causing an objectionable appearance resulting from either defective or nonconforming materials and workmanship.
- B. Defects shall include by not be limited to the following:
  - 1. Discoloring noticeably by yellowing, streaking, blooming, changing color or darkening
  - 2. Mildewing
  - 3. Peeling, cracking, blistering, alligatoring or releasing from the substrate
  - 4. Chalking or dusting excessively
  - 5. Changing sheen in irregular fashion
  - 6. Softening or becoming tacky
  - 7. Bubbling

## PART 2 - PRODUCTS

### 2.1 ACCEPTABLE MANUFACTURERS

- A. All paint materials selected for coating systems for each type of surface shall be the product of a single manufacturer and shall, as a system, have flame spread, fuel contribution, and smoke density test results less than 25.

- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following as selected by the Architect:
  - 1. Benjamin Moore & Co.
  - 2. ICI Paints.
  - 3. Kelly-Moore Paints.
  - 4. PPG Architectural Finishes, Inc.
  - 5. Sherwin-Williams Company (The).

## 2.2 MATERIALS

- A. Paint and Coatings: Ready mixed, except for field catalyzed coatings; having good flow and brushing properties and consistent drying or curing behavior, free of sags and streaks.
- B. Accessory Materials: Linseed oil, turpentine, paint thinners and other materials recommended by paint and coatings manufacturer as necessary to achieve finishes specified.
- C. Patching and Surface Preparation: Latex fillers as recommended by paint and coatings manufacturer.

## 2.3 COLORS

- A. Colors shall be as selected by Architect. Different colors may be selected for each room, and more than one color may be selected in each room.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Verify that site environmental conditions are appropriate and substrates are in proper condition to receive Work of this Section.
- B. Verify that shop applied primers are compatible with specified finish coats.
- C. Measure moisture content of surfaces using an electronic moisture meter. Do not begin application of coatings unless moisture content of surfaces is below the following maximum values:
  - 1. Gypsum soffits: 12 percent.
  - 2. Plaster: 12 percent.
  - 3. Masonry surfaces: 12 percent.
  - 4. Wood surfaces: 15 percent.
  - 5. Vertical concrete surfaces: 12 percent.
  - 6. Horizontal concrete surfaces: 8 percent.

## PAINTING



### 3.2 ITEMS TO RECEIVE PAINT

- A. Generally, all new items that are normally painted in any typical building, including but not limited to the following list:
1. All ferrous metal
  2. All exterior galvanized metal
  3. All exterior wood
  4. All interior wood
  5. All prime coated hardware
  6. All exposed conduit, outlet boxes and electrical cabinets, excluding those located in mechanical rooms.
  7. All exposed pipe, plumbing, and ductwork, including those located in mechanical rooms.
  8. All metal grilles, except aluminum, unless otherwise indicated.
  9. All exposed gypsum board surfaces, including all mechanical rooms.
  10. All exposed concrete masonry units (CMU), including all mechanical rooms.
  11. Miscellaneous other items which normally require painting or are scheduled to be painted.
  12. Consult plans, finish schedule, details and specifications for other trades as all items usually field painted or finish will be considered as part of the Contract.
  13. All exposed structure scheduled or noted to receive paint.
- B. All work where a coat of material has been applied must be inspected and approved by Architect before application of succeeding specified coat, otherwise no credit for coat applied will be given. Notify Architect when a particular coat has been completed for inspection and approval. Apply coats of material in strict accordance with manufacturer's specifications except where requirements of these specifications are in excess of manufacturer's requirements. Paint all sight exposed pipe and plumbing only after all mechanical work and tests have been completed.

### 3.3 PREPARATION

- A. General: Surface must be clean to insure adhesion. Remove oil and grease with paint thinner. Wash off dirt with warm soapy water and rinse with clean water. Remove rust by wire brushing or sanding.

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- B. Wall surfaces must be dry before painting. Verify with moisture meter.

- C. Unfinished Surfaces:

1. Wood: Sand smooth and apply one (1) coat of Primer Undercoat. After primer has

- dried overnight, putty nail holes and cracks, then spot-prime putty with primer. Again, allow the primer to dry over- night, sand lightly and topcoat.
2. Masonry and Concrete: Remove efflorescence or cement dust on masonry and concrete by etching with a 10 percent solution of muriatic (Hydrochloric) acid. Flush off surface after etching with clean water, and paint while still damp. On surface where muriatic acid cannot be used to neutralize the efflorescence, remove the efflorescence by sanding, scraping or wire brushing and apply a coat of Masonry Conditioner before painting. If efflorescence is not present, no primer is necessary on concrete and masonry surfaces. Fill voids and pores in concrete and haydite blocks with Latex Block Filler and allow to dry overnight before topcoating.
  3. Iron and Steel: Prime with Metal Primer and allow to dry overnight before topcoating.
  4. Galvanized Metal: Prime with galvanized metal primer and allow to dry overnight before topcoating.

### 3.4 APPLICATION

- A. General: Surfaces to be finished must be clean, dry and free of dirt, oils, loose paint or any other contamination that would adversely affect adhesion, protective properties or appearance of the coating.
- B. Paint Thickness: Provide the following minimum dry film thickness per coat unless noted otherwise:
  1. Enamels on Metal: 1 mil
  2. Latex Paints: 1 mil
  3. Metal Primers: 1.5 mils
  4. Undercoats: 1.5 mils
  5. Oil Paints: 1.5 mils
  6. Epoxy Coating: 2.0 mils
  7. Thickness test: Use observation gauge that measures "V" shape scratch.
- C. Allow exterior paints to dry 72 hours between coats and interior paint to dry 24 hours between coats. Allow all enamels and varnishes to dry 24 hours between coats. If enamel and varnishes are tacky after 24 hours, allow additional time until finish is dry.
- D. Leveling: Apply with proper consistency and quality so paint flows out to a level surface free of brush and roller marks, bubbles, dust, runs, sags, and holidays. Spread evenly.
- E. Appearance: Uniform color, texture and sheen.
- F. Neatness: Paint shall not be smeared, spattered or run over adjoining colors or materials. Cut-on lines shall be straight.
- G. First coat shall be white, unless otherwise specified.

### 3.5 CLEANING AND PROTECTION

- A. Keep project premises free of painting-related debris. Collect material that may constitute a fire hazard, place in closed metal containers, and remove daily from site.
- B. Protect work adjacent to painting operations from paint spatters and spills. Immediately remove paint that falls on finished surfaces not scheduled to receive paint, using materials and techniques that will not damage affected surfaces.

### 3.6 SCHEDULE

- A. Paint items indicated on the Drawings. If not indicated, the following schedule of typical painted items shall apply, but does not specifically include every item that is to receive paint, but rather should establish type and quality of finish for all items normally included in a complete paint job.
- B. Exterior Surfaces:
  - 1. Steel - Unprimed:
    - a. One (1) coat of alkyd primer.
    - b. Two (2) coats of alkyd enamel, semi-gloss.
  - 2. Steel - Shop Primed:
    - a. Touch-up with zinc chromate primer.
    - b. Two (2) coats of alkyd enamel, semi-gloss.
  - 3. Steel - Galvanized:
    - a. One (1) coat galvanize primer.
    - b. Two (2) coats of alkyd enamel, semi-gloss.
  - 4. Aluminum - Mill Finish:
    - a. One (1) coat etching primer.
    - b. Two (2) coats of alkyd enamel, semi-gloss.
- C. Interior Surfaces:
  - 1. Wood - Painted:
    - a. One (1) coat of alkyd prime sealer.
    - b. Two (2) coats of alkyd enamel, semi-gloss.

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2. Wood - Stained:
  - a. One (1) coat interior stain.
  - b. Two (2) coats interior satin varnish
  
3. Concrete Masonry Units (CMU):
  - a. One (1) coat block filler.
  - b. One (1) coat of latex primer.
  - c. Two (2) coats of latex enamel, semi-gloss.
  
4. Steel - Unprimed:
  - a. One (1) coat of alkyd primer.
  - b. Two (2) coats of alkyd enamel, semi-gloss.
  
5. Steel - Primed:
  - a. Touch-up with alkyd primer.
  - b. Two (2) coats of alkyd enamel, semi-gloss.
  
6. Steel - Galvanized:
  - a. One (1) coat galvanize primer.
  - b. Two (2) coats of alkyd enamel, semi-gloss.
  
7. Aluminum - Mill Finish:
  - a. One (1) coat etching primer.
  - b. Two (2) coats of alkyd enamel, semi-gloss.
  
8. Gypsum Board:
  - a. One (1) coat of latex primer sealer.
  - b. Two (2) coats of latex enamel, semi-gloss.

END OF SECTION

## SECTION 10 15 50 - SOLID POLYMER TOILET PARTITIONS

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions, apply to this Section.

#### 1.2 SUMMARY

- A. Section includes solid polymer, floor mounted, overhead braced, toilet partitions fabricated of non-corrosive High Density Polyethylene (HDPE) materials with hardware, fasteners, and accessories required for a complete installation located as shown on Drawings.
- B. Related Sections: Coordinate Work of this Section with work of other sections, including Division 01 Sections, as required to properly execute the work and as necessary to maintain satisfactory progress of the work.

#### 1.3 QUALITY ASSURANCE

- A. This Section outlines the minimum standards and requirements for this Project. Refer to the Drawings for additional requirements. Bring all conflicts and discrepancies to the attention of the Architect and do not start work until such conflicts and discrepancies are clarified and corrected.

#### 1.4 SUBMITTALS

- A. Submit under provisions of Division 01 Section "Submittal Procedures".
- B. Product Data:
  - 1. Manufacturer's specifications and other data needed to prove compliance with the specified requirements.
  - 2. Manufacturer's installation instructions.
- C. Shop Drawings: Show all required field measurements, all details and elevations, plans and sections required to indicate all conditions, and dimensioned drawings of hardware.
- D. Samples:
  - 1. Actual samples or color charts indicating manufacturer's full line of colors for Architect's selection and approval.
  - 2. Actual samples of each item of hardware.
- E. Certification: Manufacturer's written certification indicating compliance with building code authorities having jurisdiction regarding to the use of the material on the Project as it applies to the use of "plastic in a commercial building".

## 1.5 DELIVERY AND STORAGE

- A. Delivery: Deliver clearly labeled, undamaged materials in the manufacturer's special protective plastic covering.
- B. Timing and Coordination: Deliver materials to allow for minimum storage time at the project site. Coordinate delivery with the scheduled time of installation.
- C. Storage: Store materials in a clean, dry location, protected from weather and abuse.

## PART 2 - PRODUCTS

### 2.1 APPROVED MANUFACTURER

- A. Specifications are based on Poly-Mar HD Solid Polymer (HDPE) Panels manufactured by Scranton Products (Santana/Comtec/Capitol), represented by J.M. Maly, New Caney, Texas; (281) 429-4600, or equal by Accurate Partitions Corp., Global Partitions, Flush-Metal Partition Corp., or Architect approved equal. Other manufacturers must have a minimum of five (5) years experience manufacturing equivalent products to those specified and comply with Division 01 requirements regarding substitution to be considered.

### 2.2 TOILET PARTITIONS

- A. Materials:
  - 1. All toilet partitions shall be floor mounted, overhead braced, with non-corrosive panels doors and pilasters of solid polymer and in the dimensions and arrangements indicated on the drawings. Partitions between urinals and lavatories shall have floor mounted pilasters.
  - 2. Panels, doors and pilasters shall be fabricated from Polymer resins under high pressure forming a single component section which is waterproof, non-absorbent and has a self-lubricating surface that resists marking with pens, pencils or other writing utensils.
- B. Construction and Fabrication:
  - 1. Doors, Panels, and Pilasters: Shall be one (1) inch thick and all edges machined to a radius of 0.250 inch and all exposed edges to be free of saw marks.
  - 2. Dividing Panels: Shall be 55 inches high and shall be mounted at 14 inches above the finished floor.
  - 3. Doors: Shall be 55 inches high and shall be mounted at 14 inches above the finished floor.
  - 4. Pilasters shall be 82 inches high and fastened to 3 inch high 20 gauge stainless steel shoes with theft proof sex bolts.
  - 5. Finish: Doors, panels, and pilasters shall be equal to "Plasti-Glaze 280" in color selected by Architect from manufacturer's colors.
  - 6. Edging Strips: Shall be aluminum fastened to the bottom edge of all doors and panels utilizing vandal-proof stainless steel fasteners.

7. Door hardware shall be as follows:
  - a. Hinges: Shall be full length continuous stainless steel piano hinge. No integral hinges allowed.
  - b. Each Door: Shall be furnished with one (1) coat hook/bumper of heavy chrome plated rubber bumper. Handicapped doors also include one (1) door pull and one (1) wall stop. No Zamac coated hardware allowed.
  - c. Door Strike and Keeper: Shall be fabricated from heavy aluminum extrusion (6463-T5 Alloy) with clear anodized finish with wrap around flange, surface mounted and thru-bolted to pilaster with one-way sex bolts. Size of strike shall be six (6) inches.
  - d. Door Latch Housing: Shall be fabricated from heavy aluminum extrusion (6463-T5 Alloy) with clear anodized finish, surface mounted and thru-bolted to door with one-way sex bolts. Slide bolt and button shall be heavy aluminum with similar or equal to “Tuff-Coat Black” finish.
8. Pilaster Shoes: Shall be stainless steel.
9. Wall Brackets: Shall be full length continuous wall brackets (6463-T5 Alloy) with mill finish weighing not less than 1.685 lbs. per linear foot similar or equal to section #58992 shall be used for all panels to pilaster, pilaster to wall, and panel to wall connections. Wall brackets shall be predrilled by manufacturer with holes spaced every six (6) inches along full length of brackets. Wall brackets shall be thru-bolted to panels and pilasters with one-way sex bolts.
10. Headrail: Shall be fabricated from heavy aluminum extrusion (6463-T5 Alloy) with mill finish in anti-grip configuration weighing not less than 1.188 lbs. per linear foot similar or equal to section #58993. Headrail shall be fastened to tops of pilasters and headrail brackets by thru-bolting with one-way sex bolts.
11. Headrail Brackets: Shall be of 16 gauge stainless steel.

## PART 3 - EXECUTION

### 3.1 PREPARATION

- A. Provide blocking/anchoring devices to secure to wall. Anchoring devices must be compatible to wall type to ensure adequate strength.

### 3.2 INSTALLATION

- A. Install partitions in substantial manner, straight, plumb, and true in accordance with manufacturer’s instructions.
- B. Install all partitions where indicated on the drawings, and as indicated on the shop drawings, anchoring all components firmly in place for a long life under hard use and in complete accordance with the manufacturer’s recommendations.
- C. Pilaster shoes shall be anchored to the floor with No. 5 plastic anchors and No. 14 stainless steel philips head screws.
- D. Attachment of brackets to adjacent wall construction shall be accomplished by one (1) theft

proof nail in head anchor directly behind the vertical edge of panels and pilasters at every 12 inches along the length of bracket and two (2) No. 5 plastic anchors and No. 14 x 1-1/4 inch stainless steel Philips head screws at each 12 inch interval alternately spaced between anchor connections.

- E. No evidence of drilling, cutting or patching shall be visible in any of the finished work. Defaced finish will not be permitted. Damaged, scratched or marred defective materials will be rejected and shall be replaced with new materials.

### 3.3 ADJUSTING, CLEANING AND REPLACEMENT

- A. Clearance of vertical edges of doors shall be uniform top to bottom and shall not exceed 3/16 inch.
- B. Except for toilet partitions for the handicapped, adjust doors to remain at a uniformly open position when unlocked.
- C. Clean surfaces free of dirt, oil, grease and other imperfections.
- D. Damaged, scratched or marred defective materials will be rejected and shall be replaced with new undamaged materials at no additional expense to Owner.

END OF SECTION



## SECTION 102800

### WASHROOM ACCESSORIES

#### PART 1 GENERAL

##### 1.1 SECTION INCLUDES

- A. Washroom Accessories:
  - 1. Soap dispensers.
  - 2. Paper towel dispensers.
  - 3. Toilet tissue dispensers.
  - 4. Mirrors.
  - 5. Shower rods and curtains.
  - 6. Folding shower seats.
  - 7. Grab bars.
  - 8. Hooks.

##### 1.2 RELATED REQUIREMENTS

- A. Section 061000 - Rough Carpentry, coordination with blocking.
- B. Section 092000 - Plaster and Gypsum Board, coordination with blocking.
- C. Section 093000 - Tiling, coordination with layout and installation.
- D. Section 102113 - Toilet Compartments, coordination with accessories.

##### 1.3 SUBMITTALS

- A. Product Data: Submit manufacturer's data sheets for each product specified, including the following:
  - 1. Installation instructions and recommendations.
  - 2. Storage and handling requirements and recommendations.
  - 3. Cleaning and maintenance instructions.
  - 4. Replacement parts information.
- B. Schedule: Submit a toilet accessory schedule, indicating the type and quantity to be installed in each washroom. Use room numbers as indicated on the Drawings.
- C. Country of Origin: Manufacturer must supply, with first submittal, Country of Origin information for each type of washroom accessory for this project.

##### 1.4 QUALITY ASSURANCE

- A. Manufacturer: Provide products manufactured by a company with a minimum of 10 years successful experience manufacturing similar products.

- B. Single Source Requirements: To the greatest extent possible provide products from a single manufacturer.
- C. Accessibility Requirements: Comply with requirements applicable in the jurisdiction of the project, including but not limited to ADA and ICC/ANSI A117.1 requirements as applicable.
- D. Hazardous Materials: Comply with EU Directive “Restrictions of Hazardous Substances (RoHS) requirements.”

#### 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store and handle materials and products in strict compliance with manufacturer's instructions and recommendations. Protect from damage.

#### 1.6 WARRANTY

- A. Manufacturer’s Warranty for Washroom Accessories: Manufacturer’s standard 1 year warranty for materials and workmanship.
- B. Manufacturer’s Warranty for Electric Hand Dryers: Manufacturer’s standard 10 year warranty on parts, except 3 year warranty on motor brushes from date of purchase. Does not include Bobrick Compac Model B-710.

### PART 2 PRODUCTS

#### 2.1 MANUFACTURER

- A. Basis of Design: Bobrick Washroom Equipment, Inc., [www.bobrick.com](http://www.bobrick.com).

- 1. Location of Manufacturer: United States.

#### 2.2 SOAP DISPENSERS

- A. Surface-Mounted Vertical Soap Dispensers:
  - 1. Basis of Design: Bobrick Classic Model B-2111.
  - 2. Compliance: Valve is operable with one hand, without tight grasping, pinching or twisting of the wrist and with less than 5 pounds of force (22.2 N) to comply with barrier-free accessibility guidelines (including ADAAG).
  - 3. Container:
    - a. Materials: 18-8, Type 304, 22 gauge (0.8mm) stainless steel with satin finish.
    - b. Construction: Body is drawn, one-piece, seamless construction.
  - 4. Valve: Corrosion-resistant, black molded plastic push button and spout, antibacterial-soap-resistant plastic cylinder; soap head-holding mushroom valve, stainless steel spring, U-packing seal and duckbill.
  - 5. Mounting: Vandal-resistant, concealed wall plate; back plate with mounting bracket.
  - 6. Filling: Locked, hinged stainless steel lid for top filling opens with key provided. To prevent corrosion of tank, use only chloride-free pH-neutral liquid soaps.
  - 7. Refill Indication: Clear acrylic refill-indicator window.
  - 8. Capacity: 40 fl oz (1.2 L).

#### 2.3 PAPER TOWEL DISPENSERS

- A. Surface-Mounted Paper-Towel Dispensers:
  - 1. Basis of Design: Bobrick Classic Model B-262.
    - a. Locking: Tumbler lock keyed like other washroom accessories.
    - b. Capacity: 400 C-fold or 525 multifold towels 3-1/8 inches to 3-13/16 inches (79 mm to 97 mm) deep.
  - 2. Door: 18-8, Type 304, 22 gauge (0.8mm) stainless steel with satin finish.
  - 3. Cabinet: All-welded, 18-8, Type 304, 22 gauge (0.8mm) stainless steel with satin finish.

#### WASHROOM ACCESSORIES

4. finish on exposed surfaces.

## 2.4

1. Cabinet Back: Formed to recess mounting slots to prevent mounting screw heads from snagging towels.
2. Hinge: Full-length stainless steel piano-hinge.
3. Towel Dispensing: Hemmed towel tray opening dispenses towels without tearing.
4. Filling: Door swings down for loading towels into cabinet.
5. Refill Indication: Two slots on each side of cabinet indicate refill time.

## 2.5 TOILET TISSUE DISPENSERS

- A. Surface-Mounted Multi-Roll Toilet Tissue Dispensers:
  1. Basis of Design: Bobrick Model B-2888.
  2. Materials: Type 304 stainless steel with satin finish and all-welded construction.
  3. Unit Front: 22 gauge (0.8 mm), drawn, one-piece, seamless construction; equipped with a tumbler lock.
  4. Capacity: Accommodates two standard-core 5-1/4 inch (135 mm) diameter (1800 sheets) toilet tissue rolls.
  5. Spindles: Theft-resistant, one-piece, molded polyethylene spindles with minimum 1/8 inch (3 mm) wall thickness.
  6. Towel Dispensing: Roll held in reserve automatically drops into place after bottom roll is depleted. Dispensing mechanism constructed of all-welded, 16 gauge (1.6 mm) plated steel.

## 2.6 MIRRORS

- A. Stainless Steel, Welded, Angle Frame Mirrors:
  1. Basis of Design: Bobrick Model B-290 2436.
    - a. Overall Size: 24 inches (610 mm) W x 36 inches (914 mm) H.
  2. Basis of Design: Bobrick Model B-290 2460.
    - a. Overall Size: 24 inches (610 mm) W x 60 inches (1524 mm) H.
  3. Angle Frame:
    - a. Materials: Type 304 stainless steel angle 3/4 inch x 3/4 inch (19 x 19 mm), with satin finish with vertical grain on exposed surfaces.
    - b. Construction: One-piece, roll-formed construction with continuous integral stiffener.
    - c. Design: Beveled design on front of angle to hold mirror tightly against frame; prevents exposure to sharp edges.
    - d. Corners: Heliarc welded, ground, and polished smooth.
  4. Mirror:
    - a. No. 1 quality, 1/4 inch (6 mm) float/plate glass.
    - b. Edges: Protected with plastic filler strips.
    - c. Back of Mirror: Protected by full-size, shock-absorbing, water-resistant, non-abrasive 3/16 inch (5 mm) thick polyethylene padding.
  5. Mounting: Removable, galvanized steel back with integral horizontal hanging brackets located at top and bottom for mounting on Concealed one-piece rectangular wall hanger(s); galvanized steel back fastened to frame with Concealed screws to permit glass replacement; attachment by rivets or tabs is not acceptable; Concealed Phillips head locking setscrews secure mirror to wall hanger in bottom of frame.

## 2.7 SHOWER RODS AND CURTAINS

- A. Shower Curtain Rods With Concealed Mounting:
  1. Basis of Design: Bobrick Model B-207X36.

### WASHROOM ACCESSORIES

- a. Length: 36 inch (915 mm).
2. Curtain Rod: 18-8, Type 304, 20 gauge (1.0 mm) stainless steel tubing with satin finish.
3. Outside Diameter: 1 inch (25 mm).
4. Flanges: 1-3/8 inch (35 mm) in diameter, chrome-plated plastic with bright polish finish, mount on concealed wall brackets.
5. Mounting: Concealed aluminum brackets.

## 2.8 FOLDING SHOWER SEATS

### A Folding Shower Seats With Bobrick Padded Cushion:

#### 2.8.1.1 Basis of Design: Bobrick Model B-517.

##### 2.8.1.1.1 Configuration: Right-hand seat.

#### 2.8.1.2 Compliance: ADA Accessibility Design Guidelines (including ADAAG) for structural strength; clearance between back of shower seat and wall is 1-1/2 inches (38 mm)

##### 2.8.1.2.1 Capacity: Designed to support 360 lbs (163 kg) in compliant installations.

#### 2.8.1.3 Seat: 2 inches (51 mm) overall thickness, comprised of 1-1/2 inch (38 mm) thick, closed-cell polyurethane foam padding mounted on 1/2" (13 mm) thick plywood; covered in white naugahyde (water-resistant, reinforced vinyl fabric), able to lock in upright position.

#### 2.8.1.4 Seat Supports: Do not come into contact with floor.

#### 2.8.1.5 Frame: 18-8, Type 304 stainless steel with satin finish; 16 gauge (1.6 mm), 1-1/4 inch (32 mm) square members, 18 gauge (1.2 mm), 1 inch (25 mm) diameter tubing.

#### 2.8.1.6 Mounting Flanges: 18-8, Type 304, 3/16 inch (5 mm) thick stainless steel with satin finish; 3 inch (76 mm) diameter with three mounting screw holes.

#### 2.8.1.7 Baseplate: 18-8, Type 304, heavy gauge stainless steel.

#### 2.8.1.8 Spring: 17-7, Type 301, 24 gauge (0.6 mm) stainless steel, spot-welded to baseplate.

#### 2.8.1.9 Guide Bracket: 18-8, Type 304, 16 gauge (1.6 mm) stainless steel with satin finish.

## 2.9 GRAB BARS

### 2.9.1 Stainless Steel Grab Bars: With snap flange covers:

#### 2.9.1.1 Satin Finish:

##### 2.9.1.1.1 Basis of Design: Bobrick Model B-6806X36.

##### 2.9.1.1.1.1 Length: 36 inches (914 mm).

##### 2.9.1.1.2 Basis of Design: Bobrick Model B-6806X42.

##### 2.9.1.1.2.1 Length: 42 inches (1067 mm).

#### 2.9.1.2 Compliance: Accessibility guidelines (including ADAAG) for structural strength.

##### 2.9.1.2.1 Capacity: Designed to support 900 lbs (408 kg) in compliant installations.

#### 2.9.1.3 Description: Clearance between grab bar and finished wall is 1-1/2 inches (38 mm).

#### 2.9.1.4 Grab Bar Materials: 18-8, Type 304, stainless steel tubing with satin finish.

#### 2.9.1.5 Grab Bar Construction: 18 gauge (1.2 mm), ends heliarc welded to flanges.

#### 2.9.1.6 Outside Diameter: 1-1/2 inch (38 mm).

#### 2.9.1.7 Mounting Flanges: Concealed, 18-8, Type 304, 1/8 inch (3 mm) thick,

## WASHROOM ACCESSORIES

2.9.1.7.1 End Flanges: 2 inches x 3-1/8 inches (50 mm x 80 mm) with two holes for attachment to wall.

2.9.1.7.2 Intermediate Flanges: 2-5/8 inches x 3-1/8 inches (65 mm x 80 mm) wide x 3-1/8 inch (80 mm) diameter.

2.9.1.8 Snap Flange Covers: 18-8, Type 304, 22 gauge (0.8 mm) drawn stainless steel with satin finish, 3-1/4 inch (85 mm) diameter x 1/2 inches (13 mm) deep; snap over mounting flange to conceal mounting screws.

2.9.1.9 Mounting Accessories: Provide the following optional mounting accessories as scheduled and indicated on the Drawings and as required for complete installation.

2.9.1.9.1 Mounting Kits: Provide optional Bobrick Part No. 252-30 Mounting Kit; 3 Type 304 stainless steel, Phillips round-head, sheet-metal screws for each flange.

2.9.1.9.2 Grab Bar Fasteners: Provide optional Bobrick Part No. 251-4 WingIt Grab Bar Fastener; round-head, Phillips 18/8 stainless steel screws and grab bar fastener.

2.9.1.9.3 Anchor Devices: Provide optional Bobrick Part No. 2583 Optional Mounting Kit; for 3/4 inch to 1 inch (19 mm to 25 mm) panels.

2.9.1.9.4 Anchor Devices: Provide optional Bobrick Part No. 2586 Optional Mounting Kit; for 1/2 inch (13 mm) panels.

## 2.10 HOOKS

### 2.10.1 Heavy-Duty Clothes Hooks:

2.10.1.1 Basis of Design: Bobrick Model B-211.

2.10.1.1.1 Mounting: Exposed, three countersunk mounting screw holes.

2.10.1.2 Projection from Wall: 3-7/16 inch (87 mm).

2.10.1.3 Hook and Flange: One-piece brass casting with satin nickel-plated finish.

2.10.1.4 Capacity: Designed to support maximum 300 lbs (136 kg) downward in compliant installations.

## PART 3 EXECUTION

### 3.1 INSTALLATION

- A. Install products in strict compliance with manufacturer's written instructions and recommendations, including the following:
1. Verify blocking has been installed properly.
  2. Verify location does not interfere with door swings or use of fixtures.
  3. Comply with manufacturer's recommendations for backing and proper support.
  4. Use fasteners and anchors suitable for substrate and project conditions
  5. Install units rigid, straight, plumb, and level, in accordance with manufacturer's installation instructions and approved shop drawings.
  6. Conceal evidence of drilling, cutting, and fitting to room finish.
  7. Test for proper operation.

### 3.2 CLEANING AND PROTECTION

- A. Clean exposed surfaces of compartments, hardware, and fittings.
- B. Touch-up, repair or replace damaged products until Substantial Completion.

