

SECTION 10 28 00

TOILET ACCESSORIES

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Toilet accessories.
- B. Grab bars in washrooms and toilet rooms.
- C. Attachment hardware.

1.02 REFERENCES

- A. ASTM A167 - Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet and Strip.
- B. ASTM A269 - Seamless and Welded Austenitic Stainless Steel Tubing for General Service.
- C. ASTM A1008/A1008M - Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability.

1.03 SUBMITTALS

- A. Product data on accessories describing size, finish, details of function, attachment methods.
- B. Manufacturer's installation instructions.

1.04 REGULATORY REQUIREMENTS

- A. Conform to CBC Chapter 11B for accessibility requirements.

1.05 KEYING

- A. Supply two keys for each accessory to Owner.
- B. Master key all accessories.
- C. Accessories shall be from a single manufacturer to facilitate keying.

1.06 SEQUENCING AND SCHEDULING

- A. Coordinate the Work of this Section with the placement of internal wall reinforcement to receive anchor attachments.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Products of one of the following manufacturers form the basis for design and quality intended.
 - 1. Bobrick Washroom Equipment, Inc., North Hollywood, CA. (www.bobrick.com)
 - 2. Bradley Corporation, Ontario, CA. (www.bradley.com)
 - 3. American Specialties, Inc, Yonkers, NY (www.americanspecialties.com)
- B. Or equal as approved in accordance with Division 01, General Requirements for Substitutions.

2.02 MATERIALS - TOILET AND BATH ACCESSORIES

- A. Sheet Steel: ASTM A1008.
- B. Stainless Steel Sheet: ASTM A167, Type 304.
- C. Tubing: ASTM A269, stainless steel.
- D. Fasteners, Screws and Bolts: Stainless steel or chrome, tamperproof.

2.03 MATERIALS - GRAB BARS

- A. Tubing: ASTM A269; stainless steel, mandrel bent, uniform diameter at curves.
 - 1. Size: 1-1/2 inch diameter.
 - 2. Wall Thickness: 18-gage.
 - 3. Configuration and Length: As indicated on Drawings.
 - a. 36 inches for rear walls.
 - b. 42 inches minimum for side walls, Section 1115B.4.1.3 CBC.
 - 4. Design Strength: Withstand minimum 250 lb. point load in any direction at any point on the bar without damage or permanent set in accordance with CBC.
 - 5. Wall Clearance: 1-1/2 inches and 1-1/2 inches clear to any adjacent toilet room accessory at accessible water closet locations.
- B. Mounting Flange: ASTM A167, 304 stainless steel plate, heliarc welded.
 - 1. Size: 2"W x 3-1/8"H.
 - 2. Thickness: 1/8" thick with minimum 2 mounting screws for concealed anchors.
- C. Cover Plate: ASTM A167, 304 stainless steel, 22 gauge 3-1/4 inch diameter snap-cover over mounting flange.
- D. Fasteners: stainless steel, tamperproof, minimum two #14 stainless steel screws x length required for secure attachment to backing plate.

2.04 FABRICATION

- A. Weld and grind smooth joints and miters of fabricated components.
- B. Form exposed surfaces from single sheet of stock, free of joints.
- C. Form surfaces flat without distortion. Maintain flat surfaces without scratches or dents.
- D. Back paint components where contact is made with building finishes to prevent electrolysis.
- E. Shop assemble components and package complete with anchors and fittings.
- F. Provide steel adapters and anchor components for installation.

2.05 FACTORY FINISHING

- A. Stainless Steel: No. 4 satin luster finish.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify that site conditions are ready to receive Work.
- B. Beginning of installation means acceptance of existing conditions.

3.02 PREPARATION

- A. Deliver inserts and rough-in frames to site at appropriate time for building-in.
- B. Provide templates and rough-in measurements as required.
- C. Verify exact location of accessories for installation.

3.03 INSTALLATION

- A. Install fixtures, accessories and items in accordance with manufacturers' instructions.
- B. Install plumb and level, securely and rigidly anchored to backing. Mounting heights and locations as indicated on the Drawings.
- C. Where ceramic tile wainscot occurs, provide stainless steel closure angles flush to perimeter of all wall-mounted accessories. Seal visible cracks with silicone sealant as specified in Section 07 92 00.
- D. Accessible Compliant toilet accessories: California Building Code Chapter 11B.
 - 1. Mount heights according to CBC Section 1115B.8.