END OF SECTION

## WASHROOM ACCESSORIES

Prozign Architects, Inc.; Project No. 1449.15

City of Houston – WBS No.S-000020-0007

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## SECTION 10 51 13 - LOCKERS

### PART 1 GENERAL

#### 1.1 SECTION INCLUDES

- A. Lockers of the following types:
  - 1. Plastic lockers.
  - 2. Phenolic lockers.
  - 3. Standard duty metal lockers, Traditional Collection.
  - 4. Heavy duty metal lockers, Traditional Plus Collection.
  - 5. Athletic metal lockers, Competitor Collection.
  - 6. Stadium metal lockers, Pro Collection.
  - 7. Angle iron welded metal lockers.
  - 8. Locker accessories.

#### 1.2 RELATED SECTIONS

- A. Section 03 30 00 - Cast-in-Place Concrete.
- B. Section 06 10 00 - Rough Carpentry.

#### 1.3 REFERENCES

- A. ADAAG - American with Disabilities Act, Accessibility Guidelines.
- B. ANSI A117.1 - Accessible and Usable Buildings and Facilities.
- C. ASTM International (ASTM):
  - 1. ASTM A 1008 - Standard Specification for Steel Sheet, Carbon, Cold-Rolled, Commercial Quality.
  - 2. ASTM D 4976 - Standard Specification for Polyethylene Plastics Molding and Extrusion Materials.
  - 3. ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials.

#### 1.4 SUBMITTALS

- A. Submit under provisions of Section 01 30 00 - Administrative Requirements.
- B. [ Product Data ]: Manufacturer's data sheets on each product to be used, including:
  - 1. Preparation instructions and recommendations.
  - 2. Storage and handling requirements and recommendations.
  - 3. Installation methods.
- C. Shop Drawings: Provide layout and elevations of lockers with overall dimensions.
- D. Maintenance Data: For adjusting, repairing, and replacing locker doors and latching mechanisms.
- E. Verification Samples: For finish product specified, two samples, minimum size 6 inches (150 mm) square, representing actual product and color selected.

#### 1.5 QUALITY ASSURANCE

- A. Provide all lockers from a single manufacturer.

### LOCKERS

## 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Inspect lockers upon receipt for visible damage. Further inspection if necessary for hidden damage.
- B. Store products in manufacturer's unopened packaging until ready for installation.
- C. Sequence deliveries to avoid project delays, but minimize on-site storage.

## PART 2 PRODUCTS

### 2.1 MANUFACTURERS

- A. Acceptable Manufacturer: ASI Storage Solutions, which is located at: 2171 Liberty Hill Rd.; Eastanollee, GA 30538; Tel: 706-827-2720; Fax: 706-827-2710; Email:[request info \(info@asi-storage.com\)](mailto:request_info@asi-storage.com); Web:[www.asi-storage.com](http://www.asi-storage.com)
- B. Substitutions: Not permitted.
- C. Requests for substitutions will be considered in accordance with provisions of Section 01 60 00 - Product Requirements.

### 2.2 MATERIALS

- A. Plastic: High impact, high density polyethylene plastic (HDPE).
  - 1. Coat Hooks: Zinc plated forged steel; ball ends.
  - 2. Fasteners: Zinc plated manufacturer's standard.
- B. Plastic: Plastic laminate faced phenolic core.
  - 1. Coat Hooks: Zinc plated forged steel; ball ends.
  - 2. Fasteners: Zinc plated manufacturer's standard.
- C. Steel: Prime grade mild cold-rolled sheet steel free from surface imperfection, capable of taking a powder coating finish.
  - 1. Hooks: Zinc plated forged steel, ball ends.
  - 2. Bolts and Nuts: Zinc plated truss fin head bolts, hex nuts.
  - 3. Rivets.

### 2.3 PLASTIC LOCKERS

- A. Standard Duty High Impact, High Density Polyethylene Plastic (HDPE):
  - 1. Acceptable Manufacturer: ASI Storage Solutions
  - 2. Series: Traditional Series by ASI.
  - 3. Series: Traditional Plus Series by ASI.
  - 4. Type of Lockers:
    - a. Single Tier:
      - 1) Height: 60 inches (1524 mm).
      - 2) Height: 72 inches (1829 mm).
      - 3) Size: 12 inches (305 mm) wide by 12 inches (305 mm) deep.
      - 4) Size: 12 inches (305 mm) wide by 15 inches (381 mm) deep.
      - 5) Size: 12 inches (305 mm) wide by 18 inches (457 mm) deep.
      - 6) Size: 15 inches (381 mm) wide by 15 inches (381 mm) deep.
      - 7) Size: 15 inches (381 mm) wide by 18 inches (457 mm) deep.
      - 8) Size: 18 inches (457 mm) wide by 18 inches (457 mm) deep.
    - b. Double Tier:
      - 1) Height: 60 inches (1524 mm).

## LOCKERS

- 2) Height: 72 inches (1829 mm).
  - 3) Size: 12 inches (305 mm) wide by 12 inches (305 mm) deep.
  - 4) Size: 12 inches (305 mm) wide by 15 inches (381 mm) deep.
  - 5) Size: 12 inches (305 mm) wide by 18 inches (457 mm) deep.
  - 6) Size: 15 inches (381 mm) wide by 15 inches (381 mm) deep.
  - 7) Size: 15 inches (381 mm) wide by 18 inches (457 mm) deep.
  - 8) Size: 18 inches (457 mm) wide by 18 inches (457 mm) deep.
- c. Triple Tier:
- 1) Height: 60 inches (1524 mm).
  - 2) Height: 72 inches (1829 mm).
  - 3) Size: 12 inches (305 mm) wide by 12 inches (305 mm) deep.
  - 4) Size: 12 inches (305 mm) wide by 15 inches (381 mm) deep.
  - 5) Size: 12 inches (305 mm) wide by 18 inches (457 mm) deep.
- d. Five Tier:
- 1) Height: 60 inches (1524 mm).
  - 2) Size: 12 inches (305 mm) wide by 12 inches (305 mm) deep.
  - 3) Size: 12 inches (305 mm) wide by 15 inches (381 mm) deep.
  - 4) Size: 12 inches (305 mm) wide by 18 inches (457 mm) deep.
  - 5) Size: 15 inches (381 mm) wide by 15 inches (381 mm) deep.
  - 6) Size: 15 inches (381 mm) wide by 18 inches (457 mm) deep.
  - 7) Size: 18 inches (457 mm) wide by 18 inches (457 mm) deep.
- e. Six Tier:
- 1) Height: 72 inches (1829 mm).
  - 2) Size: 12 inches (305 mm) wide by 12 inches (305 mm) deep.
  - 3) Size: 12 inches (305 mm) wide by 15 inches (381 mm) deep.
  - 4) Size: 12 inches (305 mm) wide by 18 inches (457 mm) deep.
  - 5) Size: 15 inches (381 mm) wide by 15 inches (381 mm) deep.
  - 6) Size: 15 inches (381 mm) wide by 18 inches (457 mm) deep.
  - 7) Size: 18 inches (457 mm) wide by 18 inches (457 mm) deep.
- f. Two Person Z-Locker:
- 1) Height: 60 inches (1524 mm).
  - 2) Height: 72 inches (1829 mm).
  - 3) Size: 12 inches (305 mm) wide by 12 inches (305 mm) deep.
  - 4) Size: 12 inches (305 mm) wide by 15 inches (381 mm) deep.
  - 5) Size: 12 inches (305 mm) wide by 18 inches (457 mm) deep.
  - 6) Size: 15 inches (381 mm) wide by 15 inches (381 mm) deep.
  - 7) Size: 15 inches (381 mm) wide by 18 inches (457 mm) deep.
  - 8) Size: 18 inches (457 mm) wide by 18 inches (457 mm) deep.
- g. Cubbies - Lockers and Shelves: Non-locked, open storage.
- 1) Size: Each cubby opening shall be 12 inches (305 mm) width and depth. Height of 6 inches (152 mm), 8 inches (203 mm), or 12 inches (305 mm) as scheduled or indicated. The full unit shall be configured up to three openings across and, depending on the height, up to eight openings tall. The maximum height of the entire unit cannot exceed 48 inches (1219 mm).
- h. Custom Size and Styles: \_\_\_\_\_.

B. Construction:

1. Components: High density polyethylene (HDPE) sheet. Commercial grade texture finish on flat surfaces.
  - a. Doors shall be constructed of 1/2 inch (13 mm) water resistant and non-absorbing HDPE. Color as scheduled. Doors shall be fitted with a flush handle, number plate, padlock hasp, and locking device. Door latches shall be mounted at the mid-point of each door. Handles shall be capable of release from the

LOCKERS



- inside of the locker. Hasps shall be mounted within each handle and will accept standard padlock styles. Doors shall be mounted to door frame using Piano style hinge and Steel Fasteners.
- b. End Cover Panels shall be constructed of 1/2 inch (13 mm) water resistant and non-absorbing HDPE. Color as scheduled.
  - c. Side Panels shall be constructed of 3/8 inch (9.5 mm) water resistant and non-absorbing HDPE.
  - d. Side Panels shall be constructed of 1/2 inch (13 mm) water resistant and non-absorbing HDPE.
  - e. Tops, Bottoms and Shelves shall be constructed of 1/2 inch (13 mm) water resistant and non-absorbing HDPE.
  - f. Slope Tops, Filler Panels and Recessed Locker Trim shall be constructed of 1/2 inch (13 mm) water resistant and non-absorbing HDPE. Provide where scheduled or indicated. Color as scheduled.
2. Hinges: Continuous full length zinc plated, powder coated black color.
  3. Latches: Securely attach to the door, continuous in design and be capable of accepting various locking mechanisms.
  4. Interior Equipment:
    - a. Single tier lockers 48 inches (1219 mm) and higher shall have a shelf.
    - b. Single tier lockers less than 18 inches (457 mm) deep shall have two wall hooks and one ceiling hook.
    - c. Single tier lockers 18 inches (457 mm) deep and more shall have a coat rod instead of a ceiling hook.
    - d. Double Tier lockers shall have two wall hooks and one ceiling hook
    - e. Triple Tier lockers shall have two wall hooks for 12 inches (305 mm) wide lockers.
    - f. Triple tier lockers shall have two wall hooks for 15 inches (381 mm) and wider lockers.
  5. Number Plates: Polished aluminum attached to door face with black numerals 1/2 inch (13 mm) high.
  6. Assembly Units: Group of no more than three adjacent lockers. Single unit construction.
  7. Locker components to be square, rigid, and free of scratches.
  8. Assemble locker box enclosure by means of machined joints, pins and tamper resistant mechanical fasteners.
  9. Locate mechanical fasteners internal to locker box enclosure or on rear of unit.
  10. CNC machine locker door frames from single piece of solid HDPE material.
  11. Machine locker doors from solid HDPE sheets without using limited door insert area.
  12. Provide CNC machined ventilation ports positioned in an array pattern.
  13. Mount door handle to internal latch mechanism.
  14. Color: Ivory Essence Speckle #9500.
  15. Color: Cream #9235.
  16. Color: Folkstone Grey #9400.
  17. Color: Grey #9200.
  18. Color: Tan #9202.
  19. Color: Charcoal #9237.
  20. Color: Moss #9233.
  21. Color: Blueberry #9509.
  22. Color: Burgundy #9211.
  23. Mounting: Floor mounting. Lockers shall be elevated a minimum 1/2 inch (13 mm) above the finished floor.
  24. Mounting: 4 inches (102 mm) base mounting. Fabricate from HDPE Polymer to form components with 1 inch (25 mm) nominal thickness.
  25. Slope Tops: 4 inches (102 mm) for 12 inch (305 mm) deep lockers.

#### LOCKERS

26. Slope Tops: 5 inches (127 mm) for 15 inch (381 mm) deep lockers.
27. Slope Tops: 6 inches (152 mm) for 18 inch (457 mm) deep, lockers.

## 2.4 PHENOLIC LOCKERS

### A. Standard Duty Laminate-Faced Solid Phenolic Lockers:

1. Acceptable Manufacturer: ASI Storage Solutions
2. Series: Traditional Series by ASI.
3. Series: Traditional Plus Series by ASI.
4. Type of Lockers:
  - a. Single Tier:
    - 1) Height: 60 inches (1524 mm).
    - 2) Height: 72 inches (1829 mm).
    - 3) Size: 12 inches (305 mm) wide by 12 inches (305 mm) deep.
    - 4) Size: 12 inches (305 mm) wide by 15 inches (381 mm) deep.
    - 5) Size: 12 inches (305 mm) wide by 18 inches (457 mm) deep.
    - 6) Size: 15 inches (381 mm) wide by 15 inches (381 mm) deep.
    - 7) Size: 15 inches (381 mm) wide by 18 inches (457 mm) deep.
    - 8) Size: 18 inches (457 mm) wide by 18 inches (457 mm) deep.
  - b. Double Tier:
    - 1) Height: 60 inches (1524 mm).
    - 2) Height: 72 inches (1829 mm).
    - 3) Size: 12 inches (305 mm) wide by 12 inches (305 mm) deep.
    - 4) Size: 12 inches (305 mm) wide by 15 inches (381 mm) deep.
    - 5) Size: 12 inches (305 mm) wide by 18 inches (457 mm) deep.
    - 6) Size: 15 inches (381 mm) wide by 15 inches (381 mm) deep.
    - 7) Size: 15 inches (381 mm) wide by 18 inches (457 mm) deep.
    - 8) Size: 18 inches (457 mm) wide by 18 inches (457 mm) deep.
  - c. Triple Tier:
    - 1) Height: 60 inches (1524 mm).
    - 2) Height: 72 inches (1829 mm).
    - 3) Size: 12 inches (305 mm) wide by 12 inches (305 mm) deep.
    - 4) Size: 12 inches (305 mm) wide by 15 inches (381 mm) deep.
    - 5) Size: 12 inches (305 mm) wide by 18 inches (457 mm) deep.
    - 6) Size: 15 inches (381 mm) wide by 15 inches (381 mm) deep.
    - 7) Size: 15 inches (381 mm) wide by 18 inches (457 mm) deep.
    - 8) Size: 18 inches (457 mm) wide by 18 inches (457 mm) deep.
  - d. Five Tier:
    - 1) Height: 60 inches (1524 mm).
    - 2) Size: 12 inches (305 mm) wide by 12 inches (305 mm) deep.
    - 3) Size: 12 inches (305 mm) wide by 15 inches (381 mm) deep.
    - 4) Size: 12 inches (305 mm) wide by 18 inches (457 mm) deep.
    - 5) Size: 15 inches (381 mm) wide by 15 inches (381 mm) deep.
    - 6) Size: 15 inches (381 mm) wide by 18 inches (457 mm) deep.
    - 7) Size: 18 inches (457 mm) wide by 18 inches (457 mm) deep.
  - e. Six Tier:
    - 1) Height: 72 inches (1829 mm).
    - 2) Size: 12 inches (305 mm) wide by 12 inches (305 mm) deep.
    - 3) Size: 12 inches (305 mm) wide by 15 inches (381 mm) deep.
    - 4) Size: 12 inches (305 mm) wide by 18 inches (457 mm) deep.
    - 5) Size: 15 inches (381 mm) wide by 15 inches (381 mm) deep.
    - 6) Size: 15 inches (381 mm) wide by 18 inches (457 mm) deep.
    - 7) Size: 18 inches (457 mm) wide by 18 inches (457 mm) deep.
  - f. Two Person Z-Locker:

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- 1) Height: 60 inches (1524 mm).
  - 2) Height: 72 inches (1829 mm).
  - 3) Size: 12 inches (305 mm) wide by 12 inches (305 mm) deep.
  - 4) Size: 12 inches (305 mm) wide by 15 inches (381 mm) deep.
  - 5) Size: 12 inches (305 mm) wide by 18 inches (457 mm) deep.
  - 6) Size: 15 inches (381 mm) wide by 15 inches (381 mm) deep.
  - 7) Size: 15 inches (381 mm) wide by 18 inches (457 mm) deep.
  - 8) Size: 18 inches (457 mm) wide by 18 inches (457 mm) deep.
  - g. Cubbies - Lockers and Shelves: Non-locked, open storage.
    - 1) Size: Each cubby opening shall be 12 inches (305 mm) width and depth of 6 inches (152 mm), 8 inches (203 mm), or 12 inches (305 mm) as scheduled or indicated. The full unit shall be configured up to three openings across and, depending on the height, up to eight openings tall. The maximum height of the entire unit cannot exceed 48 inches (1219 mm).
- B. Construction:
1. Components: Solid phenolic core decorative plastic laminate with multiple resin-impregnated kraft and surface sheets fused at high temperature and pressure. Units fabricated using stainless steel fasteners. Exposed edges shall be smooth and chamfered.
    - a. Doors shall be constructed of 1/2 inch (13 mm) plastic laminate faced solid phenolic core. Color as scheduled. Doors shall be fitted with a flush handle, number plate, padlock hasp, and locking device. Door latches shall be mounted at the mid-point of each door. Handles shall be capable of release from the inside of the locker. Hasps shall be mounted within each handle and will accept standard padlock styles. Perimeter ventilation. Doors shall be mounted to Side Panel using Piano Type hinge and Steel Fasteners.
    - b. End Cover Panels shall be constructed of 1/2 inch (13 mm) solid phenolic core with plastic laminate. Color as scheduled.
    - c. Side Panels shall be constructed of 3/8 inch (9.5 mm) solid phenolic core plastic laminate.
    - d. Side Panels shall be constructed of 1/2 inch (13 mm) solid phenolic core plastic laminate.
    - e. Tops, Bottoms and Shelves shall be constructed of 1/2 inch (13 mm) solid phenolic core with Speckle-tone material plastic laminate.
    - f. Slope Tops, Filler Panels and Recessed Locker Trim shall be constructed of 1/2 inch (13 mm) solid phenolic core with plastic laminate. Provide where scheduled or indicated. Color as scheduled.
  2. Hinges: Segmented 120 Degree, piano style hinge.
    - a. Finish: Powder coated in black color.
  3. Interior Equipment:
    - a. Single tier lockers 48 inches (1219 mm) and higher shall have a shelf.
    - b. Single tier lockers less than 18 inches (457 mm) deep shall have two wall hooks and one ceiling hook.
    - c. Single tier lockers 18 inches (457 mm) deep and more shall have a coat rod instead of a ceiling hook.
    - d. Double Tier lockers shall have two wall hooks and one ceiling hook
    - e. Triple Tier lockers shall have two wall hooks for 12 inches (305 mm) wide lockers.
    - f. Triple tier lockers shall have two wall hooks for 15 inches (381 mm) and wider lockers.
  4. Color: Hazelnut 4450C.
  5. Color: Sage 6450C.

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6. Color: Gray Mist 3450C.
7. Color: Cinnamon 5450C.
8. Color: Persian Blue 7450C.
9. Color: Black 2000C.
10. Color: Neutral Glace #1130.
11. Color: Silver Gray #3000.
12. Color: Dove Gray #3010.
13. Color: Graphite Grafix #3020.
14. Color: Desert Zephyr #4583.
15. Color: Tungsten EV #4801.
16. Color: Almond #4000.
17. Color: Natural Canvas #4410.
18. Color: Taupe #9096.
19. Color: Folkstone Celesta #3300.
20. Mounting: Floor mounting. Lockers shall be elevated a minimum 1/2 inch (13 mm) above the finished floor.
21. Mounting: 4 inches (102 mm) base mounting. Fabricate from black HDPE Polymer to form components with 1 inch (25 mm) nominal thickness.
22. Slope Tops: 4 inches (102 mm) for 12 inch (305 mm) deep lockers.
23. Slope Tops: 5 inches (127 mm) for 15 inch (381 mm) deep lockers.
24. Slope Tops: 6 inches (152 mm) for 18 inch (457 mm) deep lockers.

## 2.5 STANDARD DUTY METAL LOCKERS

- A. Standard Duty Metal Lockers:
  1. Acceptable Product: ASI Storage Solutions Traditional Collection.
  2. Type of Lockers: Knocked Down.
  3. Type of Lockers: Welded.
  4. All Heights shown with 6 inch (152 mm) legs.
  5. Single Tier:
    - a. Height: 42 inches (1067 mm).
    - b. Height: 54 inches (1372 mm).
    - c. Height: 66 inches (1676 mm).
    - d. Height: 78 inches (1981 mm).
    - e. Size: 12 inches (305 mm) wide by 12 inches (305 mm) deep.
    - f. Size: 12 inches (305 mm) wide by 15 inches (381 mm) deep.
    - g. Size: 12 inches (305 mm) wide by 18 inches (457 mm) deep.
    - h. Size: 15 inches (381 mm) wide by 15 inches (381 mm) deep.
    - i. Size: 15 inches (381 mm) wide by 18 inches (457 mm) deep.
    - j. Size: 18 inches (457 mm) wide by 18 inches (457 mm) deep.
  6. Double Tier:
    - a. Height: 66 inches (1676 mm).
    - b. Height: 78 inches (1981 mm).
    - c. Size: 12 inches (305 mm) wide by 12 inches (305 mm) deep.
    - d. Size: 12 inches (305 mm) wide by 15 inches (381 mm) deep.
    - e. Size: 12 inches (305 mm) wide by 18 inches (457 mm) deep.
    - f. Size: 15 inches (381 mm) wide by 15 inches (381 mm) deep.
    - g. Size: 15 inches (381 mm) wide by 18 inches (457 mm) deep.
    - h. Size: 18 inches (457 mm) wide by 18 inches (457 mm) deep.
  7. Triple Tier:
    - a. Height: 66 inches (1676 mm).
    - b. Height: 78 inches (1981 mm).
    - c. Size: 12 inches (305 mm) wide by 12 inches (305 mm) deep.
    - d. Size: 12 inches (305 mm) wide by 15 inches (381 mm) deep.

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- e. Size: 12 inches (305 mm) wide by 18 inches (457 mm) deep.
8. Four Tier:
  - a. Height: 66 inches (1676 mm).
  - b. Height: 78 inches (1981 mm).
  - c. Size: 12 inches (305 mm) wide by 12 inches (305 mm) deep.
  - d. Size: 12 inches (305 mm) wide by 15 inches (381 mm) deep.
  - e. Size: 12 inches (305 mm) wide by 18 inches (457 mm) deep.
9. Five Tier:
  - a. Height: 66 inches (1676 mm).
  - b. Size: 12 inches (305 mm) wide by 12 inches (305 mm) deep.
  - c. Size: 12 inches (305 mm) wide by 15 inches (381 mm) deep.
  - d. Size: 12 inches (305 mm) wide by 18 inches (457 mm) deep.
  - e. Size: 15 inches (381 mm) wide by 15 inches (381 mm) deep.
  - f. Size: 15 inches (381 mm) wide by 18 inches (457 mm) deep.
10. Six Tier:
  - a. Height: 78 inches (1981 mm).
  - b. Size: 12 inches (305 mm) wide by 12 inches (305 mm) deep.
  - c. Size: 12 inches (305 mm) wide by 15 inches (381 mm) deep.
  - d. Size: 12 inches (305 mm) wide by 18 inches (457 mm) deep.
  - e. Size: 15 inches (381 mm) wide by 15 inches (381 mm) deep.
  - f. Size: 15 inches (381 mm) wide by 18 inches (457 mm) deep.
11. Two Person:
  - a. Height: 78 inches (1981 mm).
  - b. Size: 15 inches (381 mm) wide by 15 inches (381 mm) deep.
  - c. Size: 15 inches (381 mm) wide by 18 inches (457 mm) deep.
  - d. Size: 18 inches (457 mm) wide by 18 inches (457 mm) deep.
  - e. Size: 18 inches (457 mm) wide by 21 inches (533 mm) deep
12. Specialty 16 Person. Coat rod shall be mounted between tiers.
13. Specialty Wall Mount. Coat rod shall be mounted below wall mounted lockers.
14. Material: Steel parts shall be mild cold rolled commercial quality steel, ASTM A1008.
15. Finish: Steel surfaces shall be power washed, phosphate treated and finished with an electrostatically applied 2 mm thick hybrid epoxy/polyester powder coating and baked.
16. Construction: Lockers shall be built on a unitized principle with common intermediate uprights separating units.
17. Door Frames: 16 gauge formed in a channel shape. Vertical members shall have additional flange to provide a continuous door strike. Cross frame members; 16 gauge channel shaped.
  - a. Double Tier Lockers: Include intermediate cross frames.
  - b. Triple Tier Lockers: Include intermediate cross frames.
18. Doors: Knocked Down: 16 gauge with louvers, channel shaped on both the lock and hinge side, with angle formations across the top and bottom.
19. Doors: Welded: 14 gauge with louvers, channel shaped on both the lock and hinge side, with angle formations across the top and bottom.
20. Body:
  - a. Bottoms: 16 gauge.
  - b. Tops, Sides and Shelves, Knocked Down: 24 gauge.
  - c. Tops, Sides and Shelves, Welded: 16 gauge.
  - d. Backs: 18 gauge.
  - e. Bolt spacing shall not exceed 9 inches (228 mm) o.c.
21. Hinges: Full length 16 gauge continuous piano type, riveted to both door and frame.
22. Handles: One-piece 20 gauge deep drawn stainless steel cup designed to accommodate locks.
23. Latching: 1-3 Tiers Lifting trigger 14 gauge steel, attached to the latching channel. Trigger shall have a padlock eye for use with 9/32 inch (7 mm) diameter padlock

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- shackle. Doors to have latch clip engaging frame at three points on doors over 42 inches (1.067 m) high and two points on all other doors. Locking device to be positive automatic type, whereby locker door may be locked when open, then closed without unlocking.
24. Latching: 4,5,6 Tier: An 11 gauge frame hook shall be secured to the frame. The frame shall have a padlock hasp protruding through the recessed handle. A rubber silencer shall be firmly secured to the frame at each latch hook.
  25. A rubber silencer shall be firmly secured to the frame at each latch hook.
  26. Interior Equipment:
    - a. Single tier lockers 48 inches (1.219 m) or higher shall have a shelf.
    - b. Single tier lockers less than 18 inches (457 mm) deep shall have three wall hooks and one ceiling hook.
    - c. Single tier lockers 18 (457 mm) inches deep or more shall have a coat rod instead of a ceiling hook.
    - d. Double Tier lockers shall have three wall hooks and one ceiling hook
    - e. Triple Tier lockers shall have three wall hooks for 12 inches (305 mm) wide lockers.
    - f. Triple tier lockers shall have four wall hooks for 15 inches (381 mm) and wider lockers.
  27. Number Plates: Each locker shall have a polished aluminum number plate riveted to door face with black numerals 1/2 inch (12 mm) high.
  28. Finish: Doors and exposed body parts shall be finished in a baked on powder coat finish in color indicated.
    - a. Color: White #29.
    - b. Color: Gray #25.
    - c. Color: Charcoal #23.
    - d. Color: Almond #03.
    - e. Color: Tan #01.
    - f. Color: Yellow # 50.
    - g. Color: Orange #05.
    - h. Color: Red #45.
    - i. Color: Burgundy #49.
    - j. Color: Plum #04.
    - k. Color: Sky Blue #31.
    - l. Color: Blue Frost #36.
    - m. Color: Mist Green #06.
    - n. Color: Pine Forest #53.
    - o. Color: Black #11.
  29. Assembly:
    - a. Factory Assembly: All locker components shall be assembled with rivets.
    - b. Knocked Down: All locker components shall be assembled with nuts and bolts.

## 2.6 HEAVY DUTY METAL LOCKERS

- A. Heavy Duty Metal Lockers:
  1. Acceptable Product: ASI Storage Solutions Traditional Plus Collection.
  2. Type of Lockers: Knocked Down.
  3. Type of Lockers: Welded.
  4. Single Tier:
    - a. Height: 66 inches (1676 mm).
    - b. Height: 78 inches (1981 mm).
    - c. Size: 12 inches (305 mm) wide by 12 inches (305 mm) deep.
    - d. Size: 12 inches (305 mm) wide by 15 inches (381 mm) deep.
    - e. Size: 12 inches (305 mm) wide by 18 inches (457 mm) deep.