- a. Following (but not limited to) operable parts (including coin slots) of toilet room accessories (adult ht.) shall be mounted within 40 inches maximum AFF:
 - 1) Towel Dispensers
 - 2) Sanitary napkin dispensers/receptacles.
 - 3) Waste receptacles.
 - 4) Other similar dispensing and disposal fixtures.
- 2. Toilet tissue and feminine napkin disposals located on grab bar side of accessible toilet room or stall shall not project more than the grab bar. The grab bar cannot project more than 3 inches into the 48 inches minimum clear space in front of the water closet. The accessory shall not be located closer than 1-1/2 inches clear of the tangent point of the grab bar.
- 3. Toilet tissue dispensers shall be located on the wall within 12 inches, of the front edge of the toilet seat, dispensers that control delivery or that does not permit continuous paper flow shall not be used, Section 1115B.8.4.
- 4. Bottom of reflective surface of mirrors shall be 40 inches maximum, AFF per CBC 1115B.8.1.
- 5. Paper Towel Dispensers: If located more than 27" AFF, maximum projection from wall shall not exceed 4" or encroach into 30" x 48" clear space.

3.04 SCHEDULE

	Bobrick	Bradley	ASI
A. Grab Bars Series	B-6806	8120	3800 Series
B. Framed Mirrors	B-165	781	0620
C. Mirrors larger than 18 x 30 inches - Refer to Section 08 80 00, Glazing			
D. Toilet Tissue Dispenser (recessed)	B-3888	5412	0033
E. Toilet Tissue Dispenser (surface mounted)	B-2888	5402	9030

	Bobrick	Bradley	ASI
F. FEMALE (seat cover, tissue dispenser, sanitary disposal) 1. Partition-mounted (flush in Accessible compartment) 2. Recess mounted in single user Accessible compartment 3. Centered in partition for inaccessible compartment	B-3571 B-3574 B-357	5911 5912 591	0481-HC 0482 0481
G. Soap Dispenser (Liquid)	B-2111	6562	0347
H. Soap Dispenser (Liquid) counter mounted	B-822	6342	0332
I. Paper Towel Dispenser (recessed)	B-359	244	0457
J. Automatic Touchless Roll Paper Towel Dispenser - Surface Mounted.	B-2974	---	8523-A
K. Paper Towel Dispenser (surface mounted)	B-262	250-15	0210
L. Mop Rack (length as indicated on drawings)	B-223	9953	8215-3 or 4
M. Seat Cover Dispenser (surface mounted)	B-221	5831	0477-SM
N. Seat Cover Dispenser (recessed)	B-301	584	0477
O. Napkin Dispenser (surface mounted)	B-282-25	426-45	0864-25
P. Napkin Dispenser Vendor (recessed)	B-352-25	401-45	0464-25
Q. Napkin Disposal (surface mounted)	B-254	4722	0473-A
R. Napkin Disposal (recessed)	B-353	4731	0473
S. Napkin Disposal/toilet tissue dispenser combo (recessed)	B-3094	5942	04823
T. Waste Paper Receptacle (semi-recessed)	B-3644	344	0458

	Bobrick	Bradley	ASI
U. Paper Towel Dispenser/Waste Receptacle Combination (semi-recessed)	B-3944	237-10	0469
V. Protection for Disabled-Person lavatories. (Insulating jacket)	LavGuard by TRUEBRO Inc., Ellington, CT. Tested in accordance with ASTM D635. Rate of Burning and/or Extent and Time of Burning of Plastics in a Horizontal Position.		
W. Protection for Disabled-Person counter sinks.	BasinGuard by TRUEBRO Inc., Ellington, CT. UL Listing MH25426.		

END OF SECTION

SECTION 10 44 13

FIRE EXTINGUISHERS AND CABINETS

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Fire extinguishers.
- B. Cabinets

1.02 REFERENCES

- A. NFPA 10 - Standard for Portable Fire Extinguishers.
- B. CFC - California Fire Code 2010, Section 906.
- C. Title 19, CCR, California Code of Regulations, Public Safety, State Fire Marshal Regulations, Division 01, Chapter 3, Article 5.
- D. UL Underwriters Laboratories Inc. Fire Protection Equipment.

1.03 SUBMITTALS

- A. Product data showing physical dimensions, operational features, color and finish, anchorage details, rough-in measurements, location and details.
- B. Manufacturer's installation instructions.
- C. Manufacturer's operation and maintenance data. Include test, refill or recharge schedules, procedures and re-certification including requirements applicable to Work.

1.04 QUALITY ASSURANCE

- A. Conform to NFPA 10, Title 19-CCR, Division 01 Chapters 1 and 3, and 2010 CFC, Section 906 requirements for extinguishers.
- B. Fire extinguishers shall have current certification tag attached.
- C. Fire extinguishers must be UL certified.
- D. Cabinets shall comply with CBC Sections 1117B.6, and 1118B.

1.05 ENVIRONMENTAL REQUIREMENTS

- A. Do not install extinguishers when ambient temperatures may cause freezing.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Products of following manufacturers form basis for design and quality intended.
 - 1. Larsen's Manufacturer's Company, Ft. Lauderdale, FL.
 - 2. Potter-Roemer, Inc., Santa Ana, CA., UL No. EX 3697.
 - 3. Amerex Corporation, Los Angeles, CA, UL No. EX 2835.
 - 4. Ansul Inc, Marinette, WI., UL No. EX 2199.
 - 5. Kidde Mebane, NC., UL No. EX 966
- B. Or equal as approved in accordance with Division 01, General Requirements for substitutions.

2.02 EXTINGUISHERS

- A. ABC Multi-Purpose Dry Chemical:
 - 1. Red glossy polyester coated steel cylinder with pressure gauge and nozzle.
 - 2. Size: 5 lbs
 - 3. Class: 2A:10B:C
 - 4. Positioning: 48 inches max. to handle.
 - 5. Provide and install hanger bracket accessory at exposed wall-mounted fire-extinguisher units.

2.03 CABINETS

- A. Model: Larsen's – Model: 2409-6R (2-1/2" trim) fire rated cabinets at rated assemblies.
 - 1. Size: To accommodate extinguisher specified herein.
 - 2. Mounting Style: Semi-recessed bottom of cabinet at 32 inches above finish floor, 4 inches maximum projection.
 - a. Stainless Steel: No. 304 stainless with No. 4 finish.
 - 3. Door Style(s):
 - a. Duo Vertical Panel with lock.
 - 4. Glazing:
 - a. Clear tempered safety glass.
 - 5. Lettering
 - a. Vertical: Red
- B. Accessibility Type Latching and locking hardware be operable with a single effort by lever type hardware, or other hardware designed so as to not require grasping the opening hardware and not require a force greater than 5 lbs to open.
 - 1. Force required to activate controls shall not exceed 5 lbs.
 - 2. Be recessed or semi-recessed in order not to protrude more than 4 inches from face of wall.
 - 3. Mount between 15-48 inches AFF for forward approach.
 - 4. Mounted Between 9-54 inches AFF for side approach.

2.04 FABRICATION OF CABINETS

- A. Form body of cabinet with tight inside corners and seams.
- B. Pre-drill holes for anchorage.
- C. Form perimeter trim and door stiles by welding, filling and grinding smooth.
- D. Hinge doors for 180 degree opening with continuous piano hinge.
- E. Glaze doors with resilient channel gasket glazing.
- F. Pull Handle: U-pull type with roller catch, 5 pounds maximum operating force.

PART 3 - EXECUTION

3.01 INSPECTION

- A. Verify rough openings for cabinet are correctly sized and located.
- B. Beginning of installation means acceptance of existing conditions.

3.02 INSTALLATION

- A. Install cabinets plumb and level in wall openings. Locate cabinets to a height to yield a maximum of 48 inches from finish floor to top of handle of fire extinguisher unit.
- B. Secure rigidly in place.

3.03 INSPECTION BY REGULATORY AGENCIES

- A. Schedule inspection with agencies and Owner.
- B. Furnish approval certificates issued by jurisdictional authorities.

END OF SECTION

SECTION 10 80 00

MISCELLANEOUS SPECIALTIES

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Miscellaneous specialty items applicable to Work and not specified under individual technical sections.

1.02 SUBMITTALS

- A. Shop drawings and product data for all components, hardware and accessories under provisions of Division 01, General Requirements. Show construction and fabrications details, procedures, layout and erection diagrams, anchorages and pertinent information for specified specialty item.
- B. Samples sufficiently sized to illustrate clearly all sizes, available colors, materials, patterns and finishes.
- C. Manufacturer's installation instructions and maintenance recommendations under provisions of Division 01, General Requirements.

1.03 FIELD MEASUREMENTS

- A. Verify site conditions. Obtain accurate dimensions of openings, levels, locations and arrangements of embedded and concealed anchorages. Report discrepancies between drawings and field dimensions to Architect before commencing work.