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- f. Size: 15 inches (381 mm) wide by 15 inches (381 mm) deep.
  - g. Size: 15 inches (381 mm) wide by 18 inches (457 mm) deep.
  - h. Size: 18 inches (457 mm) wide by 18 inches (457 mm) deep.
5. Double Tier:
- a. Height: 66 inches (1676 mm).
  - b. Height: 78 inches (1981 mm).
  - c. Size: 12 inches (305 mm) wide by 12 inches (305 mm) deep.
  - d. Size: 12 inches (305 mm) wide by 15 inches (381 mm) deep.
  - e. Size: 12 inches (305 mm) wide by 18 inches (457 mm) deep.
  - f. Size: 15 inches (381 mm) wide by 15 inches (381 mm) deep.
  - g. Size: 15 inches (381 mm) wide by 18 inches (457 mm) deep.
  - h. Size: 18 inches (457 mm) wide by 18 inches (457 mm) deep.
6. Triple Tier:
- a. Height: 66 inches (1676 mm).
  - b. Height: 78 inches (1981 mm).
  - c. Size: 12 inches (305 mm) wide by 12 inches (305 mm) deep.
  - d. Size: 12 inches (305 mm) wide by 15 inches (381 mm) deep.
  - e. Size: 12 inches (305 mm) wide by 18 inches (457 mm) deep.
  - f. Size: 15 inches (381 mm) wide by 18 inches (457 mm) deep.
  - g. Size: 18 inches (457 mm) wide by 18 inches (457 mm) deep.
7. Material: Steel parts shall be mild cold tolled commercial quality steel, ASTM A1008.
8. Finish: Steel surfaces shall be power washed, phosphate treated and finished with an electrostatically applied 2 mm thick hybrid epoxy/polyester powder coating and baked.
9. Construction: Lockers shall be built on a unitized principle with common intermediate uprights separating units.
10. Door Frames: 16 gauge formed in a channel shape. Vertical members shall have additional flange to provide a continuous door strike. Cross frame members; 16 gauge channel shaped
- a. Double Tier Lockers: Include intermediate cross frames.
  - b. Triple Tier Lockers: Include intermediate cross frames.
11. Doors: 14 gauge, channel shaped on both the lock and hinge side, with angle formations across the top and bottom. Locker doors shall have 16 gauge full height reinforcement channel in the door edges.
12. Body:
- a. Bottoms: 16 gauge.
  - b. Tops, Sides, Backs and Shelves, Knocked Down: 24 gauge.
  - c. Tops, Sides, Backs and Shelves, Welded: 18 gauge.
  - d. Bolt spacing shall not exceed 9 inches (228 mm) o.c.
13. Hinges: Full length 16 gauge continuous piano type, riveted to both door and frame.
14. Handles: One-piece 20 gauge deep drawn stainless steel cup designed to accommodate locks.
15. Latching: An 11 gauge frame hook shall be secured to the fame. The frame shall have a padlock hasp protruding through the recessed handle. A rubber silencer shall be firmly secured to the frame at each latch hook.
16. Interior Equipment:
- a. Single tier lockers 48 inches (1.219 m) or higher shall have a shelf.
  - b. Single tier lockers less than 18 inches (457 mm) deep shall have three wall hooks and one ceiling hook.
  - c. Single tier lockers 18 inches (457 mm) deep or more shall have a coat rod instead of a ceiling hook.
  - d. Double Tier lockers shall have three wall hooks and one ceiling hook
  - e. Triple Tier lockers shall have three wall hooks for 12 inches (305 mm) wide lockers.

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- f. Triple tier lockers shall have four wall hooks for 15 inches (381 mm) and wider lockers.
- 17. Number Plates: Each locker shall have a polished aluminum number plate riveted to door face with black numerals 1/2 inch (12 mm) high.
- 18. Finish: Baked on powder coat finish in color indicated.
  - a. Color: White #29.
  - b. Color: Gray #25.
  - c. Color: Charcoal #23.
  - d. Color: Almond #03.
  - e. Color: Tan #01.
  - f. Color: Yellow # 50.
  - g. Color: Orange #05.
  - h. Color: Red #45.
  - i. Color: Burgundy #49.
  - j. Color: Plum #04.
  - k. Color: Sky Blue #31.
  - l. Color: Blue Frost #36.
  - m. Color: Mist Green #06.
  - n. Color: Pine Forest #53.
  - o. Color: Black #11.
- 19. Assembly: All locker components shall be assembled with rivets.

## 2.7 ATHLETIC METAL LOCKERS

- A. Athletic Metal Lockers:
  - 1. Acceptable Product: ASI Storage Solutions Competitor Collection.
  - 2. Type of Lockers: Knocked Down.
  - 3. Type of Lockers: Welded.
  - 4. Single Tier:
    - a. Height: 66 inches (1676 mm).
    - b. Height: 78 inches (1981 mm).
    - c. Size: 12 inches (305 mm) wide by 12 inches (305 mm) deep.
    - d. Size: 12 inches (305 mm) wide by 15 inches (381 mm) deep.
    - e. Size: 12 inches (305 mm) wide by 18 inches (457 mm) deep.
    - f. Size: 15 inches (381 mm) wide by 15 inches (381 mm) deep.
    - g. Size: 15 inches (381 mm) wide by 18 inches (457 mm) deep.
    - h. Size: 18 inches (457 mm) wide by 18 inches (457 mm) deep.
    - i. Size: 18 inches (457 mm) wide by 24 inches (610 mm) deep.
    - j. Size: 24 inches (610 mm) wide by 24 inches (610 mm) deep.
  - 5. Double Tier:
    - a. Height: 66 inches (1676 mm).
    - b. Height: 78 inches (1981 mm).
    - c. Size: 12 inches (305 mm) wide by 12 inches (305 mm) deep.
    - d. Size: 12 inches (305 mm) wide by 15 inches (381 mm) deep.
    - e. Size: 12 inches (305 mm) wide by 18 inches (457 mm) deep.
    - f. Size: 15 inches (381 mm) wide by 15 inches (381 mm) deep.
    - g. Size: 15 inches (381 mm) wide by 18 inches (457 mm) deep.
    - h. Size: 18 inches (457 mm) wide by 18 inches (457 mm) deep.
    - i. Size: 18 inches (457 mm) wide by 24 inches (610 mm) deep.
    - j. Size: 24 inches (610 mm) wide by 24 inches (610 mm) deep.
  - 6. Triple Tier:
    - a. Height: 66 inches (1676 mm).
    - b. Height: 78 inches (1981 mm).

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- c. Size: 12 inches (305 mm) wide by 12 inches (305 mm) deep.
  - d. Size: 12 inches (305 mm) wide by 15 inches (381 mm) deep.
  - e. Size: 12 inches (305 mm) wide by 18 inches (457 mm) deep.
  - f. Size: 15 inches (381 mm) wide by 15 inches (381 mm) deep.
  - g. Size: 15 inches (381 mm) wide by 18 inches (457 mm) deep.
  - h. Size: 18 inches (457 mm) wide by 18 inches (457 mm) deep.
  - i. Size: 18 inches (457 mm) wide by 24 inches (610 mm) deep.
  - j. Size: 24 inches (610 mm) wide by 24 inches (610 mm) deep.
7. Four Tier:
- a. Height: 66 inches (1676 mm).
  - b. Height: 78 inches (1981 mm).
  - c. Size: 12 inches (305 mm) wide by 12 inches (305 mm) deep.
  - d. Size: 12 inches (305 mm) wide by 15 inches (381 mm) deep.
  - e. Size: 12 inches (305 mm) wide by 18 inches (457 mm) deep.
  - f. Size: 15 inches (381 mm) wide by 15 inches (381 mm) deep.
  - g. Size: 15 inches (381 mm) wide by 18 inches (457 mm) deep.
8. Five Tier:
- a. Height: 66 inches (1676 mm).
  - b. Size: 12 inches (305 mm) wide by 12 inches (305 mm) deep.
  - c. Size: 12 inches (305 mm) wide by 15 inches (381 mm) deep.
  - d. Size: 12 inches (305 mm) wide by 18 inches (457 mm) deep.
  - e. Size: 15 inches (381 mm) wide by 15 inches (381 mm) deep.
  - f. Size: 15 inches (381 mm) wide by 18 inches (457 mm) deep.
9. Six Tier:
- a. Height: 78 inches (1981 mm).
  - b. Size: 12 inches (305 mm) wide by 12 inches (305 mm) deep.
  - c. Size: 12 inches (305 mm) wide by 15 inches (381 mm) deep.
  - d. Size: 12 inches (305 mm) wide by 18 inches (457 mm) deep.
  - e. Size: 15 inches (381 mm) wide by 15 inches (381 mm) deep.
  - f. Size: 15 inches (381 mm) wide by 18 inches (457 mm) deep.
10. Material: Steel parts shall be mild cold tolled commercial quality steel, ASTM A1008.
11. Finish: Steel surfaces shall be power washed, phosphate treated and finished with an electrostatically applied 2 mm thick hybrid epoxy/polyester powder coating and baked.
12. Construction: Lockers shall be built on a unitized principle with common intermediate uprights separating units.
13. Door Frames: 16 gauge formed in a channel shape. Vertical members shall have additional flange to provide a continuous door strike. Cross frame members; 16 gauge channel shaped
- a. Single Tier Lockers: Include intermediate cross frames.
  - b. Double Tier Lockers: Include intermediate cross frames.
  - c. Triple Tier Lockers: Include intermediate cross frames.
14. Doors: 14 gauge with diamond perforations, channel shaped on both the lock and hinge side, with angle formations across the top and bottom.
- a. Single tier lockers shall have an additional 16 gauge full height reinforcement channel.
  - b. Double tier lockers shall have an additional 16 gauge full height reinforcement channel
  - c. Triple tier lockers shall have an additional 16 gauge full height reinforcement channel
15. Ventilation: Locker sides and doors 20 inches (508 mm) or higher shall be perforated with diamond-shaped openings 3/4 inch (19 mm) wide by 1-1/2 inches (38 mm) high in a quantity and pattern to ensure maximum ventilation and maintain structural strength. Doors less than 20 inches (508 mm) high shall have small diamond-shaped

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- perforations 7/16 inch (11 mm) wide by 15/16 inch (24 mm) high.
16. Body:
    - a. Backs: 18 gauge.
    - b. Bottoms, Tops, Sides, and Shelves: 16 gauge.
    - c. Bolt spacing shall not exceed 9 inches (228 mm) o.c.
  17. Hinges: Full length 16 gauge continuous piano type, riveted to both door and frame.
  18. Handles: One-piece 20 gauge deep drawn stainless steel cup designed to accommodate locks.
  19. Latching: An 11 gauge frame hook shall be secured to the frame. The frame shall have a padlock hasp protruding through the recessed handle. A rubber silencer shall be firmly secured to the frame at each latch hook.
  20. Interior Equipment:
    - a. Single tier lockers 48 inches (1.219 m) or higher shall have a shelf.
    - b. Single tier lockers less than 18 inches (467 mm) deep shall have three wall hooks and one ceiling hook.
    - c. Single tier lockers 18 inches (457) deep or more shall have a coat rod instead of a ceiling hook.
    - d. Double Tier lockers shall have three wall hooks and one ceiling hook
    - e. Triple Tier lockers shall have three wall hooks for 12 inches (305 mm) wide lockers.
    - f. Triple tier lockers shall have four wall hooks for 15 inches (381 mm) and wider lockers.
  21. Number Plates: Each locker shall have a polished aluminum number plate riveted to door face with black numerals 1/2 inch (12 mm) high.
  22. Finish: Baked on powder coat finish in color indicated.
    - a. Color: White #29.
    - b. Color: Gray #25.
    - c. Color: Charcoal #23.
    - d. Color: Almond #03.
    - e. Color: Tan #01.
    - f. Color: Yellow # 50.
    - g. Color: Orange #05.
    - h. Color: Red #45.
    - i. Color: Burgundy #49.
    - j. Color: Plum #04.
    - k. Color: Sky Blue #31.
    - l. Color: Blue Frost #36.
    - m. Color: Mist Green #06.
    - n. Color: Pine Forest #53.
    - o. Color: Black #11.
  23. Assembly:
    - a. Factory Assembly: All locker components shall be assembled with rivets.
    - b. Knocked Down: All locker components shall be assembled with nuts and bolts.

## 2.8 STADIUM METAL LOCKERS

- A. Stadium Metal Lockers:
  1. Acceptable Product: ASI Storage Solutions Pro Collection.
  2. Type of Lockers: Knocked Down.
  3. Type of Lockers: Welded.
  4. Single Tier:
    - a. Height: 72 inches (1829 mm).
    - b. Size: 24 inches (610 mm) wide by 18 inches (457 mm) deep.

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- c. Size: 24 inches (305 mm) wide by 21 inches (533 mm) deep.
- d. Size: 24 inches (610 mm) wide by 24 inches (610 mm) deep.
- e. Size: 33 inches (838 mm) wide by 18 inches (457 mm) deep.
- f. Size: 33 inches (838 mm) wide by 21 inches (533 mm) deep.
- g. Size 33 inches (533 mm) wide by 24 inches (610 mm) deep.
5. Material: Steel parts shall be mild cold tolled commercial quality steel, ASTM A1008.
6. Finish: Steel surfaces shall be power washed, phosphate treated and finished with an electrostatically applied 2 mm thick hybrid epoxy/polyester powder coating and baked.
7. Construction: Lockers shall be built on a unitized principle.
8. Locker Frames: 16 gauge formed in a channel shape.
9. Ventilation: Open front; side shall be diamond perforated.
10. Body:
  - a. Tops, sides, and shelves shall be 16 gauge.
  - b. Backs: 18 gauge.
  - c. Bottoms shall be 16 gauge and shall have two welded reinforcement channels.
  - d. Bolt spacing shall not exceed 9 inches (228 mm) o.c.
11. Interior Equipment: Each locker shall have one coat rod, two coat rod holders and two single wall hooks.
12. Number Plates: Each locker shall have a polished aluminum number plate riveted to door face with black numerals 1/2 inch (12 mm) high.
13. Finish: Doors and exposed body parts shall be finished in a baked on powder coat finish in color indicated
  - a. Color: White #29.
  - b. Color: Gray #25.
  - c. Color: Charcoal #23.
  - d. Color: Almond #03.
  - e. Color: Tan #01.
  - f. Color: Yellow # 50.
  - g. Color: Orange #05.
  - h. Color: Red #45.
  - i. Color: Burgundy #49.
  - j. Color: Plum #04.
  - k. Color: Sky Blue #31.
  - l. Color: Blue Frost #36.
  - m. Color: Mist Green #06.
  - n. Color: Pine Forest #53.
  - o. Color: Black #11.
14. Assembly:
  - a. Factory Assembly: All locker components shall be assembled with rivets.
  - b. Knocked Down: All locker components shall be assembled with nuts and bolts.
15. Security Box: 14 gauge lockable door with a 16 gauge side panel. The door shall be attached to a welded frame with a continuous hinge. The hinge shall be mounted to the door with aluminum rivets. The door shall have a recessed handle. Security box door frame members shall not be less than 16 gauge formed to a channel shape. Vertical members shall have an additional flange to provide a continuous door strike.
16. Footlocker: Front footlocker panel shall include a single point latch with padlock strike plate and mini louvers. Footlocker top shall have a continuous hinge. Opening and closing shall be quieted by rubber bumpers mounted to the contact points. Seat shall be strengthened with two reinforcement channels welded to bottom of seat. Two side seat supports shall be fastened to side panels and inserted in a support tab on the front locker panels for added strength.

## 2.9 ANGLE IRON WELDED METAL LOCKERS

### LOCKERS

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- A. Angle Iron Metal Lockers:
1. Acceptable Product: ASI Storage Solutions
  2. Type of Lockers: Angle Iron Lockers: Fully welded construction.
    - a. Single Tier:
      - 1) Height: 66 inches (1676 mm).
      - 2) Height: 78 inches (1981 mm).
      - 3) Size: 12 inches (305 mm) wide by 12 inches (305 mm) deep.
      - 4) Size: 12 inches (305 mm) wide by 15 inches (381 mm) deep.
      - 5) Size: 12 inches (305 mm) wide by 18 inches (457 mm) deep.
      - 6) Size: 15 inches (381 mm) wide by 15 inches (381 mm) deep.
      - 7) Size: 15 inches (381 mm) wide by 18 inches (457 mm) deep.
      - 8) Size: 18 inches (457 mm) wide by 18 inches (457 mm) deep.
      - 9) Size: 18 inches (457 mm) wide by 24 inches (610 mm) deep.
      - 10) Size: 24 inches (610 mm) wide by 24 inches (610 mm) deep.
    - b. Double Tier:
      - 1) Height: 66 inches (1676 mm).
      - 2) Height: 78 inches (1981 mm).
      - 3) Size: 12 inches (305 mm) wide by 12 inches (305 mm) deep.
      - 4) Size: 12 inches (305 mm) wide by 15 inches (381 mm) deep.
      - 5) Size: 12 inches (305 mm) wide by 18 inches (457 mm) deep.
      - 6) Size: 15 inches (381 mm) wide by 15 inches (381 mm) deep.
      - 7) Size: 15 inches (381 mm) wide by 18 inches (457 mm) deep.
      - 8) Size: 18 inches (457 mm) wide by 18 inches (457 mm) deep.
      - 9) Size: 18 inches (457 mm) wide by 24 inches (610 mm) deep.
      - 10) Size: 24 inches (610 mm) wide by 24 inches (610 mm) deep.
    - c. Triple Tier:
      - 1) Height: 66 inches (1676 mm).
      - 2) Height: 78 inches (1981 mm).
      - 3) Size: 12 inches (305 mm) wide by 12 inches (305 mm) deep.
      - 4) Size: 12 inches (305 mm) wide by 15 inches (381 mm) deep.
      - 5) Size: 12 inches (305 mm) wide by 18 inches (457 mm) deep.
      - 6) Size: 15 inches (381 mm) wide by 15 inches (381 mm) deep.
      - 7) Size: 15 inches (381 mm) wide by 18 inches (457 mm) deep.
      - 8) Size: 18 inches (457 mm) wide by 18 inches (457 mm) deep.
      - 9) Size: 18 inches (457 mm) wide by 24 inches (610 mm) deep.
      - 10) Size: 24 inches (610 mm) wide by 24 inches (610 mm) deep.
    - d. Four Tier:
      - 1) Height: 66 inches (1676 mm).
      - 2) Height: 78 inches (1981 mm).
      - 3) Size: 12 inches (305 mm) wide by 12 inches (305 mm) deep.
      - 4) Size: 12 inches (305 mm) wide by 15 inches (381 mm) deep.
      - 5) Size: 12 inches (305 mm) wide by 18 inches (457 mm) deep.
      - 6) Size: 15 inches (381 mm) wide by 15 inches (381 mm) deep.
      - 7) Size: 15 inches (381 mm) wide by 18 inches (457 mm) deep.
    - e. Five Tier:
      - 1) Height: 66 inches (1676 mm).
      - 2) Size: 12 inches (305 mm) wide by 12 inches (305 mm) deep.
      - 3) Size: 12 inches (305 mm) wide by 15 inches (381 mm) deep.
      - 4) Size: 12 inches (305 mm) wide by 18 inches (457 mm) deep.
      - 5) Size: 15 inches (381 mm) wide by 15 inches (381 mm) deep.
      - 6) Size: 15 inches (381 mm) wide by 18 inches (457 mm) deep.
    - f. Six Tier:
      - 1) Height: 78 inches (1981 mm).

**LOCKERS**

- 2) Size: 12 inches (305 mm) wide by 12 inches (305 mm) deep.
- 3) Size: 12 inches (305 mm) wide by 15 inches (381 mm) deep.
- 4) Size: 12 inches (305 mm) wide by 18 inches (457 mm) deep.
- 5) Size: 15 inches (381 mm) wide by 15 inches (381 mm) deep.
- 6) Size: 15 inches (381 mm) wide by 18 inches (457 mm) deep.
3. Finish: Steel surfaces shall be power washed, phosphate treated and finished with an electrostatically applied 2 mm thick hybrid epoxy/polyester powder coating and baked.
4. Doors: 14-gage perforated cold-rolled steel with double bends on vertical sides and single bend on horizontal sides.
5. Ventilation: Locker sides and doors 20 inches (508 mm) or higher shall be perforated with diamond-shaped openings 3/4 inch (19 mm) wide by 1-1/2 inches (38 mm) high in a quantity and pattern to ensure maximum ventilation and maintain structural strength. Doors less than 20 inches (508 mm) high shall have small diamond-shaped perforations 7/16 inch (11 mm) wide by 15/16 inch (24 mm) high.
6. Hinges: Full length 16 gauge continuous piano type, riveted to both door and frame.
7. Handles: One-piece 20 gauge deep drawn stainless steel cup designed to accommodate locks.
8. Frame: 1" x 1" x 1/8" angle formed steel
9. Latching:
  - a. Single Point: 11-gage latch welded to frame with stainless steel recessed cup with integral handle. Padlock hasp protruding through recessed handle. Provide rubber silencer secured to frame at each latch hook.
  - b. Multi-Point: 20 gage stainless steel recessed handle with integral lift trigger attached to latching channel. Latch to engage frame at 3 points on doors over 42 inches (1067 mm) and at 2 points on others. Positive slam type lock.
  - c. Cremone Latch: 3/8 inch (9.5 mm) diameter latching rods engage top and bottom of locker frame. Center latch engages locker frame. Provide 11-gage steel handle.
10. Interior Equipment:
  - a. Single tier lockers 48 inches (1.219 m) or higher shall have a shelf.
  - b. Single tier lockers less than 18 inches (467 mm) deep shall have three wall hooks and one ceiling hook.
  - c. Single tier lockers 18 inches (457) deep or more shall have a coat rod instead of a ceiling hook.
  - d. Double Tier lockers shall have three wall hooks and one ceiling hook
11. Number Plates: Each locker shall have a polished aluminum number plate riveted to door face with black numerals 1/2inch (12 mm) high.
12. Finish: Doors and exposed body parts shall be finished in a baked on powder coat finish in color indicated. Non-exposed body parts shall be finished in a baked on powder coat finish in a neutral color chosen by manufacturer.
  - a. Color: White #29.
  - b. Color: Gray #25.
  - c. Color: Charcoal #23.
  - d. Color: Almond #03.
  - e. Color: Tan #01.
  - f. Color: Yellow # 50.
  - g. Color: Orange #05.
  - h. Color: Red #45.
  - i. Color: Burgundy #49.
  - j. Color: Plum #04.
  - k. Color: Sky Blue #31.
  - l. Color: Blue Frost #36.
  - m. Color: Mist Green #06.

## LOCKERS

- n. Color: Pine Forest #53.
- o. Color: Black #11.

## 2.10 LOCKER ACCESSORIES

- A. Metal Locker Sloped Tops:
  - 1. Continuous slope top shall be 18 gauge sheet steel, powder coated to match the color of the lockers. Hoods are 72 inches (1.828 m) in length by depth of locker. For longer lengths, slip joints without visible fasteners at splice locations shall be provided. End closures shall be provided. The slope shall have a rise equal to 1/3 of the locker depth, plus a 1 inch (25 mm) vertical rise at the front.
  - 2. Individual sloped tops shall be 24 gauge sheet steel, powder coated to match the color of the lockers. Tops shall be formed to a slope which rises 1/3 of the locker depth.
- B. Metal Locker Bases:
  - 1. Base: Zee base shall be 14 gauge sheet steel, powder coated to match the color of the lockers.
  - 2. Base: Front base/closed end base shall be 18 gauge sheet steel, powder coated to match the color of the lockers. Front bases shall be installed between the front legs without overlap or exposes fasteners. End bases shall be installed between front and rear legs of lockers at end of a row.
- C. Metal Locker Fillers-Vertical: Fillers shall be 20 gauge sheet steel, powder coated to match the color of the lockers.
  - 1. Filler Width: 6 inches (152 mm).
  - 2. Filler Width: 12 inches (305 mm).
- D. Metal Locker Recess Trim: Recess trim shall be 18 gauge sheet steel, powder coated to match the color of the lockers.
  - 1. Side Trim (Trim is handed):
    - a. 3 inches (76 mm) wide by 63 inches (1.60 m) high.
    - b. 3 inches (76 mm) wide by 75 inches (1.90 m) high.
  - 2. Top Trim: 74 inches (1.88 m) long by 3 inches (76 mm) high
  - 3. Splice: 2 inches (50 mm) by 3 inches (76 mm).
- E. Benches:
  - 1. Moveable Stainless Steel Bench: Pedestal shall be 2 inches (50 mm) in diameter, 16 gauge brushed stainless steel formed into the shape of a trapezoid. Bottom shall be 14 inches (356 mm) wide with tow (2) mounting holes. The pedestal shall be 16-1/4 inches (413 mm) high. The top flange shall have four (4) holes for fastening to the bench. Minimum spacing of bench support shall be 4 feet (1219 mm).
  - 2. Heavy Duty Stationary Bench: The pedestal shall be 1-1/2 inches (38 mm) diameter steel tubing with 10 gauge steel flanges welded to each end. The pedestal shall be 16-1/4 (356 mm) inches high and shall be finished to match the lockers. Minimum spacing of bench support shall be 4 feet (1219 mm).
  - 3. Wood Bench Tops: Wood bench tops shall be fabricated of hardwood with all corners sanded and rounded and finished with two (2) coats of clear lacquer.
  - 4. Phenolic Bench Tops: Phenolic bench tops shall be fabricated from 3/4 inches (19mm) plastic laminate faced solid phenolic core with all corners sanded and routed.
  - 5. Polymer Bench Tops: Polymer bench tops shall be fabricated from water resistant and non-absorbing HDPE with all corners and edges rounded.
  - 6. Bench Top Width and Depth, Standard Units: 9-1/2 (241 mm) inches deep by 1-1/4 inches (32 mm) thick.

## LOCKERS

7. Bench Top Width and Depth, ADA Compliant Units: 12 inches (305 mm) deep by 1-1/4 inches (32 mm) thick.
8. Bench Top Length: As indicated on the Drawings.
9. Bench Top Length: \_\_\_\_\_.

F. Locks:

1. Built-In Combination Locks: Built-in combination locks shall have five (5) combination changes and be furnished with master keys. Locks shall be furnished with stainless steel escutcheon plates and dead bolts or spring bolts LH or RH reversible.
2. Built-In Key Locks: Provide the following with built-in key locks:
  - a. Flat keys.
  - b. Grooved keys.
  - c. Key combination.
  - d. All keyed alike.
  - e. RH hand dead bolt.
  - f. RH reversible dead bolt.
3. Combination Padlocks: Rust resistant combination padlocks shall be furnished with and without master keying as required. Locks shall be 3-number dialing.

### PART 3 EXECUTION

#### 3.1 EXAMINATION

- A. Do not begin installation until substrates and bases have been properly prepared.
- B. If substrate and bases are the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

#### 3.2 INSTALLATION

- A. Install lockers and accessories at locations shown in accordance with manufacturer's instructions.
- B. Install lockers level and plumb with flush surfaces and rigid attachment to anchoring surfaces.
- C. Anchor lockers to floor and wall at 48 inches (1.219 m) or less, as recommended by the manufacturer.
- D. Fasten adjoining locker units together to provide rigid installation.
- E. Install sloping tops and metal fillers using concealed fasteners. Provide flush hairline joints against adjacent surfaces.
- F. Install front bases between legs without overlap or exposed fasteners. Provide end bases on exposed ends.
- G. Install benches by fastening bench tops to pedestals and securely anchoring to the floor using appropriate anchors for the floor material.

#### 3.3 ADJUSTING AND CLEANING

- A. Adjust doors and latches to operate without binding. Verify that latches are operating satisfactorily.

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- B. Touch-up factory-finish and repair or replace damaged products before Substantial Completion.

3.4 PROTECTION

- A. Protect installed products until completion of project.

END OF SECTION



## SECTION 10 51 43 – LOCKER ROOM BENCHES

### PART 1 – GENERAL

#### 1.1 SUBMITTALS

- A. Plastic product work includes the following, where indicated:
  - 1. Solid Plastic Locker Room Benches.
- B. Furnish all labor and materials necessary for the completion of work in this section as shown on the contract drawings and specified herein.
- C. Work in this section shall include, but is not limited to:
  - 1. Locker room benches and plastic, steel or aluminum pedestals.
  - 2. Hardware for locker room benches and pedestals.
  - 3. Shop drawings and working drawings.
  - 4. Manufacturer's guarantee.
- D. Related work specified elsewhere shall include accessories and anchorage/blocking for attachment of Locker room benches.

#### 1.2 PRODUCT

- A. Submit six (6) sets of shop drawings and details for architect's approval.
- B. Colors shall be selected from the 13 manufacturer's standard bench colors: grey, white, beige, royal blue, midnight black, burgundy, hunter green, charcoal grey, beige flint, grey slate, glacier grey, cappuccino, and sandcastle.
- C. Color samples and hardware samples shall be submitted for approval by the architect upon request.

### PART 2 – PRODUCTS

#### 2.1 MANUFACTURER

- A. Locker room benches to be supplied by SCRANTON PRODUCTS (Santana/Comtec/Capitol), Moosic, PA, or approved equal.

#### 2.2 MATERIALS

- A. Locker room bench tops shall be 1 ½" thick with a homogeneous color throughout, constructed from High Density Polyethylene (HDPE) resins. Locker benches tops shall be fabricated from polymer resins compounded under high pressure, forming a single component which is waterproof,

#### LOCKER ROOM BENCHES

nonabsorbent and has a self lubricating surface that resists marks from pens, pencils, markers and other writing instruments. All plastic components shall be covered with a protective plastic masking.

## 2.3 CONSTRUCTION

- A. Locker room bench tops shall be 1 ½” thick with all edges rounded to a ¼” radius. Standard bench top size is 9 ½” wide by customer specified length not to exceed 96” for one single piece.