PART 2 - PRODUCTS

2.01 SPECIALTY ITEMS

A. FIREPLACE

- 1. Electric Fireplace - Built in: Model Optiflame BLF50, by Dimplex North America Ltd, Cambridge, ON
 - a. Provide the following features:
 - 1. Dimensions: 50.3"w x 19.4"h x 7"d
 - 2. 120V, 4180 BTUs, hardwired
 - 3. Finish: black powder finish
 - 4. Glass doors, tempered
 - 5. Mesh Screening
 - 6. Controls: panel.

B. LOCK BOX

- 1. Manufacturer: The Knox Co., Newport Beach, CA.
- 2. Model: Heavy Duty [3200 Knox-Box surface-mounted] [3200-R Knox-Box recessed with Recessed Mounting Kit RMK] [4100 Series Knox-Vault] [4400 Series Knox-Vault], capacity 10 keys and access cards.

3. Finish: Polyester powder coat, [dark bronze] [black] [aluminum].
4. Confirm location with Local Fire Authority prior to installation.

C. LIBRARY BOOK DROP

1. Building Mounted (Thru wall) Depository
 - a. Manufacturer: Kingsley Companies, Pomona, CA.
 - b. Model: 10-8900 Series, 18-gauge Type 304 Stainless Steel
 - c. Book Drop: provide (1) for unit specified.
 - d. Aluminum Cart: Model 30-9040, one per return.
 - e. Or approved equal.
 - f. ADA compliant: Install at heights per California Building Code CBC 2010.
 - g. Braille Identification tags: book and video.

D. ASSISTIVE LISTENING SYSTEM (ALS)

1. Provide Permanent (**complete**) operational system and install to meet ADA requirements, in accordance with California Building Code Section 1104B.2. Minimum required; 4% of seating but not less than 2. Include the following:
 - a. Manufacturer: SENNHEISER, Old Lyme, Connecticut.
 - b. System: SZI 1015-T master transmitter/emitter combination system, Single Channel System AudioLink Personal Listening System.
 - c. Receivers: RI-150.

E. NO SMOKING SIGNS

1. Manufacturer: mysecuritysign.com or equal.
2. Size: 5 inches high by 7 inches wide
3. Legend: "THIS IS A SMOKE-FREE FACILITY THANK YOU FOR NOT SMOKING"
4. Material: Polished rigid polycarbonate construction, subsurface, exterior application.
5. Provide fasteners and adhesive sticks for proper pole and wall mountings.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install equipment specialties according to manufacturer's recommended procedures.
- B. Provide electrical and mechanical [irrigation] connections to building systems. Wire internal connections when part of unit's functionality.
- C. Install with wall and floor anchors per manufacturer's recommendations.

END OF SECTION

SECTION 11 51 13

LIBRARY CONTROLS

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Electronic library security system.

1.02 SUBMITTALS

- A. Shop drawings indicating, plan layout of equipment, mounting bolt dimensions, conduit and outlet locations, power requirements and wiring diagrams.
- B. Provide product data on sensing antennae, controls, scanners and all equipment specified.
- C. Manufacturer's installation instructions.
- D. Samples of sensitized cards illustrating size, coding and copy.
- E. Project Record Documents
 - 1. Accurately record actual locations of buried conduit and control wiring.
- F. Operation and Maintenance Data
 - 1. Include data for maintaining operating equipment, training personnel, changing security access code and spare parts.

1.03 QUALITY ASSURANCE

- A. Manufacturer: Company specializing in library controls with five years experience.
- B. Installer: Company specializing in installing and adjusting library controls with five years experience approved by manufacturer.

1.04 COORDINATION

- A. Coordinate the placement of equipment frames and anchors.
- B. Coordinate the placement of conduit and accessories and the power wiring to operating equipment.

1.05 MAINTENANCE SERVICE

- A. Furnish complete service and maintenance of operating equipment for a period of one year from Date of Certified Completion.

1.06 EXTRA STOCK

- A. Provide 5000 extra detection labels each, for start-up operations.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Products of the following manufacturer or supplier form the basis for design and quality intended.
 - 1. 3M, Library Systems, St. Paul, MN
 - 2. Sentry Technology Corp., KNOGO Systems
 - 3. Checkpoint Systems Inc.
- B. Or equal as approved in accordance with Division 01 General Requirements for substitutions.