## 2.4 HARDWARE

- A. Steel pedestals shall be 16 ¼” high, secured to bench tops with stainless steel, torx screws and secured to the floor using lead expansion shields with 2” stainless steel Phillips head machine bolts.
- B. Plastic pedestals shall be 16 1/8” high, secured to the bench tops with stainless steel, torx screws and secured to the floor using lead expansion shields with 2” stainless steel Phillips head machine bolts.
- C. Aluminum pedestals shall be 16” high, and secured to bench tops with stainless steel torx screws and secured to the floor using lead expansion shields with 2” stainless steel Phillips head machine bolts

## PART 3 - EXECUTION

### 3.1 PREPARATION

- A. Examine areas to receive Locker room benches for correct location and spacing of anchorage/blocking and plumbing fixtures that may affect installation of benches. Report any discrepancies to the architect.
- B. Take complete and accurate measurements of Locker room bench locations.
- C. Start of work constitutes acceptance of job.

### 3.2 INSTALLATION

- A. Install benches rigid, straight, plumb, and level manor, with plastic laid out as shown on shop drawings and manufacturer's installation instructions.
- B. No evidence of cutting, drilling, and/or patching shall be visible on the finished work.
- C. Finished surfaces shall be cleaned after installation and be left free of all imperfections.

## LOCKER ROOM BENCHES

### 3.3 WARRANTY

- A. SCRANTON PRODUCTS (Santana/Comtec/Capitol), guarantees its plastic against breakage, corrosion, and delamination under normal conditions for 15 years from the date of receipt by the customer. If materials are found to be defective during that period for reasons listed above, the materials will be replaced free of charge. (Labor not included in warranty.)

END OF SECTION

## SECTION 220500 - COMMON WORK RESULTS FOR PLUMBING

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

#### 1.2 SUMMARY

- A. This Section includes the following:
1. Piping materials and installation instructions common to most piping systems.
  2. Transition fittings.
  3. Dielectric fittings.
  4. Mechanical sleeve seals.
  5. Sleeves.
  6. Escutcheons.
  7. Grout.
  8. Plumbing demolition.
  9. Equipment installation requirements common to equipment sections.
  10. Painting and finishing.
  11. Concrete bases.
  12. Supports and anchorages.

#### 1.3 DEFINITIONS

- A. Finished Spaces: Spaces other than mechanical and electrical equipment rooms, furred spaces, pipe chases, unheated spaces immediately below roof, spaces above ceilings, unexcavated spaces, crawlspaces, and tunnels.
- B. Exposed, Interior Installations: Exposed to view indoors. Examples include finished occupied spaces and mechanical equipment rooms.
- C. Exposed, Exterior Installations: Exposed to view outdoors or subject to outdoor ambient temperatures and weather conditions. Examples include rooftop locations.
- D. Concealed, Interior Installations: Concealed from view and protected from physical contact by building occupants. Examples include above ceilings and in chases.
- E. Concealed, Exterior Installations: Concealed from view and protected from weather conditions and physical contact by building occupants but subject to outdoor ambient temperatures. Examples include installations within unheated shelters.
- F. The following are industry abbreviations for plastic materials:
1. ABS: Acrylonitrile-butadiene-styrene plastic.
  2. CPVC: Chlorinated polyvinyl chloride plastic.
  3. PE: Polyethylene plastic.
  4. PVC: Polyvinyl chloride plastic.
- G. The following are industry abbreviations for rubber materials:
1. EPDM: Ethylene-propylene-diene terpolymer rubber.
  2. NBR: Acrylonitrile-butadiene rubber.

#### 1.4 SUBMITTALS

- A. Product Data: For the following:
1. Transition fittings.
  2. Dielectric fittings.
  3. Mechanical sleeve seals.
  4. Escutcheons.
- B. Welding certificates.

1.5 QUALITY ASSURANCE

- A. Steel Support Welding: Qualify processes and operators according to AWS D1.1, "Structural Welding Code--Steel."
- B. Steel Pipe Welding: Qualify processes and operators according to ASME Boiler and Pressure Vessel Code: Section IX, "Welding and Brazing Qualifications."
  - 1. Comply with provisions in ASME B31 Series, "Code for Pressure Piping."
  - 2. Certify that each welder has passed AWS qualification tests for welding processes involved and that certification is current.
- C. Electrical Characteristics for Plumbing Equipment: Equipment of higher electrical characteristics may be furnished provided such proposed equipment is approved in writing and connecting electrical services, circuit breakers, and conduit sizes are appropriately modified. If minimum energy ratings or efficiencies are specified, equipment shall comply with requirements.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver pipes and tubes with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe end damage and to prevent entrance of dirt, debris, and moisture.
- B. Store plastic pipes protected from direct sunlight. Support to prevent sagging and bending.

1.7 COORDINATION

- A. Arrange for pipe spaces, chases, slots, and openings in building structure during progress of construction, to allow for plumbing installations.
- B. Coordinate installation of required supporting devices and set sleeves in poured-in-place concrete and other structural components as they are constructed.
- C. Coordinate requirements for access panels and doors for plumbing items requiring access that are concealed behind finished surfaces. Access panels and doors are specified in Division 08 Section "Access Doors and Frames."

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. In other Part 2 articles where subparagraph titles below introduce lists, the following requirements apply for product selection:
  - 1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the manufacturers specified.
  - 2. Manufacturers: Subject to compliance with requirements, provide products by the manufacturers specified.

2.2 PIPE, TUBE, AND FITTINGS

- A. Refer to individual Division 22 piping Sections for pipe, tube, and fitting materials and joining methods.
- B. Pipe Threads: ASME B1.20.1 for factory-threaded pipe and pipe fittings.

2.3 JOINING MATERIALS

- A. Refer to individual Division 22 piping Sections for special joining materials not listed below.
- B. Pipe-Flange Gasket Materials: Suitable for chemical and thermal conditions of piping system contents.
  - 1. ASME B16.21, nonmetallic, flat, asbestos-free, 1/8-inch maximum thickness unless thickness or specific material is indicated.
    - a. Full-Face Type: For flat-face, Class 125, cast-iron and cast-bronze flanges.
    - b. Narrow-Face Type: For raised-face, Class 250, cast-iron and steel flanges.

2. AWWA C110, rubber, flat face, 1/8 inch thick, unless otherwise indicated; and full-face or ring type, unless otherwise indicated.
- C. Flange Bolts and Nuts: ASME B18.2.1, carbon steel, unless otherwise indicated.
- D. Plastic, Pipe-Flange Gasket, Bolts, and Nuts: Type and material recommended by piping system manufacturer, unless otherwise indicated.
- E. Solder Filler Metals: ASTM B 32, lead-free alloys. Include water-flushable flux according to ASTM B 813.
- F. Brazing Filler Metals: AWS A5.8, BCuP Series, copper-phosphorus alloys for general-duty brazing, unless otherwise indicated; and AWS A5.8, BAg1, silver alloy for refrigerant piping, unless otherwise indicated.
- G. Welding Filler Metals: Comply with AWS D10.12 for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.
- H. Solvent Cements for Joining Plastic Piping:
  1. ABS Piping: ASTM D 2235.
  2. CPVC Piping: ASTM F 493.
  3. PVC Piping: ASTM D 2564. Include primer according to ASTM F 656.
  4. PVC to ABS Piping Transition: ASTM D 3138.
- I. Fiberglass Pipe Adhesive: As furnished or recommended by pipe manufacturer.

#### 2.4 TRANSITION FITTINGS

- A. AWWA Transition Couplings: Same size as, and with pressure rating at least equal to and with ends compatible with, piping to be joined.
  1. Manufacturers:
    - a. Cascade Waterworks Mfg. Co.
    - b. Dresser Industries, Inc.; DMD Div.
    - c. Ford Meter Box Company, Incorporated (The); Pipe Products Div.
    - d. JCM Industries.
    - e. Smith-Blair, Inc.
    - f. Viking Johnson.
  2. Underground Piping NPS 1-1/2 and Smaller: Manufactured fitting or coupling.
  3. Underground Piping NPS 2 and Larger: AWWA C219, metal sleeve-type coupling.
  4. Aboveground Pressure Piping: Pipe fitting.
- B. Plastic-to-Metal Transition Fittings: CPVC and PVC one-piece fitting with manufacturer's Schedule 80 equivalent dimensions; one end with threaded brass insert, and one solvent-cement-joint end.
  1. Manufacturers:
    - a. Eslon Thermoplastics.
- C. Plastic-to-Metal Transition Adaptors: One-piece fitting with manufacturer's SDR 11 equivalent dimensions; one end with threaded brass insert, and one solvent-cement-joint end.
  1. Manufacturers:
    - a. Thompson Plastics, Inc.
- D. Plastic-to-Metal Transition Unions: MSS SP-107, CPVC PVC CPVC and PVC four-part union. Include brass end, solvent-cement-joint end, rubber O-ring, and union nut.
  1. Manufacturers:
    - a. NIBCO INC.
    - b. NIBCO, Inc.; Chemtrol Div.
- E. Flexible Transition Couplings for Underground Non-pressure Drainage Piping: ASTM C 1173 with elastomeric sleeve, ends same size as piping to be joined, and corrosion-resistant metal band on each end.
  1. Manufacturers:
    - a. Cascade Waterworks Mfg. Co.
    - b. Fernco, Inc.
    - c. Mission Rubber Company.

d. Plastic Oddities, Inc.

2.5 DIELECTRIC FITTINGS

- A. Description: Combination fitting of copper alloy and ferrous materials with threaded, solder-joint, plain, or weld-neck end connections that match piping system materials.
- B. Insulating Material: Suitable for system fluid, pressure, and temperature.
- C. Dielectric Unions: Factory-fabricated, union assembly, for 250-psig minimum working pressure at 180 deg F
- D. Coordinate subparagraph and associated subparagraphs below with Part 2 "Manufacturers" Article. Retain "Available" for nonproprietary and delete for semiproprietary specifications.
  - 1. Manufacturers:
    - a. Capitol Manufacturing Co.
    - b. Central Plastics Company.
    - c. Eclipse, Inc.
    - d. Epco Sales, Inc.
    - e. Hart Industries, International, Inc.
    - f. Watts Industries, Inc.; Water Products Div.
    - g. Zurn Industries, Inc.; Wilkins Div.
- E. Dielectric Flanges: Factory-fabricated, companion-flange assembly, for 150- or 300-psig minimum working pressure as required to suit system pressures.
  - 1. Manufacturers:
    - a. Capitol Manufacturing Co.
    - b. Central Plastics Company.
    - c. Epco Sales, Inc.
    - d. Watts Industries, Inc.; Water Products Div.
- F. Dielectric-Flange Kits: Companion-flange assembly for field assembly. Include flanges, full-face- or ring-type neoprene or phenolic gasket, phenolic or polyethylene bolt sleeves, phenolic washers, and steel backing washers.
  - 1. Manufacturers:
    - a. Advance Products & Systems, Inc.
    - b. Calpico, Inc.
    - c. Central Plastics Company.
    - d. Pipeline Seal and Insulator, Inc.
  - 2. Separate companion flanges and steel bolts and nuts shall have 150- or 300-psig minimum working pressure where required to suit system pressures.
- G. Dielectric Couplings: Galvanized-steel coupling with inert and noncorrosive, thermoplastic lining; threaded ends; and 300-psig minimum working pressure at 225 deg F
  - 1. Manufacturers:
    - a. Calpico, Inc.
    - b. Lochinvar Corp.
- H. Dielectric Nipples: Electroplated steel nipple with inert and noncorrosive, thermoplastic lining; plain, threaded, or grooved ends; and 300-psig minimum working pressure at 225 deg F.
  - 1. Manufacturers:
    - a. Perfection Corp.
    - b. Precision Plumbing Products, Inc.
    - c. Sioux Chief Manufacturing Co., Inc.
    - d. Victaulic Co. of America.

2.6 MECHANICAL SLEEVE SEALS

- A. Description: Modular sealing element unit, designed for field assembly, to fill annular space between pipe and sleeve.
  - 1. Manufacturers:
    - a. Advance Products & Systems, Inc.

- b. Calpico, Inc.
- c. Metraflex Co.
- d. Pipeline Seal and Insulator, Inc.
2. Sealing Elements: EPDM interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe.
3. Pressure Plates: Carbon steel. Include two for each sealing element.
4. Connecting Bolts and Nuts: Stainless steel of length required to secure pressure plates to sealing elements. Include one for each sealing element.

## 2.7 SLEEVES

- A. Galvanized-Steel Sheet: 0.0239-inch minimum thickness; round tube closed with welded longitudinal joint.
- B. Steel Pipe: ASTM A 53, Type E, Grade B, Schedule 40, galvanized, plain ends.
- C. Cast Iron: Cast or fabricated "wall pipe" equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop, unless otherwise indicated.
- D. Stack Sleeve Fittings: Manufactured, cast-iron sleeve with integral clamping flange. Include clamping ring and bolts and nuts for membrane flashing.
  1. Under deck Clamp: Clamping ring with set screws.
- E. Molded PVC: Permanent, with nailing flange for attaching to wooden forms.
- F. PVC Pipe: ASTM D 1785, Schedule 40.
- G. Molded PE: Reusable, PE, tapered-cup shaped and smooth-outer surface with nailing flange for attaching to wooden forms.

## 2.8 ESCUTCHEONS

- A. Description: Manufactured wall and ceiling escutcheons and floor plates, with an ID to closely fit around pipe, tube, and insulation of insulated piping and an OD that completely covers opening.
- B. One-Piece, Deep-Pattern Type: Deep-drawn, box-shaped brass with polished chrome-plated finish.
- C. One-Piece, Cast-Brass Type: With set screw.
  1. Finish: Polished chrome-plated.
- D. Split-Casting, Cast-Brass Type: With concealed hinge and set screw.
  1. Finish: Polished chrome-plated.
- E. One-Piece, Stamped-Steel Type: With set screw set screw or spring clips and chrome-plated finish.
- F. Split-Plate, Stamped-Steel Type: With concealed hinge, set screw or spring clips, and chrome-plated finish.
- G. One-Piece, Floor-Plate Type: Cast-iron floor plate.
- H. Split-Casting, Floor-Plate Type: Cast brass with concealed hinge and set screw.

## 2.9 GROUT

- A. Description: ASTM C 1107, Grade B, non-shrink and nonmetallic, dry hydraulic-cement grout.
  1. Characteristics: Post-hardening, volume-adjusting, non-staining, noncorrosive, nongaseous, and recommended for interior and exterior applications.
  2. Design Mix: 5000-psi, 28-day compressive strength.
  3. Packaging: Premixed and factory packaged.

## PART 3 - EXECUTION

### 3.1 PLUMBING DEMOLITION

- A. Refer to Division 01 Section "Cutting and Patching" and Division 02 Section "Selective Structure Demolition" for general demolition requirements and procedures.
- B. Disconnect, demolish, and remove plumbing systems, equipment, and components indicated to be removed.



1. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.
  2. Piping to Be Abandoned in Place: Drain piping and cap or plug piping with same or compatible piping material.
  3. Equipment to Be Removed: Disconnect and cap services and remove equipment.
  4. Equipment to Be Removed and Reinstalled: Disconnect and cap services and remove, clean, and store equipment; when appropriate, reinstall, reconnect, and make equipment operational.
  5. Equipment to Be Removed and Salvaged: Disconnect and cap services and remove equipment and deliver to Owner.
- C. If pipe, insulation, or equipment to remain is damaged in appearance or is unserviceable, remove damaged or unserviceable portions and replace with new products of equal capacity and quality.

### 3.2 PIPING SYSTEMS - COMMON REQUIREMENTS

- A. Install piping according to the following requirements and Division 22 Sections specifying piping systems.
  - B. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on Coordination Drawings.
  - C. Install piping in concealed locations, unless otherwise indicated and except in equipment rooms and service areas.
  - D. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.
- E. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.
- F. Install piping to permit valve servicing.
  - G. Install piping at indicated slopes.
  - H. Install piping free of sags and bends.
  - I. Install fittings for changes in direction and branch connections.
  - J. Install piping to allow application of insulation.
  - K. Select system components with pressure rating equal to or greater than system operating pressure.
  - L. Install escutcheons for penetrations of walls, ceilings, and floors according to the following:
    1. New Piping:
      - a. Piping with Fitting or Sleeve Protruding from Wall: One-piece, deep-pattern type.
      - b. Chrome-Plated Piping: One-piece, cast-brass type with polished chrome-plated finish.
      - c. Insulated Piping: One-piece, stamped-steel type with spring clips.
      - d. Bare Piping at Wall and Floor Penetrations in Finished Spaces: One-piece, cast-brass type with polished chrome-plated finish.
      - e. Bare Piping at Wall and Floor Penetrations in Finished Spaces: One-piece, stamped-steel type.
      - f. Bare Piping at Ceiling Penetrations in Finished Spaces: One-piece, cast-brass type with polished chrome-plated finish.
      - g. Bare Piping in Unfinished Service Spaces: One-piece, cast-brass type with polished chrome-plated finish.
      - h. Bare Piping in Equipment Rooms: One-piece, cast-brass type.
      - i. Bare Piping in Equipment Rooms: One-piece, stamped-steel type with set screw or spring clips.
      - j. Bare Piping at Floor Penetrations in Equipment Rooms: One-piece, floor-plate type.
    2. Existing Piping: Use the following:

- a. Chrome-Plated Piping: Split-casting, cast-brass type with chrome-plated finish.
  - b. Insulated Piping: Split-plate, stamped-steel type with concealed hinge and spring clips.
  - c. Bare Piping at Wall and Floor Penetrations in Finished Spaces: Split-casting, cast-brass type with chrome-plated finish.
  - d. Bare Piping at Wall and Floor Penetrations in Finished Spaces: Split-plate, stamped-steel type with concealed hinge and spring clips.
  - e. Bare Piping at Ceiling Penetrations in Finished Spaces: Split-casting, cast-brass type with chrome-plated finish.
  - f. Bare Piping at Ceiling Penetrations in Finished Spaces: Split-plate, stamped-steel type with concealed hinge and set screw.
  - g. Bare Piping in Unfinished Service Spaces: Split-casting, cast-brass type with polished chrome-plated finish.
  - h. Bare Piping in Unfinished Service Spaces: Split-plate, stamped-steel type with concealed hinge and set screw or spring clips.
  - i. Bare Piping in Equipment Rooms: Split-casting, cast-brass type.
  - j. Bare Piping in Equipment Rooms: Split-plate, stamped-steel type with set screw or spring clips.
  - k. Bare Piping at Floor Penetrations in Equipment Rooms: Split-casting, floor-plate type.
- M. Sleeves are not required for core-drilled holes.
- N. Permanent sleeves are not required for holes formed by removable PE sleeves.
- O. Install sleeves for pipes passing through concrete and masonry walls and concrete floor and roof slabs.
- P. Install sleeves for pipes passing through concrete and masonry walls, gypsum-board partitions, and concrete floor and roof slabs.
- 1. Cut sleeves to length for mounting flush with both surfaces.
    - a. Exception: Extend sleeves installed in floors of mechanical equipment areas or other wet areas 2 inches above finished floor level. Extend cast-iron sleeve fittings below floor slab as required to secure clamping ring if ring is specified.
  - 2. Install sleeves in new walls and slabs as new walls and slabs are constructed.
  - 3. Install sleeves that are large enough to provide 1/4-inch annular clear space between sleeve and pipe or pipe insulation. Use the following sleeve materials:
    - a. Steel Pipe Sleeves: For pipes smaller than NPS 6.
    - b. Steel Sheet Sleeves: For pipes NPS 6 and larger, penetrating gypsum-board partitions.
    - c. Stack Sleeve Fittings: For pipes penetrating floors with membrane waterproofing. Secure flashing between clamping flanges. Install section of cast-iron soil pipe to extend sleeve to 2 inches above finished floor level. Refer to Division 07 Section "Sheet Metal Flashing and Trim" for flashing.
- 1) Seal space outside of sleeve fittings with grout.
- 4. Except for underground wall penetrations, seal annular space between sleeve and pipe or pipe insulation, using joint sealants appropriate for size, depth, and location of joint. Refer to Division 07 Section "Joint Sealants" for materials and installation.
- Q. Above ground, Exterior-Wall Pipe Penetrations: Seal penetrations using sleeves and mechanical sleeve seals. Select sleeve size to allow for 1-inch annular clear space between pipe and sleeve for installing mechanical sleeve seals.
- 1. Install steel pipe for sleeves smaller than 6 inches in diameter.
  - 2. Install cast-iron "wall pipes" for sleeves 6 inches and larger in diameter.
  - 3. Mechanical Sleeve Seal Installation: Select type and number of sealing elements required for pipe material and size. Position pipe in center of sleeve. Assemble mechanical sleeve seals and install in annular space between pipe and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

- R. Underground, Exterior-Wall Pipe Penetrations: Install cast-iron "wall pipes" for sleeves. Seal pipe penetrations using mechanical sleeve seals. Select sleeve size to allow for 1-inch annular clear space between pipe and sleeve for installing mechanical sleeve seals.
  - 1. Mechanical Sleeve Seal Installation: Select type and number of sealing elements required for pipe material and size. Position pipe in center of sleeve. Assemble mechanical sleeve seals and install in annular space between pipe and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.
- S. Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with fire stop materials. Refer to Division 07 Section "Penetration Fire stopping" for materials.
- T. Verify final equipment locations for roughing-in.
- U. Refer to equipment specifications in other Sections of these Specifications for roughing-in requirements.

### 3.3 PIPING JOINT CONSTRUCTION

- A. Join pipe and fittings according to the following requirements and Division 22 Sections specifying piping systems.
- B. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.
- C. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.
- D. Soldered Joints: Apply ASTM B 813, water-flushable flux, unless otherwise indicated, to tube end. Construct joints according to ASTM B 828 or CDA's "Copper Tube Handbook," using lead-free solder alloy complying with ASTM B 32.
- E. Brazed Joints: Construct joints according to AWS's "Brazing Handbook," "Pipe and Tube" Chapter, using copper-phosphorus brazing filler metal complying with AWS A5.8.
- F. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:
  - 1. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.
  - 2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.
- G. Welded Joints: Construct joints according to AWS D10.12, using qualified processes and welding operators according to Part 1 "Quality Assurance" Article.
- H. Flanged Joints: Select appropriate gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Use suitable lubricants on bolt threads.
- I. Plastic Piping Solvent-Cement Joints: Clean and dry joining surfaces. Join pipe and fittings according to the following:
  - 1. Comply with ASTM F 402 for safe-handling practice of cleaners, primers, and solvent cements.
  - 2. ABS Piping: Join according to ASTM D 2235 and ASTM D 2661 Appendixes.
  - 3. CPVC Piping: Join according to ASTM D 2846/D 2846M Appendix.
  - 4. PVC Pressure Piping: Join schedule number ASTM D 1785, PVC pipe and PVC socket fittings according to ASTM D 2672. Join other-than-schedule-number PVC pipe and socket fittings according to ASTM D 2855.
  - 5. PVC Non-pressure Piping: Join according to ASTM D 2855.
  - 6. PVC to ABS Non-pressure Transition Fittings: Join according to ASTM D 3138 Appendix.
- J. Plastic Pressure Piping Gasketed Joints: Join according to ASTM D 3139.
- K. Plastic Non-pressure Piping Gasketed Joints: Join according to ASTM D 3212.
- L. PE Piping Heat-Fusion Joints: Clean and dry joining surfaces by wiping with clean cloth or paper towels. Join according to ASTM D 2657.
  - 1. Plain-End Pipe and Fittings: Use butt fusion.

2. Plain-End Pipe and Socket Fittings: Use socket fusion.

### 3.4 PIPING CONNECTIONS

- A. Make connections according to the following, unless otherwise indicated:
  1. Install unions, in piping NPS 2 and smaller, adjacent to each valve and at final connection to each piece of equipment.
  2. Install flanges, in piping NPS 2-1/2 and larger, adjacent to flanged valves and at final connection to each piece of equipment.
  3. Dry Piping Systems: Install dielectric unions and flanges to connect piping materials of dissimilar metals.
  4. Wet Piping Systems: Install dielectric coupling and nipple fittings to connect piping materials of dissimilar metals.

### 3.5 EQUIPMENT INSTALLATION - COMMON REQUIREMENTS

- A. Install equipment to allow maximum possible headroom unless specific mounting heights are not indicated.
- B. Install equipment level and plumb, parallel and perpendicular to other building systems and components in exposed interior spaces, unless otherwise indicated.
- C. Install plumbing equipment to facilitate service, maintenance, and repair or replacement of components. Connect equipment for ease of disconnecting, with minimum interference to other installations. Extend grease fittings to accessible locations.
- D. Install equipment to allow right of way for piping installed at required slope.

### 3.6 PAINTING

- A. Painting of plumbing systems, equipment, and components is specified in Division 09 Sections "Interior Painting" and "Exterior Painting."
- B. Damage and Touchup: Repair marred and damaged factory-painted finishes with materials and procedures to match original factory finish.

### 3.7 CONCRETE BASES

- A. Concrete Bases: Anchor equipment to concrete base according to equipment manufacturer's written instructions and according to seismic codes at Project.
  1. Construct concrete bases of dimensions indicated, but not less than 4 inches larger in both directions than supported unit.
  2. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch centers around the full perimeter of the base.
  3. Install epoxy-coated anchor bolts for supported equipment that extend through concrete base, and anchor into structural concrete floor.
  4. Place and secure anchorage devices. Use supported equipment manufacturer's setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
  5. Install anchor bolts to elevations required for proper attachment to supported equipment.
  6. Install anchor bolts according to anchor-bolt manufacturer's written instructions.
  7. Use 3000-psi, 28-day compressive-strength concrete and reinforcement as specified in Division 03 Section "Cast-in-Place Concrete."

### 3.8 ERECTION OF METAL SUPPORTS AND ANCHORAGES

- A. Refer to Division 05 Section "Metal Fabrications" for structural steel.
- B. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor plumbing materials and equipment.
- C. Field Welding: Comply with AWS D1.1.

### 3.9 GROUTING

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- A. Mix and install grout for plumbing equipment base bearing surfaces, pump and other equipment base plates, and anchors.
- B. Clean surfaces that will come into contact with grout.
- C. Provide forms as required for placement of grout.
- D. Avoid air entrapment during placement of grout.
- E. Place grout, completely filling equipment bases.
- F. Place grout on concrete bases and provide smooth bearing surface for equipment.
- G. Place grout around anchors.
- H. Cure placed grout.

END OF SECTION 220500

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SECTION 220529 - HANGERS AND SUPPORTS FOR PLUMBING PIPING AND EQUIPMENT

**PART 1 - GENERAL**

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following hangers and supports for plumbing system piping and equipment:
  - 1. Steel pipe hangers and supports.
  - 2. Trapeze pipe hangers.
  - 3. Metal framing systems.
  - 4. Thermal-hanger shield inserts.
  - 5. Fastener systems.
  - 6. Pipe stands.
  - 7. Pipe positioning systems.
  - 8. Equipment supports.
- B. Related Sections include the following:
  - 1. Division 05 Section "Metal Fabrications" for structural-steel shapes and plates for trapeze hangers for pipe and equipment support.
  - 2. Division 21 Section "Water-Based Fire-Suppression Systems" for pipe hangers for fire-suppression piping.

1.3 DEFINITIONS

- A. MSS: Manufacturers Standardization Society for The Valve and Fittings Industry Inc.
- B. Terminology: As defined in MSS SP-90, "Guidelines on Terminology for Pipe Hangers and Supports."

1.4 PERFORMANCE REQUIREMENTS

- A. Design supports for multiple pipes, including pipe stands, capable of supporting combined weight of supported systems, system contents, and test water.
- B. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.
- C. Design seismic-restraint hangers and supports for piping and equipment and obtain approval from authorities having jurisdiction.

1.5 SUBMITTALS

- A. Product Data: For the following:
  - 1. Steel pipe hangers and supports.
  - 2. Thermal-hanger shield inserts.
  - 3. Powder-actuated fastener systems.
  - 4. Pipe positioning systems.
- B. Shop Drawings: Show fabrication and installation details and include calculations for the following:
  - 1. Trapeze pipe hangers. Include Product Data for components.
  - 2. Metal framing systems. Include Product Data for components.
  - 3. Pipe stands. Include Product Data for components.
  - 4. Equipment supports.
- C. Welding certificates.

1.6 QUALITY ASSURANCE

- A. Welding: Qualify procedures and personnel according to ASME Boiler and Pressure Vessel Code: Section IX.
- B. Welding: Qualify procedures and personnel according to the following:
  - 1. AWS D1.1, "Structural Welding Code--Steel."
  - 2. ASME Boiler and Pressure Vessel Code: Section IX.

## **PART 2 - PRODUCTS**

### **2.1 MANUFACTURERS**

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

### **2.2 STEEL PIPE HANGERS AND SUPPORTS**

- A. Description: MSS SP-58, Types 1 through 58, factory-fabricated components. Refer to Part 3 "Hanger and Support Applications" Article for where to use specific hanger and support types.
- B. Available Manufacturers:
  - 1. AAA Technology & Specialties Co., Inc.
  - 2. B-Line Systems, Inc.; a division of Cooper Industries.
  - 3. Empire Industries, Inc.
  - 4. ERICO/Michigan Hanger Co.
  - 5. Globe Pipe Hanger Products, Inc.
  - 6. Grinnell Corp.
  - 7. Tolco Inc.
- C. Galvanized, Metallic Coatings: Pre-galvanized or hot dipped.
- D. Nonmetallic Coatings: Plastic coating, jacket, or liner.
- E. Padded Hangers: Hanger with fiberglass or other pipe insulation pad or cushion for support of bearing surface of piping.