2.02 MATERIALS AND EQUIPMENT

- A. Detection System:
 - 1. 3M, Library Systems Model 3M 3801 one corridor.
 - 2. Corridor Width: Minimum 42 inches.
 - 3. Mounting: buried cable.
- B. Detection Labels:
 - 1. Type: Flexible, programmed security strips:
 - a. 3M, Library Systems B1 Security Strips, "Tattle-Tape", adhesive one side for book spines.
 - b. 3M, Library Systems DCD-2 for CDs and CD-ROMs, "Tattle-Tape".
 - c. 3M, Library Systems DVM-1 for video cassettes, "Tattle-Tape".
 - d. 3M, Library Systems DAC-1 audio cassettes, "Tattle-Tape".
 - 2. Quantities: 5000 each detection labels or strips specified above.
- C. Self checkout system:
 - 1. Series Model 3M V Series with cabinet "kiosk" SelfCheck Unit: Interface with automated circulation system. Reads library labels and strips of library items.
 - a. Model V2, barcode self-service and Tattle-Tape Security Strip technology, with multiple book detection.
 - b. Plastic laminate for cabinet units: NEMA LD 3, ASTM E84, Class B, Decorative High Pressure Laminate, General Purpose type, 0.028 at vertical surfaces. Conform to Section 16, of the Woodwork Institute (WI) Manual of Millwork. Colors: Specified in Section 09 06 00.
- D. Circulation Accessories, 3M, Library Systems:
 - 1. Staff Work Station: Model 946.
 - 2. Resensitizer: Model 2011 (magnetic media) (Audio and Video Cassettes).

3. Desensitizer: Model 763 (magnetic media) (Audio and Video Cassettes).
4. Bookcheck Desensitizer/Resensitizer: Model 942 [943 with barcode scanner], Security Strips on printed materials, DVDs, CDs (non magnetic).

2.03 FINISHES

- A. Color for detection system: Pantone Cool Gray 4C.
- B. Finishes and graphics for Panels: Specified in Section 09 06 00.
- C. Colors for Casework: Specified in Section 09 06 00.

PART 3 - EXECUTION

3.01 INSPECTION

- A. Verify that locations scheduled for equipment installation are ready to receive work and dimensions are as indicated on shop drawings.
- B. Verify that proper power supply is available.
- C. Beginning of installation means acceptance of existing surfaces.

3.02 INSTALLATION

- A. Install library control system and components in accordance with manufacturer's instructions for buried cables. Provide all conduit and wiring as required to make system operable.
- B. Conform to CACRM for provisions for the physically disabled.

3.03 TEST AND ADJUST

- A. Test and adjust system for proper function.

END OF SECTION

SECTION 11 51 23
LIBRARY SHELVING

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes:
1. Steel-bracket shelving.
 2. Wood-case shelving.

1.02 ACTION SUBMITTALS

- A. Product Data: For each type of product.
1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for library stack systems and accessories.
- B. Shop Drawings:
1. Include plans, elevations, sections, and details.
 2. Show clear-aisle widths from face of units.
 3. Detail fabrication and installation of library stack systems including methods of anchoring to building structure at locations recommended by manufacturer and as required for seismic restraint.
- C. Samples for Verification: For the following products, one of each, in manufacturer's standard sizes:
1. Each type of specialized shelving.
 2. End panels.
 3. Top panels.

1.03 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.

1.04 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For library stack systems to include in maintenance manuals.

1.05 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Shelf Units: Five percent of quantity installed for each size and type indicated, but no fewer than 10 units.

1.06 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.

1.07 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of library stack systems that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Deterioration of metals, metal finishes, and other materials beyond normal wear.
 - 2. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

- A. Seismic Performance: Library stack systems shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.

2.02 STEEL-BRACKET SHELVING

- A. Steel-Bracket Shelving: ANSI Z39.73, shelving designed for library use and consisting of two uprights and two spreaders per section forming a four-sided frame, with adjustable shelves on one or both sides of uprights cantilever-hung by brackets.
 - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Tensco.
- B. Bookstack Units :
 - 1. Type: Mechanically fastened, self-supporting units .
 - 2. Configuration: Double -faced units with gusset plates.
 - 3. Width: 36 inches.
 - 4. Height: As Indicated.