### **2.3 TRAPEZE PIPE HANGERS**

- A. Description: MSS SP-69, Type 59, shop- or field-fabricated pipe-support assembly made from structural-steel shapes with MSS SP-58 hanger rods, nuts, saddles, and U-bolts.

### **2.4 METAL FRAMING SYSTEMS**

- A. Description: MFMA-3, shop- or field-fabricated pipe-support assembly made of steel channels and other components.
- B. Available Manufacturers:
  - 1. B-Line Systems, Inc.; a division of Cooper Industries.
  - 2. ERICO/Michigan Hanger Co.; ERISTRUT Div.
  - 3. GS Metals Corp.
  - 4. Power-Strut Div.; Tyco International, Ltd.
  - 5. Thomas & Betts Corporation.
  - 6. Tolco Inc.
  - 7. Unistrut Corp.; Tyco International, Ltd.
- C. Coatings: Manufacturer's standard finish unless bare metal surfaces are indicated.
- D. Nonmetallic Coatings: Plastic coating, jacket, or liner.

### **2.5 THERMAL-HANGER SHIELD INSERTS**

- A. Description: 100-psig- minimum, compressive-strength insulation insert encased in sheet metal shield.
- B. Manufacturers:
  - 1. Carpenter & Paterson, Inc.
  - 2. ERICO/Michigan Hanger Co.
  - 3. PHS Industries, Inc.



4. Pipe Shields, Inc.
5. Rilco Manufacturing Company, Inc.
6. Value Engineered Products, Inc.
- C. Insulation-Insert Material for Cold Piping: Water-repellent treated, ASTM C 533, Type I calcium silicate.
- D. Insulation-Insert Material for Hot Piping: Water-repellent treated, ASTM C 533, Type I calcium silicate.
- E. For Trapeze or Clamped Systems: Insert and shield shall cover entire circumference of pipe.
- F. For Clevis or Band Hangers: Insert and shield shall cover lower 180 degrees of pipe.
- G. Insert Length: Extend 2 inches beyond sheet metal shield for piping operating below ambient air temperature.

## 2.6 FASTENER SYSTEMS

- A. Powder-Actuated Fasteners: Threaded-steel stud, for use in hardened portland cement concrete with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.
  1. Manufacturers:
    - a. Hilti, Inc.
    - b. ITW Ramset/Red Head.
    - c. Masterset Fastening Systems, Inc.
    - d. MKT Fastening, LLC.
    - e. Powers Fasteners.
- B. Mechanical-Expansion Anchors: Insert-wedge-type zinc-coated stainless steel, for use in hardened portland cement concrete with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.
  1. Manufacturers:
    - a. B-Line Systems, Inc.; a division of Cooper Industries.
    - b. Empire Industries, Inc.
    - c. Hilti, Inc.
    - d. ITW Ramset/Red Head.
    - e. MKT Fastening, LLC.
    - f. Powers Fasteners.

## 2.7 PIPE STAND FABRICATION

- A. Pipe Stands, General: Shop or field-fabricated assemblies made of manufactured corrosion-resistant components to support roof-mounted piping.
- B. Compact Pipe Stand: One-piece plastic unit with integral-rod-roller, pipe clamps, or V-shaped cradle to support pipe, for roof installation without membrane penetration.
  1. Manufacturers:
    - a. ERICO/Michigan Hanger Co.
    - b. MIRO Industries.
    - c. Low-Type, Single-Pipe Stand: One-piece plastic base unit with plastic roller, for roof installation without membrane penetration.
  2. Manufacturers:
    - a. MIRO Industries (or equal).
- C. High-Type, Single-Pipe Stand: Assembly of base, vertical and horizontal members, and pipe support, for roof installation without membrane penetration.
  1. Manufacturers:
    - a. ERICO/Michigan Hanger Co.
    - b. MIRO Industries.
    - c. Portable Pipe Hangers.
  2. Base: Plastic.
  3. Vertical Members: Two or more cadmium-plated-steel or stainless-steel, continuous-thread rods.

4. Horizontal Member: Cadmium-plated-steel or stainless-steel rod with plastic or stainless-steel, roller-type pipe support.
  - D. High-Type, Multiple-Pipe Stand: Assembly of bases, vertical and horizontal members, and pipe supports, for roof installation without membrane penetration.
    1. Manufacturers:
      - a. Portable Pipe Hangers.
    2. Bases: One or more plastic.
    3. Vertical Members: Two or more protective-coated-steel channels.
    4. Horizontal Member: Protective-coated-steel channel.
    5. Pipe Supports: Galvanized-steel, clevis-type pipe hangers.
  - E. Curb-Mounting-Type Pipe Stands: Shop- or field-fabricated pipe support made from structural-steel shape, continuous-thread rods, and rollers for mounting on permanent stationary roof curb.
- 2.8 PIPE POSITIONING SYSTEMS
- A. Description: IAPMO PS 42, system of metal brackets, clips, and straps for positioning piping in pipe spaces for plumbing fixtures for commercial applications.
  - B. Manufacturers:
    1. C & S Mfg. Corp.
    2. HOLDRITE Corp.; Hubbard Enterprises.
    3. Samco Stamping, Inc.
- 2.9 EQUIPMENT SUPPORTS
- A. Description: Welded, shop- or field-fabricated equipment support made from structural-steel shapes.
  - B. Bracing shall be installed at all 90s and change in direction.
- 2.10 MISCELLANEOUS MATERIALS
- A. Structural Steel: ASTM A 36/A 36M, steel plates, shapes, and bars; black and galvanized.
  - B. Grout: ASTM C 1107, factory-mixed and -packaged, dry, hydraulic-cement, non-shrink and nonmetallic grout; suitable for interior and exterior applications.
    1. Properties: Non-staining, noncorrosive, and nongaseous.
    2. Design Mix: 5000-psi, 28-day compressive strength.

### **PART 3 - EXECUTION**

- 3.1 HANGER AND SUPPORT APPLICATIONS
- A. Specific hanger and support requirements are specified in Sections specifying piping systems and equipment.
  - B. Comply with MSS SP-69 for pipe hanger selections and applications that are not specified in piping system Sections.
  - C. Use hangers and supports with galvanized, metallic coatings for piping and equipment that will not have field-applied finish.
  - D. Use nonmetallic coatings on attachments for electrolytic protection where attachments are in direct contact with copper tubing.
  - E. Use padded hangers for piping that is subject to scratching.
  - F. Horizontal-Piping Hangers and Supports: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
    1. Adjustable, Steel Clevis Hangers (MSS Type 1): For suspension of noninsulated or insulated stationary pipes, NPS 1/2 to NPS 30.
    2. Yoke-Type Pipe Clamps (MSS Type 2): For suspension of 120 to 450 deg F pipes, NPS 4 to NPS 16, requiring up to 4 inches of insulation.
    3. Carbon- or Alloy-Steel, Double-Bolt Pipe Clamps (MSS Type 3): For suspension of pipes, NPS 3/4 to NPS 24, requiring clamp flexibility and up to 4 inches of insulation.
    4. Steel Pipe Clamps (MSS Type 4): For suspension of cold and hot pipes, NPS 1/2 to NPS 24, if little or no insulation is required.

5. Pipe Hangers (MSS Type 5): For suspension of pipes, NPS 1/2 to NPS 4, to allow off-center closure for hanger installation before pipe erection.
  6. Adjustable, Swivel Split- or Solid-Ring Hangers (MSS Type 6): For suspension of non-insulated stationary pipes, NPS 3/4 to NPS 8.
  7. Adjustable, Steel Band Hangers (MSS Type 7): For suspension of non-insulated stationary pipes, NPS 1/2 to NPS 8.
  8. Adjustable Band Hangers (MSS Type 9): For suspension of noninsulated stationary pipes, NPS 1/2 to NPS 8.
  9. Adjustable, Swivel-Ring Band Hangers (MSS Type 10): For suspension of non-insulated stationary pipes, NPS 1/2 to NPS 2.
  10. Split Pipe-Ring with or without Turnbuckle-Adjustment Hangers (MSS Type 11): For suspension of non-insulated stationary pipes, NPS 3/8 to NPS 8.
  11. Extension Hinged or 2-Bolt Split Pipe Clamps (MSS Type 12): For suspension of non-insulated stationary pipes, NPS 3/8 to NPS 3.
  12. U-Bolts (MSS Type 24): For support of heavy pipes, NPS 1/2 to NPS 30.
  13. Clips (MSS Type 26): For support of insulated pipes not subject to expansion or contraction.
  14. Pipe Saddle Supports (MSS Type 36): For support of pipes, NPS 4 to NPS 36, with steel pipe base stanchion support and cast-iron floor flange.
  15. Pipe Stanchion Saddles (MSS Type 37): For support of pipes, NPS 4 to NPS 36, with steel pipe base stanchion support and cast-iron floor flange and with U-bolt to retain pipe.
  16. Adjustable, Pipe Saddle Supports (MSS Type 38): For stanchion-type support for pipes, NPS 2-1/2 to NPS 36, if vertical adjustment is required, with steel pipe base stanchion support and cast-iron floor flange.
  17. Single Pipe Rolls (MSS Type 41): For suspension of pipes, NPS 1 to NPS 30, from 2 rods if longitudinal movement caused by expansion and contraction might occur.
  18. Adjustable Roller Hangers (MSS Type 43): For suspension of pipes, NPS 2-1/2 to NPS 20, from single rod if horizontal movement caused by expansion and contraction might occur.
  19. Complete Pipe Rolls (MSS Type 44): For support of pipes, NPS 2 to NPS 42, if longitudinal movement caused by expansion and contraction might occur but vertical adjustment is not necessary.
  20. Pipe Roll and Plate Units (MSS Type 45): For support of pipes, NPS 2 to NPS 24, if small horizontal movement caused by expansion and contraction might occur and vertical adjustment is not necessary.
  21. Adjustable Pipe Roll and Base Units (MSS Type 46): For support of pipes, NPS 2 to NPS 30, if vertical and lateral adjustment during installation might be required in addition to expansion and contraction.
- G. Vertical-Piping Clamps: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
1. Extension Pipe or Riser Clamps (MSS Type 8): For support of pipe risers, NPS 3/4 to NPS 20.
  2. Carbon- or Alloy-Steel Riser Clamps (MSS Type 42): For support of pipe risers, NPS 3/4 to NPS 20, if longer ends are required for riser clamps.
- H. Hanger-Rod Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
1. Steel Turnbuckles (MSS Type 13): For adjustment up to 6 inches for heavy loads.
  2. Steel Clevises (MSS Type 14): For 120 to 450 deg F piping installations.
  3. Swivel Turnbuckles (MSS Type 15): For use with MSS Type 11, split pipe rings.
  4. Malleable-Iron Sockets (MSS Type 16): For attaching hanger rods to various types of building attachments.
  5. Steel Weldless Eye Nuts (MSS Type 17): For 120 to 450 deg F piping installations.
- I. Building Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Steel or Malleable Concrete Inserts (MSS Type 18): For upper attachment to suspend pipe hangers from concrete ceiling.
  2. Top-Beam C-Clamps (MSS Type 19): For use under roof installations with bar-joint construction to attach to top flange of structural shape.
  3. Side-Beam or Channel Clamps (MSS Type 20): For attaching to bottom flange of beams, channels, or angles.
  4. Center-Beam Clamps (MSS Type 21): For attaching to center of bottom flange of beams.
  5. Welded Beam Attachments (MSS Type 22): For attaching to bottom of beams if loads are considerable and rod sizes are large.
  6. C-Clamps (MSS Type 23): For structural shapes.
  7. Top-Beam Clamps (MSS Type 25): For top of beams if hanger rod is required tangent to flange edge.
  8. Side-Beam Clamps (MSS Type 27): For bottom of steel I-beams.
  9. Steel-Beam Clamps with Eye Nuts (MSS Type 28): For attaching to bottom of steel I-beams for heavy loads.
  10. Linked-Steel Clamps with Eye Nuts (MSS Type 29): For attaching to bottom of steel I-beams for heavy loads, with link extensions.
  11. Malleable Beam Clamps with Extension Pieces (MSS Type 30): For attaching to structural steel.
  12. Welded-Steel Brackets: For support of pipes from below, or for suspending from above by using clip and rod. Use one of the following for indicated loads:
    - a. Light (MSS Type 31): 750 lb.
    - b. Medium (MSS Type 32): 1500 lb.
    - c. Heavy (MSS Type 33): 3000 lb.
  13. Side-Beam Brackets (MSS Type 34): For sides of steel or wooden beams.
  14. Plate Lugs (MSS Type 57): For attaching to steel beams if flexibility at beam is required.
  15. Horizontal Travelers (MSS Type 58): For supporting piping systems subject to linear horizontal movement where headroom is limited.
- J. Saddles and Shields: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
1. Steel Pipe-Covering Protection Saddles (MSS Type 39): To fill interior voids with insulation that matches adjoining insulation.
  2. Protection Shields (MSS Type 40): Of length recommended in writing by manufacturer to prevent crushing insulation.
  3. Thermal-Hanger Shield Inserts: For supporting insulated pipe.
- K. Spring Hangers and Supports: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
1. Restraint-Control Devices (MSS Type 47): Where indicated to control piping movement.
  2. Spring Cushions (MSS Type 48): For light loads if vertical movement does not exceed 1-1/4 inches.
  3. Spring-Cushion Roll Hangers (MSS Type 49): For equipping Type 41 roll hanger with springs.
  4. Spring Sway Braces (MSS Type 50): To retard sway, shock, vibration, or thermal expansion in piping systems.
  5. Variable-Spring Hangers (MSS Type 51): Preset to indicated load and limit variability factor to 25 percent to absorb expansion and contraction of piping system from hanger.
  6. Variable-Spring Base Supports (MSS Type 52): Preset to indicated load and limit variability factor to 25 percent to absorb expansion and contraction of piping system from base support.
  7. Variable-Spring Trapeze Hangers (MSS Type 53): Preset to indicated load and limit variability factor to 25 percent to absorb expansion and contraction of piping system from trapeze support.
  8. Constant Supports: For critical piping stress and if necessary to avoid transfer of stress from one support to another support, critical terminal, or connected equipment. Include

auxiliary stops for erection, hydrostatic test, and load-adjustment capability. These supports include the following types:

- a. Horizontal (MSS Type 54): Mounted horizontally.
  - b. Vertical (MSS Type 55): Mounted vertically.
  - c. Trapeze (MSS Type 56): Two vertical-type supports and one trapeze member.
- L. Comply with MSS SP-69 for trapeze pipe hanger selections and applications that are not specified in piping system Sections.
  - M. Comply with MFMA-102 for metal framing system selections and applications that are not specified in piping system Sections.
  - N. Use mechanical-expansion anchors instead of building attachments where required in concrete construction.
  - O. Use pipe positioning systems in pipe spaces behind plumbing fixtures to support supply and waste piping for plumbing fixtures.

### 3.2 HANGER AND SUPPORT INSTALLATION

- A. Steel Pipe Hanger Installation: Comply with MSS SP-69 and MSS SP-89. Install hangers, supports, clamps, and attachments as required to properly support piping from building structure.
- B. Trapeze Pipe Hanger Installation: Comply with MSS SP-69 and MSS SP-89. Arrange for grouping of parallel runs of horizontal piping and support together on field-fabricated trapeze pipe hangers.
  1. Pipes of Various Sizes: Support together and space trapezes for smallest pipe size or install intermediate supports for smaller diameter pipes as specified above for individual pipe hangers.
  2. Field fabricate from ASTM A 36/A 36M, steel shapes selected for loads being supported. Weld steel according to AWS D1.1.
- C. Fiberglass Pipe Hanger Installation: Comply with applicable portions of MSS SP-69 and MSS SP-89. Install hangers and attachments as required to properly support piping from building structure.
- D. Metal Framing System Installation: Arrange for grouping of parallel runs of piping and support together on field-assembled metal framing systems.
- E. Fiberglass Strut System Installation: Arrange for grouping of parallel runs of piping and support together on field-assembled fiberglass struts.
- F. Thermal-Hanger Shield Installation: Install in pipe hanger or shield for insulated piping.
- G. Fastener System Installation:
  1. Install powder-actuated fasteners for use in lightweight concrete or concrete slabs less than 4 inches thick in concrete after concrete is placed and completely cured. Use operators that are licensed by powder-actuated tool manufacturer. Install fasteners according to powder-actuated tool manufacturer's operating manual.
  2. Install mechanical-expansion anchors in concrete after concrete is placed and completely cured. Install fasteners according to manufacturer's written instructions.
- H. Pipe Stand Installation:
  1. Pipe Stand Types except Curb-Mounting Type: Assemble components and mount on smooth roof surface. Do not penetrate roof membrane.
  2. Curb-Mounting-Type Pipe Stands: Assemble components or fabricate pipe stand and mount on permanent, stationary roof curb. Refer to Division 07 Section "Roof Accessories" for curbs.
- I. Pipe Positioning System Installation: Install support devices to make rigid supply and waste piping connections to each plumbing fixture. Refer to Division 22 Section "Plumbing Fixtures" for plumbing fixtures.
- J. Install hangers and supports complete with necessary inserts, bolts, rods, nuts, washers, and other accessories.
- K. Equipment Support Installation: Fabricate from welded-structural-steel shapes.
- L. Install hangers and supports to allow controlled thermal and seismic movement of piping systems, to permit freedom of movement between pipe anchors, and to facilitate action of expansion joints, expansion loops, expansion bends, and similar units.

- M. Install lateral bracing with pipe hangers and supports to prevent swaying.
- N. Install building attachments within concrete slabs or attach to structural steel. Install additional attachments at concentrated loads, including valves, flanges, and strainers, NPS 2-1/2 and larger and at changes in direction of piping. Install concrete inserts before concrete is placed; fasten inserts to forms and install reinforcing bars through openings at top of inserts.
- O. Load Distribution: Install hangers and supports so piping live and dead loads and stresses from movement will not be transmitted to connected equipment.
- P. Pipe Slopes: Install hangers and supports to provide indicated pipe slopes and so maximum pipe deflections allowed by ASME B31.9 (for building services piping) are not exceeded.
- Q. Insulated Piping: Comply with the following:
  - 1. Attach clamps and spacers to piping.
    - a. Piping Operating above Ambient Air Temperature: Clamp may project through insulation.
    - b. Piping Operating below Ambient Air Temperature: Use thermal-hanger shield insert with clamp sized to match OD of insert.
    - c. Do not exceed pipe stress limits according to ASME B31.9 for building services piping.
  - 2. Install MSS SP-58, Type 39, protection saddles if insulation without vapor barrier is indicated. Fill interior voids with insulation that matches adjoining insulation.
    - a. Option: Thermal-hanger shield inserts may be used. Include steel weight-distribution plate for pipe NPS 4 and larger if pipe is installed on rollers.
  - 3. Install MSS SP-58, Type 40, protective shields on cold piping with vapor barrier. Shields shall span an arc of 180 degrees.
    - a. Option: Thermal-hanger shield inserts may be used. Include steel weight-distribution plate for pipe NPS 4 and larger if pipe is installed on rollers.
  - 4. Shield Dimensions for Pipe: Not less than the following:
    - a. NPS 1/4 to NPS 3-1/2: 12 inches long and 0.048 inch thick.
    - b. NPS 4: 12 inches long and 0.06 inch thick.
    - c. NPS 5 and NPS 6: 18 inches long and 0.06 inch thick.
    - d. NPS 8 to NPS 14: 24 inches long and 0.075 inch thick.
    - e. NPS 16 to NPS 24: 24 inch long and 0.105 inch thick.
  - 5. Pipes NPS 8 and Larger: Include wood inserts.
  - 6. Insert Material: Length at least as long as protective shield.
  - 7. Thermal-Hanger Shields: Install with insulation same thickness as piping insulation.

### 3.3 EQUIPMENT SUPPORTS

- A. Fabricate structural-steel stands to suspend equipment from structure overhead or to support equipment above floor.
- B. Grouting: Place grout under supports for equipment and make smooth bearing surface.
- C. Provide lateral bracing, to prevent swaying, for equipment supports.

### 3.4 METAL FABRICATIONS

- A. Cut, drill, and fit miscellaneous metal fabrications for trapeze pipe hangers and equipment supports.
- B. Fit exposed connections together to form hairline joints. Field weld connections that cannot be shop welded because of shipping size limitations.
- C. Field Welding: Comply with AWS D1.1 procedures for shielded metal arc welding, appearance and quality of welds, and methods used in correcting welding work, and with the following:
  - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
  - 2. Obtain fusion without undercut or overlap.
  - 3. Remove welding flux immediately.
  - 4. Finish welds at exposed connections so no roughness shows after finishing and contours of welded surfaces match adjacent contours.

3.5 ADJUSTING

- A. Hanger Adjustments: Adjust hangers to distribute loads equally on attachments and to achieve indicated slope of pipe.
- B. Trim excess length of continuous-thread hanger and support rods to 1-1/2 inches.

3.6 PAINTING

- A. Touch Up: Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.
  - 1. Apply paint by brush or spray to provide minimum dry film thickness of 2.0 mils.
- B. Touch Up: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint on miscellaneous metal are specified in Division 09 painting Sections.
- C. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

END OF SECTION 220529

SECTION 220553 - IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT

**PART 1 - GENERAL**

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
  - 1. Equipment labels.
  - 2. Warning signs and labels.
  - 3. Pipe labels.
  - 4. Stencils.
  - 5. Valve tags.
  - 6. Warning tags.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Samples: For color, letter style, and graphic representation required for each identification material and device.
- C. Equipment Label Schedule: Include a listing of all equipment to be labeled with the proposed content for each label.
- D. Valve numbering scheme.
- E. Valve Schedules: For each piping system to include in maintenance manuals.

1.4 COORDINATION

- A. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.
- B. Coordinate installation of identifying devices with locations of access panels and doors.
- C. Install identifying devices before installing acoustical ceilings and similar concealment.
- D. The new plant piping colors shall match the existing colors, if painted. A schedule shall be posted in the plant that lists paint designations.
- E. All piping and valves should be marked with a stamped or engraved (NOT painted or hand lettered) brass metal tag secured with a flexible chain or cable.

**PART 2 - PRODUCTS**

2.1 EQUIPMENT LABELS

- A. Metal Labels for Equipment:
  - 1. Material and Thickness: Brass, 0.032-inch minimum thickness, and having predrilled or stamped holes for attachment hardware.
  - 2. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.
  - 3. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.
  - 4. Fasteners: Stainless-steel rivets or self-tapping screws.
  - 5. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.
- B. Plastic Labels for Equipment:
  - 1. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/8 inch thick, and having predrilled holes for attachment hardware.
  - 2. Letter Color: White.
  - 3. Background Color: Black.



4. Maximum Temperature: Able to withstand temperatures up to 160 deg F.
  5. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.
  6. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.
  7. Fasteners: Stainless-steel self-tapping screws.
  8. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.
- C. Label Content: Include equipment's Drawing designation or unique equipment number, Drawing numbers where equipment is indicated (plans, details, and schedules), plus the Specification Section number and title where equipment is specified.
- D. Equipment Label Schedule: For each item of equipment to be labeled, on 8-1/2-by-11-inch bond paper. Tabulate equipment identification number and identify Drawing numbers where equipment is indicated (plans, and schedules), plus the Specification Section number and title where equipment is specified. Equipment schedule shall be included in operation and maintenance data.

## 2.2 WARNING SIGNS AND LABELS

- A. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/8 inch thick, and having predrilled holes for attachment hardware.
- B. Letter Color: White.
- C. Background Color: Red.
- D. Maximum Temperature: Able to withstand temperatures up to 160 deg F.
- E. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.
- F. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.
- G. Fasteners: Stainless-steel self-tapping screws.
- H. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.
- I. Label Content: Include caution and warning information, plus emergency notification instructions.
- J. The ceiling grid shall be marked with plaques that designate the location of all isolation and emergency shut-off valves, resettable fire and smoke dampers, and other equipment that requires quick access in an emergency.

## 2.3 PIPE LABELS

- A. All piping shall be appropriately marked by the contractor with a stamped or engraved (NOT painted or hand-lettered) brass metal tag secured with a flexible chain or cable.
- B. General Requirements for Manufactured Pipe Labels: Preprinted, color-coded, with lettering indicating service, and showing flow direction.
- C. Pre-tensioned Pipe Labels: Pre-coiled, semi-rigid plastic formed to cover full circumference of pipe and to attach to pipe without fasteners or adhesive.
- D. Self-Adhesive Pipe Labels: Printed plastic with contact-type, permanent-adhesive backing.
- E. Pipe Label Contents: Include identification of piping service using same designations or abbreviations as used on Drawings, pipe size, and an arrow indicating flow direction.
  1. Flow-Direction Arrows: Integral with piping system service lettering to accommodate both directions, or as separate unit on each pipe label to indicate flow direction.
  2. Lettering Size: At least 1-1/2 inches high.

## 2.4 STENCILS

- A. Stencils: Prepared with letter sizes according to ASME A13.1 for piping; and minimum letter height of 3/4 inch for access panel and door labels, equipment labels, and similar operational instructions.
  1. Stencil Material: Fiberboard or metal.

2. Stencil Paint: Exterior, gloss, acrylic enamel black unless otherwise indicated. Paint may be in pressurized spray-can form.
3. Identification Paint: Exterior, acrylic enamel in colors according to ASME A13.1 unless otherwise indicated.

## 2.5 VALVE TAGS

- A. Valve Tags: Stamped or engraved with 1/4-inch letters for piping system abbreviation and 1/2-inch (13-mm) numbers.
  1. Tag Material: Brass, 0.032-inch Stainless steel, 0.025-inch Aluminum, 0.032-inch or anodized aluminum, 0.032-inch minimum thickness, and having predrilled or stamped holes for attachment hardware.
  2. Fasteners: Brass wire-link or beaded chain; or S-hook wire-link chain beaded chain S-hook.
- B. Valve Schedules: For each piping system, on 8-1/2-by-11-inch bond paper. Tabulate valve number, piping system, system abbreviation (as shown on valve tag), location of valve (room or space), normal-operating position (open, closed, or modulating), and variations for identification. Mark valves for emergency shutoff and similar special uses.
  1. Valve-tag schedule shall be included in operation and maintenance data.

## 2.6 WARNING TAGS

- A. Warning Tags: Preprinted or partially preprinted, accident-prevention tags, of plasticized card stock with matte finish suitable for writing.
  1. Size: 3 by 5-1/4 inches minimum.
  2. Fasteners: Reinforced grommet and wire or string.
  3. Nomenclature: Large-size primary caption such as "DANGER," "CAUTION," or "DO NOT OPERATE."
  4. Color: Yellow background with black lettering.

## PART 3 - EXECUTION

### 3.1 PREPARATION

- A. Clean piping and equipment surfaces of substances that could impair bond of identification devices, including dirt, oil, grease, release agents, and incompatible primers, paints, and encapsulants.

### 3.2 EQUIPMENT LABEL INSTALLATION

- A. Install or permanently fasten labels on each major item of mechanical equipment.
- B. Locate equipment labels where accessible and visible.

### 3.3 PIPE LABEL INSTALLATION

- A. Piping Color-Coding: Painting of piping is specified in Division 09.
- B. Stenciled Pipe Label Option: Stenciled labels may be provided instead of manufactured pipe labels, at Installer's option. Install stenciled pipe labels color-coded bands or rectangles complying with ASME A13.1 on each piping system.
  1. Identification Paint: Use for contrasting background.
  2. Stencil Paint: Use for pipe marking.
- C. Locate pipe labels where piping is exposed or above accessible ceilings in finished spaces; machine rooms; accessible maintenance spaces such as shafts, tunnels, and plenums; and exterior exposed locations as follows:
  1. Near each valve and control device.
  2. Near each branch connection, excluding short takeoffs for fixtures and terminal units. Where flow pattern is not obvious, mark each pipe at branch.
  3. Near penetrations through walls, floors, ceilings, and inaccessible enclosures.
  4. At access doors, manholes, and similar access points that permit view of concealed piping.
  5. Near major equipment items and other points of origination and termination.

6. Spaced at maximum intervals of 50 feet along each run. Reduce intervals to 25 feet in areas of congested piping and equipment.
  7. On piping above removable acoustical ceilings. Omit intermediately spaced labels.
- D. Pipe Label Color Schedule:
1. Low-Pressure, Compressed-Air Piping:
    - a. Background Color: Yellow.
    - b. Letter Color: Black.
  2. Domestic Water Piping:
    - a. Background Color: Blue.
    - b. Letter Color: Black.
  3. Sanitary Waste and Storm Drainage Piping:
    - a. Background Color: Blue.
    - b. Letter Color: White.

### 3.4 VALVE-TAG INSTALLATION

- A. Install tags on valves and control devices in piping systems, except check valves; valves within factory-fabricated equipment units; shutoff valves; faucets; convenience and lawn-watering hose connections; and similar roughing-in connections of end-use fixtures and units. List tagged valves in a valve schedule.
- B. Valve-Tag Application Schedule: Tag valves according to size, shape, and color scheme and with captions similar to those indicated in the following subparagraphs:
1. Valve-Tag Size and Shape:
    - a. Cold Water: 1-1/2 inches, round.
    - b. Hot Water: 1-1/2 inches, round.
    - c. Low-Pressure Compressed Air: 1-1/2 inches, round.
  2. Valve-Tag Color:
    - a. Cold Water: Natural.
    - b. Hot Water: Natural.
    - c. Low-Pressure Compressed Air: Natural.
  3. Letter Color:
    - a. Cold Water: Black.
    - b. Hot Water: Black.
    - c. Low-Pressure Compressed Air: Black.

### 3.5 WARNING-TAG INSTALLATION

- A. Write required message on, and attach warning tags to, equipment and other items where required.

END OF SECTION 220553

## SECTION 220700 - PLUMBING INSULATION

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

#### 1.2 SUMMARY

- A. Section Includes:
  - 1. Insulation Materials:
    - a. Cellular glass.
    - b. Flexible elastomeric.
    - c. Mineral fiber.
    - d. Phenolic.
  - 2. Insulating cements.
  - 3. Adhesives.
  - 4. Mastics.
  - 5. Lagging adhesives.
  - 6. Sealants.
  - 7. Factory-applied jackets.
  - 8. Field-applied jackets.
  - 9. Tapes.
  - 10. Securements.
  - 11. Corner angles.
- B. Related Sections include the following:
  - 1. Division 23 Section "HVAC Insulation."

#### 1.3 SUBMITTALS

- A. Product Data: For each type of product indicated. Include thermal conductivity, thickness, and jackets (both factory and field applied, if any).
- B. LEED Submittal:
  - 1. Product Data for Credit EQ 4.1: For adhesives and sealants, including printed statement of VOC content.
- C. Shop Drawings:
  - 1. Detail application of protective shields, saddles, and inserts at hangers for each type of insulation and hanger.
  - 2. Detail attachment and covering of heat tracing inside insulation.
  - 3. Detail insulation application at pipe expansion joints for each type of insulation.
  - 4. Detail insulation application at elbows, fittings, flanges, valves, and specialties for each type of insulation.
  - 5. Detail removable insulation at piping specialties, equipment connections, and access panels.
  - 6. Detail application of field-applied jackets.
  - 7. Detail application at linkages of control devices.
  - 8. Detail field application for each equipment type.
- D. Samples: For each type of insulation and jacket indicated. Identify each Sample, describing product and intended use. Sample sizes are as follows:
  - 1. Sample Sizes:
    - a. Preformed Pipe Insulation Materials: 12 inches long by NPS 2.
    - b. Sheet Form Insulation Materials: 12 inches square.
    - c. Jacket Materials for Pipe: 12 inches long by NPS 2.
    - d. Sheet Jacket Materials: 12 inches square.

- e. Manufacturer's Color Charts: For products where color is specified, show the full range of colors available for each type of finish material.
- E. Qualification Data: For qualified Installer.
- F. Material Test Reports: From a qualified testing agency acceptable to authorities having jurisdiction indicating, interpreting, and certifying test results for compliance of insulation materials, sealers, attachments, cements, and jackets, with requirements indicated. Include dates of tests and test methods employed.
- G. Field quality-control reports.

#### 1.4 QUALITY ASSURANCE

- A. Installer Qualifications: Skilled mechanics who have successfully completed an apprenticeship program or another craft training program certified by the Department of Labor, Bureau of Apprenticeship and Training.
- B. Fire-Test-Response Characteristics: Insulation and related materials shall have fire-test-response characteristics indicated, as determined by testing identical products per ASTM E 84, by a testing and inspecting agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and adhesive, mastic, tapes, and cement material containers, with appropriate markings of applicable testing and inspecting agency.
  - 1. Insulation Installed Indoors: Flame-spread index of 25 or less, and smoke-developed index of 50 or less.
  - 2. Insulation Installed Outdoors: Flame-spread index of 75 or less, and smoke-developed index of 150 or less.
- C. Mockups: Before installing insulation, build mockups for each type of insulation and finish listed below to demonstrate quality of insulation application and finishes. Build mockups in the location indicated or, if not indicated, as directed by Architect. Use materials indicated for the completed Work.
  - 1. Piping Mockups:
    - a. One 10-foot section of NPS 2 straight pipe.
    - b. One each of a 90-degree threaded, welded, and flanged elbow.
    - c. One each of a threaded, welded, and flanged tee fitting.
    - d. One NPS 2 or smaller valve, and one NPS 2-1/2 or larger valve.
    - e. Four support hangers including hanger shield and insert.
    - f. One threaded strainer and one flanged strainer with removable portion of insulation.
    - g. One threaded reducer and one welded reducer.
    - h. One pressure temperature tap.
    - i. One mechanical coupling.
  - 2. Equipment Mockups: One tank or vessel.
  - 3. For each mockup, fabricate cutaway sections to allow observation of application details for insulation materials, adhesives, mastics, attachments, and jackets.
  - 4. Notify Architect seven days in advance of dates and times when mockups will be constructed.
  - 5. Obtain Architect's approval of mockups before starting insulation application.
  - 6. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
  - 7. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
  - 8. Demolish and remove mockups when directed.

#### 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Packaging: Insulation material containers shall be marked by manufacturer with appropriate ASTM standard designation, type and grade, and maximum use temperature.

1.6 COORDINATION

- A. Coordinate size and location of supports, hangers, and insulation shields specified in Division 22 Section "Hangers and Supports for Plumbing Piping and Equipment."
- B. Coordinate clearance requirements with piping Installer for piping insulation application and equipment Installer for equipment insulation application. Before preparing piping Shop Drawings, establish and maintain clearance requirements for installation of insulation and field-applied jackets and finishes and for space required for maintenance.
- C. Coordinate installation and testing of heat tracing.

1.7 SCHEDULING

- A. Schedule insulation application after pressure testing systems and, where required, after installing and testing heat tracing. Insulation application may begin on segments that have satisfactory test results.
- B. Complete installation and concealment of plastic materials as rapidly as possible in each area of construction.

PART 2 - PRODUCTS

2.1 INSULATION MATERIALS

- A. Manufacturer: Subject to compliance with requirements, provide products of one of the following:
  - 1. Armstrong World Industries, Inc.
  - 2. Certainteed Corp.
  - 3. Knauf Fiber Glass GmbH.
  - 4. Owens-Corning Fiberglas Corp.
  - 5. Pittsburgh Corning Corp.
  - 6. FGH Fabricators, Inc.
- B. Adhesives shall be as manufactured by Minnesota Mining, Arabol, Benjamin-Foster, Armstrong, or Insulmastic, Inc., and shall have the same adhesive properties, fire rating, vapor seal, etc., as the types specified herein, subject to review by the Engineer.

2.2 PIPING INSULATION MATERIALS

- A. Fiberglass Piping Insulation: ASTM C 547, Class 1 unless otherwise indicated. (Indoor locations)
- B. Jackets for Piping Insulation: ASTM C 921, Type I (vapor barrier) for piping with temperatures below ambient, Type II (water vapor permeable) for piping with temperatures above ambient. Type I may be used for all piping at Installers option.
  - 1. Encase pipe fittings insulation with one-piece pre-molded 16 MIL aluminum fitting covers, fastened as per manufacturer's recommendations.
  - 2. Encase exterior piping insulation with 16 MIL aluminum jacket with "Z" closures for weather-proof construction.
- C. Staples, Bands, Wires, and Cement: As recommended by insulation manufacturer for applications indicated.
- D. Adhesives, Sealers, and Protective Finishes: As recommended by insulation manufacturer for applications indicated. White all service jacket "ASJ" vapor barrier with dual self-seal strips for all insulation except flexible unicellular.

2.3 INSULATING CEMENTS

- A. Mineral-Fiber Insulating Cement: Comply with ASTM C 195.
  - 1. Products: Subject to compliance with requirements, provide one of the following:
    - a. Insulco, Division of MFS, Inc.; Triple I.
    - b. P. K. Insulation Mfg. Co., Inc.; Super-Stik.
- B. Expanded or Exfoliated Vermiculite Insulating Cement: Comply with ASTM C 196.
  - 1. Products: Subject to compliance with requirements, provide one of the following:

- a. P. K. Insulation Mfg. Co., Inc.; Thermal-V-Kote.
- C. Mineral-Fiber, Hydraulic-Setting Insulating and Finishing Cement: Comply with ASTM C 449/C 449M.
  - 1. Products: Subject to compliance with requirements, provide one of the following:
    - a. Insulco, Division of MFS, Inc.; SmoothKote.
    - b. P. K. Insulation Mfg. Co., Inc.; PK No. 127, and Quik-Cote.
    - c. Rock Wool Manufacturing Company; Delta One Shot.

#### 2.4 ADHESIVES

- A. Materials shall be compatible with insulation materials, jackets, and substrates and for bonding insulation to itself and to surfaces to be insulated, unless otherwise indicated.
- B. Cellular-Glass, Phenolic, Polyisocyanurate, and Polystyrene Adhesive: Solvent-based resin adhesive, with a service temperature range of minus 75 to plus 300 deg F.
  - 1. Products: Subject to compliance with requirements, provide one of the following:
    - a. Childers Products, Division of ITW; CP-96.
    - b. Foster Products Corporation, H. B. Fuller Company; 81-33.
  - 2. For indoor applications, use adhesive that has a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- C. Flexible Elastomeric and Polyolefin Adhesive: Comply with MIL-A-24179A, Type II, Class I.
  - 1. Products: Subject to compliance with requirements, provide one of the following:
    - a. Aeroflex USA Inc.; Aero seal.
    - b. Armacell LCC; 520 Adhesive.
    - c. Foster Products Corporation, H. B. Fuller Company; 85-75.
    - d. RBX Corporation; Rubatex Contact Adhesive.
  - 2. For indoor applications, use adhesive that has a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- D. Mineral-Fiber Adhesive: Comply with MIL-A-3316C, Class 2, Grade A.
  - 1. Products: Subject to compliance with requirements, provide one of the following:
    - a. Childers Products, Division of ITW; CP-82.
    - b. Foster Products Corporation, H. B. Fuller Company; 85-20.
    - c. ITW TACC, Division of Illinois Tool Works; S-90/80.
    - d. Marathon Industries, Inc.; 225.
    - e. Mon-Eco Industries, Inc.; 22-25.
  - 2. For indoor applications, use adhesive that has a VOC content of 80 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- E. Polystyrene Adhesive: Solvent- or water-based, synthetic resin adhesive with a service temperature range of minus 20 to plus 140 deg F.
  - 1. Products: Subject to compliance with requirements, provide one of the following:
    - a. Childers Products, Division of ITW; CP-96.
    - b. Foster Products Corporation, H. B. Fuller Company; 97-13.
- F. ASJ Adhesive, and FSK and PVDC Jacket Adhesive: Comply with MIL-A-3316C, Class 2, Grade A for bonding insulation jacket lap seams and joints.
  - 1. Products: Subject to compliance with requirements, provide one of the following:
    - a. Childers Products, Division of ITW; CP-82.
    - b. Foster Products Corporation, H. B. Fuller Company; 85-20.
    - c. ITW TACC, Division of Illinois Tool Works; S-90/80.
    - d. Marathon Industries, Inc.; 225.
    - e. Mon-Eco Industries, Inc.; 22-25.
  - 2. For indoor applications, use adhesive that has a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- G. PVC Jacket Adhesive: Compatible with PVC jacket.
  - 1. Products: Subject to compliance with requirements, provide one of the following:
    - a. Dow Chemical Company (The); 739, Dow Silicone.
    - b. Johns-Manville; Zeston Perma-Weld, CEEL-TITE Solvent Welding Adhesive.
    - c. P.I.C. Plastics, Inc.; Welding Adhesive.

#### PLUMBING INSULATION

- d. Speedline Corporation; Speedline Vinyl Adhesive.
2. For indoor applications, use adhesive that has a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

## 2.5 MASTICS

- A. Materials shall be compatible with insulation materials, jackets, and substrates; comply with MIL-C-19565C, Type II.
- B. Vapor-Barrier Mastic: Water based; suitable for indoor and outdoor use on below ambient services.
  1. Products: Subject to compliance with requirements, provide one of the following:
    - a. Childers Products, Division of ITW; CP-35.
    - b. Foster Products Corporation, H. B. Fuller Company; 30-90.
    - c. ITW TACC, Division of Illinois Tool Works; CB-50.
    - d. Marathon Industries, Inc.; 590.
    - e. Mon-Eco Industries, Inc.; 55-40.
    - f. Vimasco Corporation; 749.
  2. Water-Vapor Permeance: ASTM E 96, Procedure B, 0.013 perm at 43-mil dry film thickness.
  3. Service Temperature Range: Minus 20 to plus 180 deg F.
  4. Solids Content: ASTM D 1644, 59 percent by volume and 71 percent by weight.
  5. Color: White.
- C. Vapor-Barrier Mastic: Solvent based; suitable for indoor use on below ambient services.
  1. Products: Subject to compliance with requirements, provide one of the following:
    - a. Childers Products, Division of ITW; CP-30.
    - b. Foster Products Corporation, H. B. Fuller Company; 30-35.
    - c. ITW TACC, Division of Illinois Tool Works; CB-25.
    - d. Marathon Industries, Inc.; 501.
    - e. Mon-Eco Industries, Inc.; 55-10.
  2. Water-Vapor Permeance: ASTM F 1249, 0.05 perm at 35-mil dry film thickness.
  3. Service Temperature Range: 0 to 180 deg F.
  4. Solids Content: ASTM D 1644, 44 percent by volume and 62 percent by weight.
  5. Color: White.
- D. Vapor-Barrier Mastic: Solvent based; suitable for outdoor use on below ambient services.
  1. Products: Subject to compliance with requirements, provide the following:
    - a. Childers Products, Division of ITW; Encacel.
    - b. Foster Products Corporation, H. B. Fuller Company; 60-95/60-96.
    - c. Marathon Industries, Inc.; 570.
    - d. Mon-Eco Industries, Inc.; 55-70.
  2. Water-Vapor Permeance: ASTM F 1249, 0.05 perm at 30-mil dry film thickness.
  3. Service Temperature Range: Minus 50 to plus 220 deg F.
  4. Solids Content: ASTM D 1644, 33 percent by volume and 46 percent by weight.
  5. Color: White.
- E. Breather Mastic: Water based; suitable for indoor and outdoor use on above ambient services.
  1. Products: Subject to compliance with requirements, provide the following:
    - a. Childers Products, Division of ITW; CP-10.
    - b. Foster Products Corporation, H. B. Fuller Company; 35-00.
    - c. ITW TACC, Division of Illinois Tool Works; CB-05/15.
    - d. Marathon Industries, Inc.; 550.
    - e. Mon-Eco Industries, Inc.; 55-50.
    - f. Vimasco Corporation; WC-1/WC-5.
  2. Water-Vapor Permeance: ASTM F 1249, 3 perms at 0.0625-inch dry film thickness.
  3. Service Temperature Range: Minus 20 to plus 200 deg F.
  4. Solids Content: 63 percent by volume and 73 percent by weight.
  5. Color: White.



- 2.6 PLUMBING PIPING SYSTEM INSULATION
- A. Insulation Omitted: Omit insulation on chrome-plated exposed piping (except for handicapped fixtures), air chambers, unions, strainers, check valves, balance cocks, flow regulators, buried piping, fire protection piping, and pre-insulated equipment.
- 2.7 EQUIPMENT INSULATION SCHEDULE
- A. Insulation materials and thicknesses are identified below. If more than one material is listed for a type of equipment, selection from materials listed is Contractor's option.
- B. Insulate indoor and outdoor equipment in paragraphs below that is not factory insulated.
1. Cellular Glass: 2 inches thick.
  2. Phenolic: 1 inch thick.
- C. Domestic cold water, and domestic hot-water hydro-pneumatic tank insulation shall be one of the following:
1. Cellular Glass: 1-1/2 inches thick.
  2. Flexible Elastomeric: 1 inch thick.
  3. Mineral-Fiber Pipe and Tank: 1 inch thick.
- D. Domestic hot-water storage tank insulation shall be one of the following, of thickness to provide an R-value of 12.5:
1. Cellular glass.
  2. Mineral-fiber pipe and tank.
  3. Phenolic.
- 2.8 PIPING INSULATION SCHEDULE, GENERAL
- A. Acceptable preformed pipe and tubular insulation materials and thicknesses are identified for each piping system and pipe size range. If more than one material is listed for a piping system, selection from materials listed is Contractor's option.
- B. Items Not Insulated: Unless otherwise indicated, do not install insulation on the following:
1. Drainage piping located in crawl spaces.
  2. Underground piping.
  3. Chrome-plated pipes and fittings unless there is a potential for personnel injury.
- 2.9 INDOOR PIPING INSULATION SCHEDULE
- A. Domestic Cold Water:
1. NPS 1 and Smaller: Insulation shall be one of the following:
    - a. Cellular Glass: 1-1/2 inches thick.
    - b. Flexible Elastomeric: 1 inch thick.
  2. NPS 1-1/4 and Larger: Insulation shall be one of the following:
    - a. Cellular Glass: 1-1/2 inches thick.
    - b. Flexible Elastomeric: 1 inch thick.
- B. Domestic Hot water and Re-circulated Hot Water:
1. NPS 1-1/4 and Smaller: Insulation shall be one of the following:
    - a. Cellular Glass: 1-1/2 inches thick.
    - b. Flexible Elastomeric: 1 inch thick.
  2. NPS 1-1/2 and Larger: Insulation shall be one of the following:
    - a. Cellular Glass: 1-1/2 inches thick.
    - b. Flexible Elastomeric: 1 inch thick.
- C. Storm water and Overflow:
1. All Pipe Sizes: Insulation shall be one of the following:
    - a. Cellular Glass: 1-1/2 inches thick.
    - b. Flexible Elastomeric: 1 inch thick.
- D. Roof Drain and Overflow Drain Bodies:
1. All Pipe Sizes: Insulation shall be one of the following:
    - a. Cellular Glass: 1-1/2 inches thick.
    - b. Flexible Elastomeric: 1 inch thick.

- E. Exposed Sanitary Drains, Domestic Water, Domestic Hot Water, and Stops for Plumbing Fixtures for People with Disabilities:
    - 1. All Pipe Sizes: Insulation shall be one of the following:
      - a. Flexible Elastomeric: 3/4 inch thick.
      - b. Polyolefin: 3/4 inch thick.
  - F. Condensate and Equipment Drain Water below 60 Deg F:
    - 1. All Pipe Sizes: Insulation shall be one of the following:
      - a. Cellular Glass: 1-1/2 inches thick.
      - b. Flexible Elastomeric: 1 inch thick.
  - G. Floor Drains, Traps, and Sanitary Drain Piping within 10 Feet of Drain Receiving Condensate and Equipment Drain Water below 60 Deg F:
    - 1. All Pipe Sizes: Insulation shall be one of the following:
      - a. Cellular Glass: 1-1/2 inches thick.
      - b. Flexible Elastomeric: 1 inch thick.
- 2.10 INDOOR, FIELD-APPLIED JACKET SCHEDULE
- A. Install jacket over insulation material. For insulation with factory-applied jacket, install the field-applied jacket over the factory-applied jacket.
  - B. If more than one material is listed, selection from materials listed is Contractor's option.
  - C. Equipment, Exposed, up to 48 Inches in Diameter or with Flat Surfaces up to 72 Inches:
  - D. Piping, Exposed:
    - 1. PVC, Color-Coded by System: 20 mils 30 mils thick.
    - 2. Aluminum, Smooth 0.024 inch thick.
- 2.11 OUTDOOR, FIELD-APPLIED JACKET SCHEDULE
- A. Install jacket over insulation material. For insulation with factory-applied jacket, install the field-applied jacket over the factory-applied jacket.
  - B. If more than one material is listed, selection from materials listed is Contractor's option.
  - C. Equipment, Exposed, up to 48 Inches in Diameter or with Flat Surfaces up to 72 Inches:
    - 1. Aluminum, Smooth with Z-Shaped Locking Seam: 0.024 inch thick.
  - D. Piping, Exposed:
    - 1. Aluminum, Smooth with Z-Shaped Locking Seam: 0.024 inch thick.
- 2.12 UNDERGROUND, FIELD-INSTALLED INSULATION JACKET
- A. For underground direct-buried piping applications, install underground direct-buried jacket over insulation material.

END OF SECTION 220700

## SECTION 22 1116 - DOMESTIC WATER PIPING

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

#### 1.2 SUMMARY

- A. Section Includes:
  - 1. Under-building slab and above ground domestic water pipes, tubes, fittings, and specialties inside the building.
  - 2. Encasement for piping.
  - 3. Specialty valves.
  - 4. Flexible connectors.
  - 5. Water meters.
  - 6. Escutcheons.
  - 7. Sleeves and sleeve seals.
  - 8. Wall penetration systems.

#### 1.3 SUBMITTALS

- A. Product Data: For the following products:
  - 1. Specialty valves.
  - 2. Transition fittings.
  - 3. Dielectric fittings.
  - 4. Flexible connectors.
  - 5. Water meters.
  - 6. Backflow preventers and vacuum breakers.
  - 7. Escutcheons.
  - 8. Sleeves and sleeve seals.
  - 9. Water penetration systems.
- B. Water Samples: Specified in "Cleaning" Article.
- C. Coordination Drawings: For piping in equipment rooms and other congested areas, drawn to scale, on which the following items are shown and coordinated with each other, using input from Installers of the items involved:
  - 1. Fire-suppression-water piping.
  - 2. Domestic water piping.
  - 3. Compressed air piping.
  - 4. HVAC hydronic piping.
- D. Field quality-control reports.

#### 1.4 QUALITY ASSURANCE

- A. Piping materials shall bear label, stamp, or other markings of specified testing agency.
- B. Comply with NSF 14 for plastic, potable domestic water piping and components. Include marking "NSF-pw" on piping.
- C. Comply with NSF 61 for potable domestic water piping and components.

#### 1.5 PROJECT CONDITIONS

- A. Interruption of Existing Water Service: Do not interrupt water service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary water service according to requirements indicated:
  - 1. Notify Architect and Construction Manager no fewer than two days in advance of proposed interruption of water service.

2. Do not proceed with interruption of water service without Architect's and Construction Manager's written permission.

## 1.6 COORDINATION

- A. Coordinate sizes and locations of concrete bases with actual equipment provided.

## PART 2 - PRODUCTS

### 2.1 PIPING MATERIALS

- A. Comply with requirements in "Piping Schedule" Article for applications of pipe, tube, fitting materials, and joining methods for specific services, service locations, and pipe sizes.

### 2.2 COPPER TUBE AND FITTINGS

- A. Hard Copper Tube: ASTM B 88, Type L water tube, drawn temper, copper pipe made of deoxidized copper (99.9% pure) shall be used for all domestic cold hot water and hot water return piping. No pipe smaller than three-fourths inches (3/4") shall be used in this project except at local connections.
  1. Cast-Copper Solder-Joint Fittings: ASME B16.18, pressure fittings.
  2. Wrought-Copper Solder-Joint Fittings: ASME B16.22, wrought-copper pressure fittings.
  3. Bronze Flanges: ASME B16.24, Class 150, with solder-joint ends.
  4. Copper Unions: MSS SP-123, cast-copper-alloy, hexagonal-stock body, with ball-and-socket, metal-to-metal seating surfaces, and solder-joint or threaded ends.

### 2.3 DUCTILE-IRON PIPE AND FITTINGS

- A. Mechanical-Joint, Ductile-Iron Pipe: AWWA C151, with mechanical-joint bell and plain spigot end unless grooved or flanged ends are indicated.
  1. Standard-Pattern, Mechanical-Joint Fittings: AWWA C110, ductile or gray iron.
  2. Compact-Pattern, Mechanical-Joint Fittings: AWWA C153, ductile iron.
    - a. Glands, Gaskets, and Bolts: AWWA C111, ductile- or gray-iron glands, rubber gaskets, and steel bolts.
- B. Push-on-Joint, Ductile-Iron Pipe: AWWA C151, with push-on-joint bell and plain spigot end unless grooved or flanged ends are indicated.
  1. Standard-Pattern, Push-on-Joint Fittings: AWWA C110, ductile or gray iron.
    - a. Gaskets: AWWA C111, rubber.
  2. Compact-Pattern, Push-on-Joint Fittings: AWWA C153, ductile iron.
    - a. Gaskets: AWWA C111, rubber.
- C. Plain-End, Ductile-Iron Pipe: AWWA C151.
  1. Grooved-Joint, Ductile-Iron-Pipe Appurtenances:
    - a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      - 1) Anvil International.
      - 2) Shurjoint Piping Products.
      - 3) Star Pipe Products.
    - b. Grooved-End, Ductile-Iron Fittings: ASTM A 47/A 47M, malleable-iron castings or ASTM A 536, ductile-iron castings with dimensions matching pipe.
- c. Grooved-End, Ductile-Iron-Pipe Couplings: AWWA C606 for ductile-iron-pipe dimensions. Include ferrous housing sections, EPDM-rubber gaskets suitable for hot and cold water, and bolts and nuts.

### 2.4 PIPING JOINING MATERIALS

- A. Pipe-Flange Gasket Materials: AWWA C110, rubber, flat face, 1/8 inch thick or ASME B16.21, nonmetallic and asbestos free, unless otherwise indicated; full-face or ring type unless otherwise indicated.
- B. Metal, Pipe-Flange Bolts and Nuts: ASME B18.2.1, carbon steel unless otherwise indicated.
- C. Solder Filler Metals: ASTM B 32, lead-free alloys. Include water-flushable flux according to ASTM B 813.
- D. Brazing Filler Metals: AWS A5.8/A5.8M, BCuP Series, copper-phosphorus alloys for general-duty brazing unless otherwise indicated.

- E. Solvent Cements for Joining CPVC Piping and Tubing: ASTM F 493.
  - 1. Use CPVC solvent cement that has a VOC content of 490 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
  - 2. Use adhesive primer that has a VOC content of 550 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- F. Solvent Cements for Joining PVC Piping: ASTM D 2564. Include primer according to ASTM F 656.
  - 1. Use PVC solvent cement that has a VOC content of 510 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
  - 2. Use adhesive primer that has a VOC content of 550 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- G. Plastic, Pipe-Flange Gaskets, Bolts, and Nuts: Type and material recommended by piping system manufacturer unless otherwise indicated.

## 2.5 REQUIREMENTS OF INTERIOR WATER PIPING SYSTEMS

- 1. All piping shall have reducing fittings used for reducing or increasing where any change in the pipe sizes occurs. No bushing of any nature shall be allowed in piping.
- 2. All exposed chrome plated, polished or enameled connections from fixtures shall be put up with special care, showing no tool marks or threads at fittings, and supported by neat racks or hangers with round head screws of same material and finish.
- 3. Wade Shokstop, or approved equal, sealed air chambers shall be provided in all water branches to fixtures, sized in accordance with manufacturer's recommendations, concealed, accessible, and located so as to protect each group of plumbing fixtures.
- 4. The fabrication of copper pipe and fittings shall in every detail conform to the recommendations and instructions of the fitting manufacturer. The tools used shall be the tools adapted to that specific purpose

## 2.6 SPECIALTY VALVES

- A. Comply with requirements in Division 22 Section "General-Duty Valves for Plumbing Piping" for general-duty metal valves.
- B. Comply with requirements in Division 22 Section "Domestic Water Piping Specialties" for balancing valves, drain valves, backflow preventers, and vacuum breakers.

## 2.7 TRANSITION FITTINGS

- A. General Requirements:
  - 1. Same size as pipes to be joined.
  - 2. Pressure rating at least equal to pipes to be joined.
  - 3. End connections compatible with pipes to be joined.
- B. Fitting-Type Transition Couplings: Manufactured piping coupling or specified piping system fitting.
- C. Sleeve-Type Transition Coupling: AWWA C219.
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Cascade Waterworks Manufacturing.
    - b. Dresser, Inc.; Dresser Piping Specialties.
    - c. Ford Meter Box Company, Inc. (The).
    - d. JCM Industries.
    - e. Romac Industries, Inc.
    - f. Smith-Blair, Inc; a Sensus company.
    - g. Viking Johnson; c/o Mueller Co.
- D. Plastic-to-Metal Transition Fittings:
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Charlotte Pipe and Foundry Company.
    - b. Harvel Plastics, Inc.
    - c. Spears Manufacturing Company.

2. Description: CPVC or PVC one-piece fitting with manufacturer's Schedule 80 equivalent dimensions; one end with threaded brass insert and one solvent-cement-socket or threaded end.

## 2.8 DIELECTRIC FITTINGS

- A. General Requirements: Assembly of copper alloy and ferrous materials or ferrous material body with separating nonconductive insulating material suitable for system fluid, pressure, and temperature.
- B. Dielectric Unions:
  1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Capitol Manufacturing Company.
    - b. Central Plastics Company.
    - c. EPCO Sales, Inc.
    - d. Hart Industries International, Inc.
    - e. Watts Regulator Co.; a division of Watts Water Technologies, Inc.
    - f. Zurn Plumbing Products Group; Wilkins Water Control Products.
  2. Description:
    - a. Pressure Rating: 150 psig at 180 deg F.
    - b. End Connections: Solder-joint copper alloy and threaded ferrous.
- C. Dielectric Flanges:
  1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Capitol Manufacturing Company.
    - b. Central Plastics Company.
    - c. EPCO Sales, Inc.
    - d. Watts Regulator Co.; a division of Watts Water Technologies, Inc.
  2. Description:
    - a. Factory-fabricated, bolted, companion-flange assembly.
    - b. Pressure Rating: 150 psig.
    - c. End Connections: Solder-joint copper alloy and threaded ferrous; threaded solder-joint copper alloy and threaded ferrous.
- D. Dielectric-Flange Kits:
  1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Advance Products & Systems, Inc.
    - b. Calpico, Inc.
    - c. Central Plastics Company.
    - d. Pipeline Seal and Insulator, Inc.
  2. Description:
    - a. Non-conducting materials for field assembly of companion flanges.
    - b. Pressure Rating: 150 psig.
    - c. Gasket: Neoprene or phenolic.
    - d. Bolt Sleeves: Phenolic or polyethylene.
    - e. Washers: Phenolic with steel backing washers.
- E. Dielectric Couplings:
  1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Calpico, Inc.
    - b. Lochinvar Corporation.
  2. Description:
    - a. Galvanized-steel coupling.
    - b. Pressure Rating: 300 psig at 225 deg F.
    - c. End Connections: Female threaded.
    - d. Lining: Inert and noncorrosive, thermoplastic.
- F. Dielectric Nipples:

(PWE)Teague Administration Building Interior Renovations  
City of Houston – General Services Department Design and  
Construction Division

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. Perfection Corporation; a subsidiary of American Meter Company.
  - b. Precision Plumbing Products, Inc.
2. Description:
  - a. Electroplated steel nipple complying with ASTM F 1545.
  - b. Pressure Rating: 300 psig at 225 deg F.
  - c. End Connections: Male threaded or grooved.
  - d. Lining: Inert and noncorrosive, propylene.

2.9 FLEXIBLE CONNECTORS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  1. Flex-Hose Co., Inc.
  2. Flexicraft Industries.
  3. Flex Pression, Ltd.
  4. Flex-Weld, Inc.
  5. Metraflex, Inc.
- B. Bronze-Hose Flexible Connectors: Corrugated-bronze tubing with bronze wire-braid covering and ends brazed to inner tubing.
  1. Working-Pressure Rating: Minimum 200 psig.
  2. End Connections NPS 2 and Smaller: Threaded copper pipe or plain-end copper tube.
  3. End Connections NPS 2-1/2 and Larger: Flanged copper alloy.
- C. Stainless-Steel-Hose Flexible Connectors: Corrugated-stainless-steel tubing with stainless-steel wire-braid covering and ends welded to inner tubing.
  1. Working-Pressure Rating: Minimum 200 psig.
  2. End Connections NPS 2 and Smaller: Threaded steel-pipe nipple.
  3. End Connections NPS 2-1/2 and Larger: Flanged steel nipple.

2.10 ESCUTCHEONS

- A. General: Manufactured ceiling, floor, and wall escutcheons and floor plates.
- B. Split Casting, Cast Brass: Polished, chrome-plated or rough-brass finish with concealed hinge and setscrew.
- C. Split-Casting Floor Plates: Cast brass with concealed hinge.

2.11 SLEEVES

- A. Galvanized-Steel-Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, zinc-coated, with plain ends.
- B. Stack Sleeve Fittings: Manufactured, cast-iron sleeve with integral clamping flange. Include clamping ring and bolts and nuts for membrane flashing.
  1. Underdeck Clamp: Clamping ring with setscrews.

2.12 SLEEVE SEALS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  1. Advance Products & Systems, Inc.
  2. Calpico, Inc.
  3. Metraflex, Inc.
  4. Pipeline Seal and Insulator, Inc.
- B. Description: Modular sealing element unit, designed for field assembly, used to fill annular space between pipe and sleeve.
  1. Sealing Elements: EPDM-rubber interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe.
  2. Pressure Plates: Stainless steel.
  3. Connecting Bolts and Nuts: Stainless steel of length required to secure pressure plates to sealing elements.

2.13 VALVE BOXES

- A. For each underground valve installed by the Contractor, the Contractor shall provide and install a two-piece, screw adjustable type valve box. These valve boxes shall be designed for heavy roadway service and they shall have a deep socket type of cover which prevents their being accidentally knocked out of position.
- B. The word "WATER" shall appear on each cover. The installation of these members shall be such that by the use of the adjustable screw type bodies the tops are just flush with the finished grade. These valve boxes shall be Tyler Pipe Industries #6850, or approved equal.

2.14 WALL PENETRATION SYSTEMS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. SIGMA.
- B. Description: Wall-sleeve assembly, consisting of housing and gland, gaskets, and pipe sleeve.
  - 1. Carrier-Pipe Deflection: Up to 5 percent without leakage.
  - 2. Housing: Ductile-iron casting with hub, waterstop, anchor ring, and locking devices. Include gland, bolts, and nuts.
  - 3. Housing-to-Sleeve Gasket: EPDM rubber.
  - 4. Housing-to-Carrier-Pipe Gasket: AWWA C111, EPDM rubber.
  - 5. Pipe Sleeve: ASTM A 53/A 53M, Schedule 40, zinc-coated steel pipe.

**PART 3 - EXECUTION**

3.1 PIPING INSTALLATION

- A. Drawing plans, schematics, and diagrams indicate general location and arrangement of domestic water piping. Indicated locations and arrangements are used to size pipe and calculate friction loss, expansion, and other design considerations. Install piping as indicated unless deviations to layout are approved on Coordination Drawings.
- B. Backflow prevention valves shall be installed on all chilled and hot water make-up lines.
- C. Backflow prevention valves shall be installed on all irrigation systems per code.
- D. Double-check valves are not an acceptable alternate to backflow preventers.
- E. Install copper tubing under building slab according to CDA's "Copper Tube Handbook."
- F. Install ductile-iron piping under building slab with restrained joints according to AWWA C600 and AWWA M41.
- G. Install underground ductile-iron pipe in PE encasement according to ASTM A 674 or AWWA C105.
- H. Install shutoff valve, hose-end drain valve, strainer, pressure gage, and test tee with valve, inside the building at each domestic water service entrance. Comply with requirements in Division 22 Section "Meters and Gages for Plumbing Piping" for pressure gages and Division 22 Section "Domestic Water Piping Specialties" for drain valves and strainers.
- I. Install shutoff valve immediately upstream of each dielectric fitting.
- J. Install water-pressure-reducing valves downstream from shutoff valves. Comply with requirements in Division 22 Section "Domestic Water Piping Specialties" for pressure-reducing valves.
- K. Install domestic water piping level and plumb.
- L. Rough-in domestic water piping for water-meter installation according to utility company's requirements.
- M. Install piping concealed from view and protected from physical contact by building occupants unless otherwise indicated and except in equipment rooms and service areas.
- N. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.
- O. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal, and coordinate with other services occupying that space.
- P. Install piping adjacent to equipment and specialties to allow service and maintenance.
- Q. Install piping to permit valve servicing.



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- R. Install nipples, unions, special fittings, and valves with pressure ratings the same as or higher than system pressure rating used in applications below unless otherwise indicated.
- S. Install piping free of sags and bends.
- T. Install fittings for changes in direction and branch connections.
- U. Install PEX piping with loop at each change of direction of more than 90 degrees.
- V. Install unions in copper tubing at final connection to each piece of equipment, machine, and specialty.
- W. Install pressure gages on suction and discharge piping from each plumbing pump and packaged booster pump. Comply with requirements in Division 22 Section "Meters and Gages for Plumbing Piping" for pressure gages.
- X. Install thermostats in hot-water circulation piping. Comply with requirements in Division 22 Section "Domestic Water Pumps" for thermostats.
- Y. Install thermometers on inlet and outlet piping from each water heater. Comply with requirements in Division 22 Section "Meters and Gages for Plumbing Piping" for thermometers.
- Z. Cast iron, glass, and galvanized pipes are not acceptable.

3.2 JOINT CONSTRUCTION

- A. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.
- B. Remove scale, slag, dirt, and debris from inside and outside of pipes, tubes, and fittings before assembly.
- C. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:
  - 1. Apply appropriate tape or thread compound to external pipe threads.
  - 2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged.
- D. Brazed Joints: Join copper tube and fittings according to CDA's "Copper Tube Handbook," "Brazed Joints" Chapter.
- E. Soldered Joints: Apply ASTM B 813, water-flushable flux to end of tube. Join copper tube and fittings according to ASTM B 828 or CDA's "Copper Tube Handbook."
- F. Copper-Tubing, Push-on Joints: Clean end of tube. Measure insertion depth with manufacturer's depth gage. Join copper tube and push-on-joint fittings by inserting tube to measured depth.
- G. Copper-Tubing Grooved Joints: Roll groove end of tube. Assemble coupling with housing, gasket, lubricant, and bolts. Join copper tube and grooved-end fittings according to AWWA C606 for roll-grooved joints.
- H. Ductile-Iron-Piping Grooved Joints: Cut groove end of pipe. Assemble coupling with housing, gasket, lubricant, and bolts. Join ductile-iron pipe and grooved-end fittings according to AWWA C606 for ductile-iron-pipe, cut-grooved joints.
- I. Steel-Piping Grooved Joints: Cut or roll groove end of pipe. Assemble coupling with housing, gasket, lubricant, and bolts. Join steel pipe and grooved-end fittings according to AWWA C606 for steel-pipe grooved joints.
- J. Flanged Joints: Select appropriate asbestos-free, nonmetallic gasket material in size, type, and thickness suitable for domestic water service. Join flanges with gasket and bolts according to ASME B31.9.
- K. Dissimilar-Material Piping Joints: Make joints using adapters compatible with materials of both piping systems.

3.3 VALVE INSTALLATION

- A. General-Duty Valves: Comply with requirements in Division 22 Section "General-Duty Valves for Plumbing Piping" for valve installations.
- B. Shut off valves shall be installed on all branch lines. All toilet rooms, any room with multiple fixtures (i.e. science labs), coffee bars, drinking fountains, and any exterior hose bib shall have their own isolation valves.
- C. All valves shall be accessible to Owner.
- D. Install shutoff valve close to water main on each branch and riser serving plumbing fixtures or equipment, on each water supply to equipment, and on each water supply to plumbing fixtures that

do not have supply stops. Use ball or gate valves for piping NPS 2 and smaller. Use butterfly or gate valves for piping NPS 2-1/2 and larger.

- E. Install drain valves for equipment at base of each water riser, at low points in horizontal piping, and where required to drain water piping. Drain valves are specified in Division 22 Section "Domestic Water Piping Specialties."
  - 1. Hose-End Drain Valves: At low points in water mains, risers, and branches.
  - 2. Stop-and-Waste Drain Valves: Instead of hose-end drain valves where indicated.
- F. Install balancing valve in each hot-water circulation return branch and discharge side of each pump and circulator. Set balancing valves partly open to restrict but not stop flow. Use ball valves for piping NPS 2 and smaller and butterfly valves for piping NPS 2-1/2 and larger. Comply with requirements in Division 22 Section "Domestic Water Piping Specialties" for balancing valves.
- G. Install calibrated balancing valves in each hot-water circulation return branch and discharge side of each pump and circulator. Set calibrated balancing valves partly open to restrict but not stop flow. Comply with requirements in Division 22 Section "Domestic Water Piping Specialties" for calibrated balancing valves.

### 3.4 FLEXIBLE CONNECTOR INSTALLATION

- A. Install flexible connectors in suction and discharge piping connections to each domestic water pump.
- B. Install bronze-hose flexible connectors in copper domestic water tubing.
- C. Install stainless-steel-hose flexible connectors in steel domestic water piping.

### 3.5 WATER METER INSTALLATION

- A. Rough-in domestic water piping according to utility company's requirements.
- B. Water meters will be furnished and installed by utility company.
- C. Install water meters according to AWWA M6, utility company's requirements, and the following:
- D. Install displacement-type water meters with shutoff valve on water-meter inlet. Install valve on water-meter outlet and valved bypass around meter unless prohibited by authorities having jurisdiction.
- E. Install turbine-type water meters with shutoff valve on water-meter inlet. Install valve on water-meter outlet and valved bypass around meter unless prohibited by authorities having jurisdiction.
- F. Install compound-type water meters with shutoff valves on water-meter inlet and outlet and on valved bypass around meter. Support meters, valves, and piping on brick or concrete piers.
- G. Install fire-service water meters with shutoff valves on water-meter inlet and outlet and on full-size valved bypass around meter. Support meter, valves, and piping on brick or concrete piers.
- H. Install remote registration system according to standards of utility company and of authorities having jurisdiction.

### 3.6 HANGER AND SUPPORT INSTALLATION

- A. Comply with requirements in Division 22 Section "Vibration and Seismic Controls for Plumbing Piping and Equipment" for seismic-restraint devices.
- B. Comply with requirements in Division 22 Section "Hangers and Supports for Plumbing Piping and Equipment" for pipe hanger and support products and installation.
  - 1. Vertical Piping: MSS Type 8 or 42, clamps.
  - 2. Individual, Straight, Horizontal Piping Runs:
    - a. 100 Feet and Less: MSS Type 1, adjustable, steel clevis hangers.
    - b. Longer Than 100 Feet: MSS Type 43, adjustable roller hangers.
    - c. Longer Than 100 Feet If Indicated: MSS Type 49, spring cushion rolls.
  - 3. Multiple, Straight, Horizontal Piping Runs 100 Feet or Longer: MSS Type 44, pipe rolls. Support pipe rolls on trapeze.
  - 4. Base of Vertical Piping: MSS Type 52, spring hangers.
- C. Support vertical piping and tubing at base and at each floor.
- D. Rod diameter may be reduced one size for double-rod hangers, to a minimum of 3/8 inch.
- E. Install hangers for copper tubing with the following maximum horizontal spacing and minimum rod diameters:

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1. NPS 3/4 and Smaller: 60 inches with 3/8-inch rod.
  2. NPS 1 and NPS 1-1/4: 72 inches with 3/8-inch rod.
  3. NPS 1-1/2 and NPS 2: 96 inches with 3/8-inch rod.
  4. NPS 2-1/2: 108 inches with 1/2-inch rod.
  5. NPS 3 to NPS 5: 10 feet with 1/2-inch rod.
  6. NPS 6: 10 feet with 5/8-inch rod.
- F. Install supports for vertical copper tubing every 10 feet.

3.7 CONNECTIONS

- A. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Install piping adjacent to equipment and machines to allow service and maintenance.
- C. Connect domestic water piping to exterior water-service piping. Use transition fitting to join dissimilar piping materials.
- D. Connect domestic water piping to water-service piping with shutoff valve; extend and connect to the following:
  1. Water Heaters: Cold-water inlet and hot-water outlet piping in sizes indicated, but not smaller than sizes of water heater connections.
  2. Plumbing Fixtures: Cold- and hot-water supply piping in sizes indicated, but not smaller than required by plumbing code. Comply with requirements in Division 22 plumbing fixture Sections for connection sizes.
  3. Equipment: Cold- and hot-water supply piping as indicated, but not smaller than equipment connections. Provide shutoff valve and union for each connection. Use flanges instead of unions for NPS 2-1/2 and larger.

3.8 IDENTIFICATION

- A. Identify system components. Comply with requirements in Division 22 Section "Identification for Plumbing Piping and Equipment" for identification materials and installation.
- B. Label pressure piping with system operating pressure.

3.9 FIELD QUALITY CONTROL

- A. Perform tests and inspections.
- B. Piping Inspections:
  1. Do not enclose, cover, or put piping into operation until it has been inspected and approved by authorities having jurisdiction.
  2. During installation, notify authorities having jurisdiction at least one day before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction:
    - a. Roughing-in Inspection: Arrange for inspection of piping before concealing or closing-in after roughing-in and before setting fixtures.
    - b. Final Inspection: Arrange final inspection for authorities having jurisdiction to observe tests specified below and to ensure compliance with requirements.
  3. Re-inspection: If authorities having jurisdiction find that piping will not pass tests or inspections, make required corrections and arrange for re-inspection.
  4. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.
- C. Piping Tests:
  1. Fill domestic water piping. Check components to determine that they are not air bound and that piping is full of water.
  2. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired. If testing is performed in segments, submit a separate report for each test, complete with diagram of portion of piping tested.
  3. Leave new, altered, extended, or replaced domestic water piping uncovered and unconcealed until it has been tested and approved. Expose work that was covered or concealed before it was tested.
  4. Cap and subject piping to static water pressure of 50 psig above operating pressure, without exceeding pressure rating of piping system materials. Isolate test source and

allow to stand for four (4) hours. Leaks and loss in test pressure constitute defects that must be repaired.

5. Repair leaks and defects with new materials and retest piping or portion thereof until satisfactory results are obtained.
  6. Prepare reports for tests and for corrective action required.
- D. Domestic water piping will be considered defective if it does not pass tests and inspections.
- E. Prepare test and inspection reports.

### 3.10 ADJUSTING

- A. Perform the following adjustments before operation:
1. Close drain valves, hydrants, and hose bibbs.
  2. Open shutoff valves to fully open position.
  3. Open throttling valves to proper setting.
  4. Adjust balancing valves in hot-water-circulation return piping to provide adequate flow.
    - a. Manually adjust ball-type balancing valves in hot-water-circulation return piping to provide flow of hot water in each branch.
    - b. Adjust calibrated balancing valves to flows indicated.
  5. Remove plugs used during testing of piping and for temporary sealing of piping during installation.
  6. Remove and clean strainer screens. Close drain valves and replace drain plugs.
  7. Remove filter cartridges from housings and verify that cartridges are as specified for application where used and are clean and ready for use.
  8. Check plumbing specialties and verify proper settings, adjustments, and operation.

### 3.11 CLEANING

- A. Clean and disinfect potable domestic water piping as follows:
1. Purge new piping and parts of existing piping that have been altered, extended, or repaired before using.
  2. Use purging and disinfecting procedures prescribed by authorities having jurisdiction; if methods are not prescribed, use procedures described in either AWWA C651 or AWWA C652 or follow procedures described below:
    - a. Flush piping system with clean, potable water until dirty water does not appear at outlets.
    - b. Fill and isolate system according to either of the following:
      - 1) Fill system or part thereof with water/chlorine solution with at least 50 ppm of chlorine. Isolate with valves and allow to stand for 24 hours.
      - 2) Fill system or part thereof with water/chlorine solution with at least 200 ppm of chlorine. Isolate and allow to stand for three hours.
    - c. Flush system with clean, potable water until no chlorine is in water coming from system after the standing time.
    - d. Submit water samples in sterile bottles to authorities having jurisdiction. Repeat procedures if biological examination shows contamination.
- B. Clean non-potable domestic water piping as follows:
1. Purge new piping and parts of existing piping that have been altered, extended, or repaired before using.
  2. Use purging procedures prescribed by authorities having jurisdiction or; if methods are not prescribed, follow procedures described below:
    - a. Flush piping system with clean, potable water until dirty water does not appear at outlets.
    - b. Submit water samples in sterile bottles to authorities having jurisdiction. Repeat procedures if biological examination shows contamination.
- C. Prepare and submit reports of purging and disinfecting activities.
- D. Clean interior of domestic water piping system. Remove dirt and debris as work progresses.
- E. After completion of the testing, the entire cold and hot water piping systems, with attached equipment, shall be thoroughly sterilized with a solution containing not less than 50 parts per million of available chlorine. The chlorinating materials shall be either liquid chlorine conforming to U. S. Army Specification No. 4-1 or calcium hypochlorite or chlorinated lime conforming to the requirements of

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Federal Specification O-C-114. The sterilizing solution shall be allowed to remain in the system for a period of eight (8) hours during which time all valves and faucets shall be opened and closed several times. After sterilization, the solution shall be flushed from the system with clean water until the residual chlorine content is not greater than 0.2 parts per million.

- F. The sterilization process shall be conducted as required by the Health Department of the City of Houston, and the specifications above, and upon completion of the process, the Health Department shall test and certify the cleanliness of the water piping system. The Mechanical Subcontractor shall pay all costs and charges incidental to this test and certification.

3.12 VALVE SCHEDULE

- A. Drawings indicate valve types to be used. Where specific valve types are not indicated, the following requirements apply:
1. Shutoff Duty: All interior plumbing valves 2" or less shall be ball valves. All valves greater than 2" shall be flanged ball valves.
  2. Throttling Duty: Use ball or globe valves for piping NPS 2 and smaller. Use butterfly or ball valves with flanged ends for piping NPS 2-1/2 and larger.
  3. Hot-Water Circulation Piping, Balancing Duty: Memory-stop balancing valves.
  4. Drain Duty: Hose-end drain valves.
- B. Use check valves to maintain correct direction of domestic water flow to and from equipment.
- C. Iron grooved-end valves may be used with grooved-end piping.
- D. Isolation valves shall be provided to isolate buildings, loops, and equipment.

END OF SECTION 221116

SECTION 221316 - SANITARY WASTE AND VENT PIPING

**PART 1 - GENERAL**

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following for soil, waste, and vent piping inside the building:
  - 1. Pipe, tube, and fittings.
  - 2. Special pipe fittings.
  - 3. Encasement for underground metal piping.
- B. Related Sections include the following:
  - 1. Division 22 Section "Chemical Waste-Systems for Laboratory Facilities" for chemical-waste and vent piping systems.

1.3 DEFINITIONS

- A. ABS: Acrylonitrile-butadiene-styrene plastic.
- B. EPDM: Ethylene-propylene-diene terpolymer rubber.
- C. LLDPE: Linear, low-density polyethylene plastic.
- D. NBR: Acrylonitrile-butadiene rubber.
- E. PE: Polyethylene plastic.
- F. PVC: Polyvinyl chloride plastic.
- G. TPE: Thermoplastic elastomer.

1.4 PERFORMANCE REQUIREMENTS

- A. Components and installation shall be capable of withstanding the following minimum working pressure, unless otherwise indicated:
  - 1. Soil, Waste, and Vent Piping: 10-foot head of water.
  - 2. Sanitary Sewer, Force-Main Piping: 100 psig.

1.5 SUBMITTALS

- A. Product Data: For pipe, tube, fittings, and couplings.
- B. LEED Submittal:
  - 1. Product Data for Credit EQ 4.1: For solvent cements and adhesive primers, including printed statement of VOC content.
- C. Field quality-control inspection and test reports.

1.6 QUALITY ASSURANCE

- A. Piping materials shall bear label, stamp, or other markings of specified testing agency.
- B. Comply with NSF 14, "Plastics Piping Systems Components and Related Materials," for plastic piping components. Include marking with "NSF-dwv" for plastic drain, waste, and vent piping; "NSF-drain" for plastic drain piping; "NSF-tubular" for plastic continuous waste piping; and "NSF-sewer" for plastic sewer piping.

**PART 2 - PRODUCTS**

2.1 MANUFACTURERS

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, manufacturers specified.
2. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

## 2.2 PIPING MATERIALS

- A. Refer to Part 3 "Piping Applications" Article for applications of pipe, tube, fitting, and joining materials.

## 2.3 PVC SOIL PIPE AND FITTINGS (Below ground application)

- A. Underground, soil, waste, and vent piping NPS 6 and smaller shall be the following:
  1. PVC Pipe: Schedule 40 PVC, conform to ASTM D-1785 Soil and Waste Vent piping. Fittings shall be compatible material with solvent cement type joints.
  2. PVC Socket Fittings: ASTM D 2665, made to ASTM D 3311 drain, waste, and vent pipe patterns with solvent-cemented joints.

## 2.4 HUBLESS CAST-IRON SOIL PIPE AND FITTINGS (above ground application)

- A. Pipe and Fittings: ASTM A 888 or CISPI 301.
- B. Solvent Stack Fittings: ASME B16.45 or ASSE 1043, hubless, cast-iron aerator and deaerator drainage fittings.
- C. Shielded Couplings: ASTM C 1277 assembly of metal shield or housing, corrosion-resistant fasteners, and rubber sleeve with integral, center pipe stop.
  1. Standard, Shielded, Stainless-Steel Couplings: CISPI 310, with stainless-steel corrugated shield; stainless-steel bands and tightening devices; and ASTM C 564, rubber sleeve.
    - a. Manufacturers:
      - 1) ANACO.
      - 2) Fernco, Inc.
      - 3) Ideal Div.; Stant Corp.
      - 4) Mission Rubber Co.
      - 5) Tyler Pipe; Soil Pipe Div.

## 2.5 SPECIAL PIPE FITTINGS

- A. Flexible, Non-pressure Pipe Couplings: Comply with ASTM C 1173, elastomeric, sleeve-type, reducing or transition pattern. Include shear ring, ends of same sizes as piping to be joined, and corrosion-resistant-metal tension band and tightening mechanism on each end.
  1. Manufacturers:
    - a. Dallas Specialty & Mfg. Co.
    - b. Fernco, Inc.
    - c. Logan Clay Products Company (The).
    - d. Mission Rubber Co.
    - e. NDS, Inc.
    - f. Plastic Oddities, Inc.
  2. Sleeve Materials:
    - a. For Cast-Iron Soil Pipes: ASTM C 564, rubber.
    - b. For Plastic Pipes: ASTM F 477, elastomeric seal or ASTM D 5926, PVC.
    - c. For Dissimilar Pipes: ASTM D 5926, PVC or other material compatible with pipe materials being joined.
- B. Shielded Non-pressure Pipe Couplings: ASTM C 1460, elastomeric or rubber sleeve with full-length, corrosion-resistant outer shield and corrosion-resistant-metal tension band and tightening mechanism on each end.
  1. Manufacturers:
    - a. Cascade Waterworks Mfg. Co.
    - b. Mission Rubber Co.

- C. Rigid, Unshielded, Non-pressure Pipe Couplings: ASTM C 1461, sleeve-type reducing- or transition-type mechanical coupling molded from ASTM C 1440, TPE material with corrosion-resistant-metal tension band and tightening mechanism on each end.
  - 1. Manufacturers:
    - a. ANACO.

### **PART 3 - EXECUTION**

#### **3.1 EXCAVATION**

- A. Refer to Division 31 Section "Earth Moving" for excavating, trenching, and backfilling.

#### **3.2 PIPING APPLICATIONS**

- A. Flanges and unions may be used on aboveground pressure piping, unless otherwise indicated.
- B. Aboveground, soil and waste piping NPS 4 and smaller shall be the following:
  - 1. Service class, cast-iron soil pipe and fittings; gaskets; and gasketed joints.
  - 2. Hubless cast-iron soil pipe and fittings and solvent stack fittings; standard, shielded, stainless-steel couplings; and hubless-coupling joints.
- C. Aboveground, soil and waste piping NPS 5 and larger shall be the following:
  - 1. Service class, cast-iron soil pipe and fittings; gaskets; and gasketed joints.
  - 2. Hubless cast-iron soil pipe and fittings; standard, shielded, stainless-steel couplings; and hubless-coupling joints.
- D. Aboveground, vent piping NPS 4 and smaller shall be the following:
  - 1. Service class, cast-iron soil pipe and fittings; gaskets; and gasketed joints.
  - 2. Hubless cast-iron soil pipe and fittings; standard, shielded, stainless-steel couplings; and hubless-coupling joints.
  - 3. Copper DWV tube, copper drainage fittings, and soldered joints.
    - a. Option for Vent Piping, NPS 2-1/2 and NPS 3-1/2: Hard copper tube, Type M; copper pressure fittings; and soldered joints.
- E. Underground, soil, waste, and vent piping NPS 5 and smaller shall be the following:
  - 1. Cellular-core, Sewer and Drain Series, PVC pipe; PVC socket fittings; and solvent-cemented joints.

#### **3.3 PIPING INSTALLATION**

- A. Sanitary sewer piping outside the building is specified in Division 22 Section "Facility Sanitary Sewers."
- B. Basic piping installation requirements are specified in Division 22 Section "Common Work Results for Plumbing."
- C. Install cleanouts at grade and extend to where building sanitary drains connect to building sanitary sewers.
- D. Install cleanout fitting with closure plug inside the building in sanitary force-main piping.
- E. Install cast-iron sleeve with water stop and mechanical sleeve seal at each service pipe penetration through foundation wall. Select number of interlocking rubber links required to make installation watertight. Sleeves and mechanical sleeve seals are specified in Division 22 Section "Common Work Results for Plumbing."
- F. Install wall-penetration fitting at each service pipe penetration through foundation wall. Make installation watertight.
- G. Install cast-iron soil piping according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook," Chapter IV, "Installation of Cast Iron Soil Pipe and Fittings."
  - 1. Install encasement on underground piping according to ASTM A 674 or AWWA C105.
- H. Make changes in direction for soil and waste drainage and vent piping using appropriate branches, bends, and long-sweep bends. Sanitary tees and short-sweep 1/4 bends may be used on vertical stacks if change in direction of flow is from horizontal to vertical. Use long-turn, double Y-branch and 1/8-bend fittings if 2 fixtures are installed back to back or side by side with common drain pipe. Straight tees, elbows, and crosses may be used on vent lines. Do not change direction of



- flow more than 90 degrees. Use proper size of standard increasers and reducers if pipes of different sizes are connected. Reducing size of drainage piping in direction of flow is prohibited.
- I. Lay buried building drainage piping beginning at low point of each system. Install true to grades and alignment indicated, with unbroken continuity of invert. Place hub ends of piping upstream. Install required gaskets according to manufacturer's written instructions for use of lubricants, cements, and other installation requirements. Maintain swab in piping and pull past each joint as completed.
  - J. Install soil and waste drainage and vent piping at the following minimum slopes, unless otherwise indicated:
    - 1. Building Sanitary Drain: 2 percent downward in direction of flow for piping NPS 2 and smaller; 1 percent downward in direction of flow for piping NPS 3 and larger.
    - 2. Horizontal Sanitary Drainage Piping: 1 percent downward in direction of flow.
    - 3. Vent Piping: 1 percent down toward vertical fixture vent or toward vent stack.
  - K. Sleeves are not required for cast-iron soil piping passing through concrete slabs-on-grade if slab is without membrane waterproofing.
  - L. Install PVC soil and waste drainage and vent piping according to ASTM D 2665.
  - M. Install underground PVC soil and waste drainage piping according to ASTM D 2321.
  - N. Do not enclose, cover, or put piping into operation until it is inspected and approved by authorities having jurisdiction.

#### 3.4 JOINT CONSTRUCTION

- A. Basic piping joint construction requirements are specified in Division 22 Section "Common Work Results for Plumbing."
- B. Join hub-and-spigot, cast-iron soil piping with gasket joints according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for compression joints.
- C. Join hub-and-spigot, cast-iron soil piping with calked joints according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for lead and oakum calked joints.
- D. Join hubless cast-iron soil piping according to CISPI 310 and CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for hubless-coupling joints.
- E. PVC Nonpressure Piping Joints: Join piping according to ASTM D 2665.

#### 3.5 HANGER AND SUPPORT INSTALLATION

- A. Pipe hangers and supports are specified in Division 22 Section "Hangers and Supports for Plumbing Piping and Equipment." Install the following:
  - 1. Vertical Piping: MSS Type 8 or Type 42, clamps.
  - 2. Install individual, straight, horizontal piping runs according to the following:
    - a. 100 Feet and Less: MSS Type 1, adjustable, steel clevis hangers.
    - b. Longer Than 100 Feet: MSS Type 43, adjustable roller hangers.
    - c. Longer Than 100 Feet, if Indicated: MSS Type 49, spring cushion rolls.
  - 3. Multiple, Straight, Horizontal Piping Runs 100 Feet or Longer: MSS Type 44, pipe rolls. Support pipe rolls on trapeze.
  - 4. Base of Vertical Piping: MSS Type 52, spring hangers.
- B. Install supports according to Division 22 Section "Hangers and Supports for Plumbing Piping and Equipment."
- C. Support vertical piping and tubing at base and at each floor.
- D. Rod diameter may be reduced 1 size for double-rod hangers, with 3/8-inch minimum rods.
- E. Install hangers for cast-iron soil piping with the following maximum horizontal spacing and minimum rod diameters:
  - 1. NPS 1-1/2 and NPS 2: 60 inches with 3/8-inch rod.
  - 2. NPS 3: 60 inches with 1/2-inch rod.
  - 3. NPS 4 and NPS 5: 60 inches with 5/8-inch rod.
  - 4. NPS 6: 60 inches with 3/4-inch rod.
  - 5. NPS 8 to NPS 12: 60 inches with 7/8-inch rod.
- F. Install supports for vertical cast-iron soil piping every 15 feet.

- G. Install hangers for PVC piping with the following maximum horizontal spacing and minimum rod diameters:
  - 1. NPS 1-1/2 and NPS 2: 48 inches with 3/8-inch rod.
  - 2. NPS 3: 48 inches with 1/2-inch rod.
  - 3. NPS 4 and 5: 48 inches with 5/8-inch rod.
  - 4. NPS 6: 48 inches with 3/4-inch rod.
  - 5. NPS 8 to NPS 12: 48 inches with 7/8-inch rod.
- H. Install supports for vertical PVC piping every 48 inches.
- I. Support piping and tubing not listed above according to MSS SP-69 and manufacturer's written instructions.

### 3.6 CONNECTIONS

- A. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Connect soil and waste piping to exterior sanitary sewerage piping. Use transition fitting to join dissimilar piping materials.
- C. Connect drainage and vent piping to the following:
  - 1. Plumbing Fixtures: Connect drainage piping in sizes indicated, but not smaller than required by plumbing code.
  - 2. Plumbing Fixtures and Equipment: Connect atmospheric vent piping in sizes indicated, but not smaller than required by authorities having jurisdiction.
  - 3. Plumbing Specialties: Connect drainage and vent piping in sizes indicated, but not smaller than required by plumbing code.
  - 4. Equipment: Connect drainage piping as indicated. Provide shutoff valve, if indicated, and union for each connection. Use flanges instead of unions for connections NPS 2-1/2 and larger.

### 3.7 FIELD QUALITY CONTROL

- A. During installation, notify authorities having jurisdiction at least 24 hours before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction.
  - 1. Roughing-in Inspection: Arrange for inspection of piping before concealing or closing-in after roughing-in and before setting fixtures.
  - 2. Final Inspection: Arrange for final inspection by authorities having jurisdiction to observe tests specified below and to ensure compliance with requirements.
- B. Re-inspection: If authorities having jurisdiction find that piping will not pass test or inspection, make required corrections and arrange for re-inspection.
- C. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.
- D. Test sanitary drainage and vent piping according to procedures of authorities having jurisdiction or, in absence of published procedures, as follows:
  - 1. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired. If testing is performed in segments, submit separate report for each test, complete with diagram of portion of piping tested.
  - 2. Leave uncovered and unconcealed new, altered, extended, or replaced drainage and vent piping until it has been tested and approved. Expose work that was covered or concealed before it was tested.
  - 3. Roughing-in Plumbing Test Procedure: Test drainage and vent piping, except outside leaders, on completion of roughing-in. Close openings in piping system and fill with water to point of overflow, but not less than 10-foot head of water. From 15 minutes before inspection starts to completion of inspection, water level must not drop. Inspect joints for leaks.
  - 4. Finished Plumbing Test Procedure: After plumbing fixtures have been set and traps filled with water, test connections and prove they are gastight and watertight. Plug vent-stack openings on roof and building drains where they leave building. Introduce air into piping system equal to pressure of 1-inch wg. Use U-tube or manometer inserted in trap of water closet to measure this pressure. Air pressure must remain constant without

introducing additional air throughout period of inspection. Inspect plumbing fixture connections for gas and water leaks.

5. Repair leaks and defects with new materials and retest piping, or portion thereof, until satisfactory results are obtained.
6. Prepare reports for tests and required corrective action.
7. Isolate test source and allow to stand for four hours. Leaks and loss in test pressure constitute defects that must be repaired.
8. Repair leaks and defects with new materials and retest piping, or portion thereof, until satisfactory results are obtained.
9. Prepare reports for tests and required corrective action.

3.8 CLEANING

- A. Clean interior of piping. Remove dirt and debris as work progresses.
- B. Protect drains during remainder of construction period to avoid clogging with dirt and debris and to prevent damage from traffic and construction work.
- C. Place plugs in ends of uncompleted piping at end of day and when work stops.

3.9 PROTECTION

- A. Exposed PVC Piping: Protect plumbing vents exposed to sunlight with two coats of water-based latex paint.
- B. All grease traps must have lid liners for odor control.

END OF SECTION 221316

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## SECTION 22 40 00 - PLUMBING FIXTURES AND FIXTURE CARRIERS

### PART 1 - GENERAL

#### 1.1 WORK INCLUDED

- A. Furnish and install water closets, urinals, lavatories, electric drinking fountains, fixture carriers and plumbing appurtenances.

#### 1.2 RELATED WORK

- A. Division 22 Plumbing
  1. Drains, Hydrants and Cleanouts.
  2. Domestic Water Piping.
  3. Soil, Waste and Sanitary Drain Piping and Vent Piping.

#### 1.3 JOB REQUIREMENTS

- A. Furnish plumbing fixtures and trim as shown and specified. Provide faucets, fittings, supply stops and similar devices of a single manufacturer. Furnish faucets and supply stops with renewable seats. Porcelain to steel and enameled cast iron fixtures shall be acid resistant. Wall hung fixtures shall be installed with a fixture carrier.

### PART 2 - PRODUCTS

#### 2.1 ACCEPTABLE MANUFACTURERS

- A. Plumbing Fixtures (Vitreous China):
  1. American Standard.
  2. Kohler.
  3. Toto
  4. Zurn
- B. Plumbing Faucets:
  1. American Standard.
  2. Chicago.
  3. T&S Brass.
  4. Zurn.
  5. Symmons
- C. Supports and Carriers:
  1. Wade
  2. Zurn
  3. J.R. Smith.
  4. Josam.
  5. Watts
- D. Flush Valves:
  1. Sloan
  2. Zurn
- E. Supplies, Stops and Chrome Plated Tubular Brass:
  1. McGuire
  2. Kohler

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3. Chicago
  4. Zurn
- F. Water Closet Seats:
1. Beneke
  2. Church
  3. Olsonite
  4. Bemis
- G. Electric Drinking Fountains:
1. Halsey Taylor
  2. Elkay
  3. Oasis
- H. Floor Drains:
1. Wade
  2. J.R. Smith
  3. Josam
  4. Zurn
  5. Watts
  6. Sioux Chief
- I. Cleanouts:
1. Wade
  2. J.R. Smith
  3. Josam
  4. Zurn
  5. Watts
- J. Shower Systems:
1. Bradley
  2. Acorn
  3. Willoughby
- K. Shower Valves
1. Chicago
  2. Symmons
  3. Bradley
- L. Stainless Steel Sinks:
1. Elkay
  2. Just
  3. Moen Commercial
- M. Mop Sinks:
1. Crane Fiat
  2. Stern Williams
- N. Roof Drains:
1. Wade
  2. J.R. Smith
  3. Josam
  4. Zurn

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- O. Thermostatic Mixing Valves
  - 1. Lawler
  - 2. Symmons
  - 3. Leonard
  - 4. Powers
  - 5. Bradley
  
- P. Emergency Safety Equipment
  - 1. Bradley
  - 2. Encon
  - 3. Haws
  
- Q. Shock Arrestors:
  - 1. Precision Products
  - 2. Sioux Chief
  
- R. Backflow Preventors
  - 1. Watts
  - 2. Febco
  - 3. Wilkins
  - 4. Beeco
  
- S. Hose Bibbs
  - 1. Wade
  - 2. Chicago
  - 3. Josam
  - 4. Woodford
  - 5. Zurn
  - 6. J.R. Smith
  
- T. Wall Hydrants
  - 1. Wade
  - 2. Woodford
  - 3. Zurn
  - 4. J.R. Smith
  - 5. Josam

2.2 REQUIREMENTS

- A. Refer to the drawings for equipment to be supplied.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Installation shall be in accordance with the manufacturer's instructions.
  
- B. Make rough-in and final connection of service to each fixture provided under this Section and other Sections or Architectural or Plumbing Drawings.
  
- C. Provide necessary stops, valves, traps, unions, vents, cold water, hot water, sanitary, etc. for a complete installation.

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- D. Provide isolation valves in domestic water lines to isolate all equipment, restrooms, hose bibbs, and where shown on drawings.
- E. Remove piping and services roughed-in incorrectly and install correctly, without cost.
- F. Exposed piping, fittings and appurtenances shall be chrome-plated brass.
- G. Coordinate with the Contractor for locations and service required for each plumbing fixture.
- H. All floor drains and floor sinks shall have Pro-Set “Trap Guard” for trap seal protection.
- I. All floor drains and floor sink locations are to be coordinated with all equipment. Locate drains in mechanical equipment spaces to conform to drain locations of equipment furnished. Coordinate drain location with food service equipment and Architectural Drawings.
- J. All floor drains, floor sinks and cleanout covers are to be provided with stainless steel vandal resistant screws.

END OF SECTION



## SECTION 224000 - PLUMBING FIXTURES

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

#### 1.2 SUMMARY

- A. This Section includes the following conventional plumbing fixtures and related components:
  1. Faucets for lavatories bathtubs bathtub/showers showers and sinks.
  2. Laminar-flow faucet-spout outlets.
  3. Flushometers.
  4. Toilet seats.
  5. Fixture supports.
  6. Interceptors.
  7. Water closets.
  8. Urinals.
  9. Lavatories.
  10. Commercial sinks.
  11. Kitchen sinks.
  12. Service sinks.

#### 1.3 DEFINITIONS

- A. ABS: Acrylonitrile-butadiene-styrene plastic.
- B. Accessible Fixture: Plumbing fixture that can be approached, entered, and used by people with disabilities.
- C. Cast Polymer: Cast-filled-polymer-plastic material. This material includes cultured-marble and solid-surface materials.
- D. Cultured Marble: Cast-filled-polymer-plastic material with surface coating.
- E. Fitting: Device that controls the flow of water into or out of the plumbing fixture. Fittings specified in this Section include supplies and stops, faucets and spouts, shower heads and tub spouts, drains and tailpieces, and traps and waste pipes. Piping and general-duty valves are included where indicated.
- F. FRP: Fiberglass-reinforced plastic.
- G. PMMA: Polymethyl methacrylate (acrylic) plastic.
- H. PVC: Polyvinyl chloride plastic.
- I. Solid Surface: Nonporous, homogeneous, cast-polymer-plastic material with heat-, impact-, scratch-, and stain-resistance qualities.

#### 1.4 SUBMITTALS

- A. Product Data: For each type of plumbing fixture indicated. Include selected fixture and trim, fittings, accessories, appliances, appurtenances, equipment, and supports. Indicate materials and finishes, dimensions, construction details, and flow-control rates.
- B. Shop Drawings: Diagram power, signal, and control wiring.
- C. Operation and Maintenance Data: For plumbing fixtures to include in emergency, operation, and maintenance manuals.
- D. Warranty: Special warranty specified in this Section.

#### 1.5 QUALITY ASSURANCE

- A. Source Limitations: Obtain plumbing fixtures, faucets, and other components of each category through one source from a single manufacturer.

1. Exception: If fixtures, faucets, or other components are not available from a single manufacturer, obtain similar products from other manufacturers specified for that category.
  - B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
  - C. Regulatory Requirements: Comply with requirements in ICC A117.1, "Accessible and Usable Buildings and Facilities"; Public Law 90-480, "Architectural Barriers Act"; and Public Law 101-336, "Americans with Disabilities Act"; for plumbing fixtures for people with disabilities.
  - D. Regulatory Requirements: Comply with requirements in Public Law 102-486, "Energy Policy Act," about water flow and consumption rates for plumbing fixtures.
  - E. NSF Standard: Comply with NSF 61, "Drinking Water System Components--Health Effects," for fixture materials that will be in contact with potable water.
  - F. Select combinations of fixtures and trim, faucets, fittings, and other components that are compatible.
- 1.6 WARRANTY
- A. Special Warranties: Manufacturer's standard form in which manufacturer agrees to repair or replace components of whirlpools that fail in materials or workmanship within specified warranty period.
    1. Failures include, but are not limited to, the following:
      - a. Structural failures of unit shell.
      - b. Faulty operation of controls, blowers, pumps, heaters, and timers.
      - c. Deterioration of metals, metal finishes, and other materials beyond normal use.

## PART 2 - PRODUCTS

### 2.1 LAVATORY FAUCETS

- A. Lavatory Faucets:
  1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
    - a. American Standard Companies, Inc.
    - b. Bradley Corporation.
    - c. Chicago Faucets.
    - d. Delta Faucet Company.
    - e. Eljer.
    - f. Elkay Manufacturing Co.
    - g. Kohler Co.
    - h. Moen, Inc.

### 2.2 SINK FAUCETS

- A. Sink Faucets:
  1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
    - a. American Standard Companies, Inc.
    - b. Bradley Corporation.
    - c. Chicago Faucets.
    - d. Delta Faucet Company.
    - e. Eljer.
    - f. Elkay Manufacturing Co.
    - g. Grohe America, Inc.
    - h. Kohler Co.
    - i. Moen, Inc.

2. Description: Kitchen faucet with spray, three-hole fixture Kitchen faucet with spray, four-hole fixture Kitchen faucet without spray Laundry tray faucet Service sink faucet with stops in shanks, vacuum breaker, hose-thread outlet, and pail hook Bar sink faucet. Include hot- and cold-water indicators; coordinate faucet inlets with supplies and fixture holes; coordinate outlet with spout and fixture receptor.
  - a. Body Material: Commercial, solid brass General-duty, solid brass General-duty, solid brass or copper or brass underbody with brass cover plate General-duty, copper or brass underbody with brass cover plate Residential, nonmetallic underbody with brass cover plate Residential, nonmetallic underbody with nonmetallic cover plate <Insert material>.
  - b. Finish: Polished chrome plate Polished brass Nonmetallic Polished or rough brass Rough brass.

### 2.3 FLUSHOMETERS

#### A. Flushometers:

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
2. Operating pressure data must be submitted with the fixture shop drawings. Dual Flush valves requiring more than 15 PSI are not acceptable.
  - a. Delta Faucet Company.
  - b. Sloan Valve Company.
  - c. Zurn Plumbing Products Group; Commercial Brass Operation.
  - d. TOTO USA, Inc.

### 2.4 TOILET SEATS

#### A. Toilet Seats:

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
  - a. American Standard Companies, Inc.
  - b. Bemis Manufacturing Company.
  - c. Church Seats.
  - d. Kohler Co.
  - e. Olsonite Corp.
2. Description: Toilet seat for water-closet-type fixture.
  - a. Material: Molded, solid plastic with antimicrobial agent.
  - b. Configuration: Closed Open front with without cover.
  - c. Size: Elongated.

### 2.5 FIXTURE SUPPORTS

#### A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Josam Company.
2. MIFAB Manufacturing Inc.
3. Smith, Jay R. Mfg. Co.
4. Tyler Pipe; Wade Div.
5. Watts Drainage Products Inc.; a div. of Watts Industries, Inc.
6. Zurn Plumbing Products Group; Specification Drainage Operation.

#### B. Water-Closet Supports:

1. Description: Combination carrier designed for accessible standard mounting height of wall-mounting, water-closet-type fixture. Include single or double, vertical or horizontal, hub-and-spigot or hubless waste fitting as required for piping arrangement; faceplates; couplings with gaskets; feet; and fixture bolts and hardware matching fixture. Include additional extension coupling, faceplate, and feet for installation in wide pipe space.

- C. Urinal Supports:
  - 1. Description: Type I, urinal carrier with fixture support plates and coupling with seal and fixture bolts and hardware matching fixture II, urinal carrier with hanger and bearing plates for wall-mounting, urinal-type fixture. Include steel uprights with feet.
  - 2. Accessible-Fixture Support: Include rectangular steel uprights.
- D. Lavatory Supports:
  - 1. Description: Type I, lavatory carrier with exposed arms and tie rods II, lavatory carrier with concealed arms and tie rod III, lavatory carrier with hanger plate and tie rod for wall-mounting, lavatory-type fixture. Include steel uprights with feet.
  - 2. Accessible-Fixture Support: Include rectangular steel uprights.
- E. Sink Supports:
  - 1. Description: Type I, sink carrier with exposed arms and tie rods II, sink carrier with hanger plate, bearing studs, and tie rod III, sink carrier with hanger plate and exposed arms for sink-type fixture. Include steel uprights with feet.

## 2.6 WATER CLOSETS

- A. Water Closets:
  - 1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
    - a. American Standard Companies, Inc.
    - b. Eljer.
    - c. Kohler Co.
    - d. TOTO USA, Inc.

## 2.7 URINALS

- A. Urinals:
  - 1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
    - a. American Standard Companies, Inc.
    - b. Eljer.
    - c. Kohler Co.
    - d. TOTO USA, Inc.
  - 2. Description: Accessible, wall Wall-mounting, back-outlet, vitreous-china fixture designed for flushometer valve operation.
    - a. Type: Blowout Siphon jet Blowout with extended shields Siphon jet with extended shields Washout with extended shields.
    - b. Strainer or Trapway: Integral cast strainer Separate removable strainer Open trapway with integral trap.
    - c. Design Consumption: 0.5 gal. /flush .
    - d. Color: White .

## 2.8 LAVATORIES

- A. Lavatories, :
  - 1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
    - a. American Standard Companies, Inc.
    - b. Eljer.
    - c. Kohler Co.
    - d. Eljer.
    - e. TOTO USA, Inc.

## 2.9 COMMERCIAL SINKS

- A. Commercial Sinks:
  - 1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
    - a. Elkay Manufacturing Co.
    - b. Just Manufacturing Company.
    - c. Metal Masters Foodservice Equipment Co., Inc.
  - 2. Description: One or Two compartment, counter-mounting, stainless-steel commercial sink with backsplash.

### **PART 3 - EXECUTION**

#### **3.1 EXAMINATION**

- A. Examine roughing-in of water supply and sanitary drainage and vent piping systems to verify actual locations of piping connections before plumbing fixture installation.
- B. Examine cabinets, counters, floors, and walls for suitable conditions where fixtures will be installed.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

#### **3.2 INSTALLATION**

- A. Assemble plumbing fixtures, trim, fittings, and other components according to manufacturers' written instructions.
- B. Install off-floor supports, affixed to building substrate, for wall-mounting fixtures.
  - 1. Use carrier supports with waste fitting and seal for back-outlet fixtures.
  - 2. Use carrier supports without waste fitting for fixtures with tubular waste piping.
  - 3. Use chair-type carrier supports with rectangular steel uprights for accessible fixtures.
- C. Install back-outlet, wall-mounting fixtures onto waste fitting seals and attach to supports.
- D. Install floor-mounting fixtures on closet flanges or other attachments to piping or building substrate.
- E. Install wall-mounting fixtures with tubular waste piping attached to supports.
- F. Install floor-mounting, back-outlet water closets attached to building floor substrate and wall bracket and onto waste fitting seals.
- G. Install counter-mounting fixtures in and attached to casework.
- H. Install fixtures level and plumb according to roughing-in drawings.
- I. Install water-supply piping with stop on each supply to each fixture to be connected to water distribution piping. Attach supplies to supports or substrate within pipe spaces behind fixtures. Install stops in locations where they can be easily reached for operation.
  - 1. Exception: Use ball, gate, or globe valves if supply stops are not specified with fixture. Valves are specified in Division 22 Section "General-Duty Valves for Plumbing Piping."
- J. Install trap and tubular waste piping on drain outlet of each fixture to be directly connected to sanitary drainage system.
- K. Install tubular waste piping on drain outlet of each fixture to be indirectly connected to drainage system.
- L. Install flushometer valves for accessible water closets and urinals with handle mounted on wide side of compartment. Install other actuators in locations that are easy for people with disabilities to reach.
- M. Install tanks for accessible, tank-type water closets with lever handle mounted on wide side of compartment.
- N. Install toilet seats on water closets.
- O. Install trap-seal liquid in dry urinals.
- P. Install faucet-spout fittings with specified flow rates and patterns in faucet spouts if faucets are not available with required rates and patterns. Include adapters if required.
- Q. Install water-supply flow-control fittings with specified flow rates in fixture supplies at stop valves.

- R. Install faucet flow-control fittings with specified flow rates and patterns in faucet spouts if faucets are not available with required rates and patterns. Include adapters if required.
- S. Install traps on fixture outlets.
  - 1. Exception: Omit trap on fixtures with integral traps.
  - 2. Exception: Omit trap on indirect wastes, unless otherwise indicated.
- T. Install disposer in outlet of each sink indicated to have disposer. Install switch where indicated or in wall adjacent to sink if location is not indicated.
- U. Install escutcheons at piping wall ceiling penetrations in exposed, finished locations and within cabinets and millwork. Use deep-pattern escutcheons if required to conceal protruding fittings. Escutcheons are specified in Division 22 Section "Common Work Results for Plumbing."
- V. Seal joints between fixtures and walls, floors, and countertops using sanitary-type, one-part, mildew-resistant silicone sealant. Match sealant color to fixture color. Sealants are specified in Division 07 Section "Joint Sealants."
- W. Filters shall be accessible on drinking water fountains.

### 3.3 CONNECTIONS

- A. Piping installation requirements are specified in other Division 22 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Connect fixtures with water supplies, stops, and risers, and with traps, soil, waste, and vent piping. Use size fittings required to match fixtures.

### 3.4 FIELD QUALITY CONTROL

- A. Verify that installed plumbing fixtures are categories and types specified for locations where installed.
- B. Check that plumbing fixtures are complete with trim, faucets, fittings, and other specified components.
- C. Inspect installed plumbing fixtures for damage. Replace damaged fixtures and components.
- D. Test installed fixtures after water systems are pressurized for proper operation. Replace malfunctioning fixtures and components, then retest. Repeat procedure until units operate properly.
- E. Install fresh batteries in sensor-operated mechanisms.

### 3.5 ADJUSTING

- A. Operate and adjust faucets and controls. Replace damaged and malfunctioning fixtures, fittings, and controls.
- B. Operate and adjust disposers hot-water dispensers and controls. Replace damaged and malfunctioning units and controls.
- C. Adjust water pressure at faucets and flushometer valves to produce proper flow and stream.
- D. Replace washers and seals of leaking and dripping faucets and stops.
- E. Install fresh batteries in sensor-operated mechanisms.

### 3.6 CLEANING

- A. Clean fixtures, faucets, and other fittings with manufacturers' recommended cleaning methods and materials. Do the following:
  - 1. Remove faucet spouts and strainers, remove sediment and debris, and reinstall strainers and spouts.
  - 2. Remove sediment and debris from drains.
- B. After completing installation of exposed, factory-finished fixtures, faucets, and fittings, inspect exposed finishes and repair damaged finishes.

### 3.7 PROTECTION

- A. Provide protective covering for installed fixtures and fittings.
- B. Do not allow use of plumbing fixtures for temporary facilities unless approved in writing by Owner.

END OF SECTION 224000

## SECTION 233713 -DIFFUSERS, REGISTERS, AND GRILLES

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

#### 1.2 SUMMARY

- A. Section Includes:
  - 1. Round ceiling diffusers.
  - 2. Rectangular and square ceiling diffusers.
  - 3. Perforated diffusers.
  - 4. Louver face diffusers.
  - 5. Linear bar diffusers.
  - 6. Linear slot diffusers.
  - 7. Ceiling-integral continuous diffusers.
  - 8. Drum louvers.
  - 9. Modular core supply grilles.
  - 10. Continuous tubular diffusers.
- B. Related Sections:
  - 1. Division 08 Section "Louvers and Vents" for fixed and adjustable louvers and wall vents, whether or not they are connected to ducts.
  - 2. Division 23 Section "Air Duct Accessories" for fire and smoke dampers and volume-control dampers not integral to diffusers, registers, and grilles.

#### 1.3 SUBMITTALS

- A. Product Data: For each type of product indicated, include the following:
  - 1. Data Sheet: Indicate materials of construction, finish, and mounting details; and performance data including throw and drop, static-pressure drop, and noise ratings.
  - 2. Diffuser, Register, and Grille Schedule: Indicate drawing designation, room location, quantity, model number, size, and accessories furnished.
- B. Samples for Initial Selection: For diffusers, registers, and grilles with factory-applied color finishes.
- C. Samples for Verification: For diffusers, registers, and grilles, in manufacturer's standard sizes to verify color selected.
- D. Coordination Drawings: Reflected ceiling plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from Installers of the items involved:
  - 1. Ceiling suspension assembly members.
  - 2. Method of attaching hangers to building structure.
  - 3. Size and location of initial access modules for acoustical tile.
  - 4. Ceiling-mounted items including lighting fixtures, diffusers, grilles, speakers, sprinklers, access panels, and special moldings.
  - 5. Duct access panels.
- E. Source quality-control reports.

### PART 2 - PRODUCTS

Refer to drawings for schedule.

#### 2.1 SOURCE QUALITY CONTROL

- A. Verification of Performance: Rate diffusers, registers, and grilles according to ASHRAE 70, "Method of Testing for Rating the Performance of Air Outlets and Inlets."

### PART 3 - EXECUTION

#### 3.1 EXAMINATION



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- A. Examine areas where diffusers, registers, and grilles are to be installed for compliance with requirements for installation tolerances and other conditions affecting performance of equipment.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install diffusers, registers, and grilles level and plumb.
- B. Ceiling-Mounted Outlets and Inlets: Drawings indicate general arrangement of ducts, fittings, and accessories. Air outlet and inlet locations have been indicated to achieve design requirements for air volume, noise criteria, airflow pattern, throw, and pressure drop. Make final locations where indicated, as much as practical. For units installed in lay-in ceiling panels, locate units in the center of panel. Where architectural features or other items conflict with installation, notify Architect for a determination of final location.
- C. Install diffusers, registers, and grilles with airtight connections to ducts and to allow service and maintenance of dampers, air extractors, and fire dampers.
- D. All exterior louvers shall have wire bird screens mounted in removable metal frames.

3.3 ADJUSTING

- A. After installation, adjust diffusers, registers, and grilles to air patterns indicated, or as directed, before starting air balancing.

END OF SECTION 233713

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