5. Shelf Depth: As indicated.
 6. Base Support: Base shelf.
 - a. Base Shelf Style: Flat with integral backstop.
 7. Shelves: Provide types, configurations, and number of shelves indicated.
- C. Frames:
1. Uprights: Steel channels, 0.060 inch thick, with slots to receive shelf bracket tabs at 1 inch o.c.
 - a. Sloped Display Frames: Where indicated, provide upright post frames with additional steel angles, 0.060 inch thick, 36 inches high, slotted to receive shelving and welded to frame or gusset plates at 10-degree angle to allow better visibility of lower two shelves.
 2. Spreaders: Tube steel, 0.060 inch thick.
 3. Longitudinal Bracing: Provide one diagonal steel rod with turnbuckles for each of three units in each range of shelving.
 4. Reinforcing Gusset Plates: Triangular steel plates, 0.060 inch thick, with return flange along bottom edge.
- D. Adjustable Shelves: 0.048-inch- thick cold-rolled steel sheet. Provide two brackets per shelf; 0.060-inch- thick cold-rolled steel.
- E. Base Shelves: One-piece shelves, 0.048-inch- thick cold-rolled steel sheet, designed to receive and fit snugly around uprights, with kick plate 3 inches high. Provide two brackets per base shelf; 0.060-inch- thick cold-rolled steel sheet, with return flange along bottom edge. Provide perforated bases at locations where base shelves cover supply-air grilles.
- F. Support Feet: Square steel tube, 0.060 inch thick, with black vinyl caps at open ends of tube shape, designed to receive and fit snugly around uprights, extending from both faces of double-faced units or one face of single-faced units.
- G. Levelers: Adjustable pin levelers at carpeted surfaces and adjustable glides elsewhere.
- H. End Panels: Provide one at end of each range.
1. Veneer-Faced End Panels: 3/4 to 1 inch thick.
 - a. Style: Flat, square top.
 - b. Face: Wood veneer or high-pressure decorative laminate as indicated.
- I. Canopy Tops: Provide full length of each range with manufacturer's standard attachment brackets for type of top indicated.
1. Steel Top Panels: Cold-rolled steel sheet, 0.048 inch thick, with smooth finish.
- J. Back Panels: Provide one-piece panels at each single-faced unit; 0.048-inch- thick cold-rolled steel sheet, with smooth finish, sized to completely fill space between uprights.

2.03 WOOD-CASE SHELVING

- A. Wood-Case Library Shelving: Shelving designed for library use and consisting of base frame and full end, top, and back panels, with end panels made to receive pins to support adjustable shelves.
 - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Worden Company.
- B. Bookstack Units :
 - 1. Type: Self-supporting units.
 - 2. Width: 36 inches.
 - 3. Height: As indicated.
 - 4. Shelf Depth: As indicated.
 - 5. Shelves: Provide styles, configurations, and numbers of shelves indicated.
- C. Base Frames: Solid hardwood toe kick, back rail, and two end cleats, 3 to 4 inches high, designed to support bottom shelf and fabricated to attach and tie together vertical panels.
- D. Bottom Shelf: Solid hardwood boards glued together, 3/4 inch thick, or veneer panels, 1 inch thick, with 1/4-inch solid-wood banding.
- E. Adjustable Shelves:
 - 1. Adjustable Wood Shelves: Panels consisting of solid hardwood boards glued together, 3/4 inch thick, or veneer panels, 1 inch thick, with 1/4-inch solid-wood banding, and grooved on underside to rest securely on supporting pins.
- F. End Panels: Panels consisting of veneer-faced panels, five or nine ply, 1 inch thick, with 1/4-inch solid-wood banding. Provide two rows of holes at 1-1/4-inch intervals for 5/16-inch shelf-support pins on one side of end panels and both sides of intermediate panels.
- G. Tops: 3/4- to 1-inch- thick veneer-faced panels banded with 2- to 3-inch solid hardwood fasciae on one side for single-faced units and on two sides for double-faced units, fabricated to attach and tie together vertical panels.
- H. Back Panels: Veneer-faced panels, 1/4 inch thick, at each single-faced unit.
- I. Divider Panels: Veneer-faced panels, 1/4 inch thick, at each double-faced unit.

2.04 WOOD MATERIALS

- A. Veneer-Faced Panels: HPVA HP-1, with face veneer of species indicated, with Grade A faces
 - 1. Face Veneer Species and Cut: European chestnut, plain sliced, unless indicated otherwise.
 - 2. Staining and Finish: Match Architect's samples.
- B. Edgebanding: Minimum 1/8-inch- thick solid wood of same species as face veneer.
 - 1. Colors: Match Architect's samples.
- C. Slatwall: Manufacturer's standard slatwall end panel consisting of grooved medium-density fiberboard ready to accept slatwall hangers and display units.
 - 1. Colors: As selected by Architect from manufacturer's full range.

2.05 GENERAL FINISH REQUIREMENTS

- A. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.06 STEEL FINISHES

- A. Baked-Enamel or Powder-Coat Finish: Manufacturer's standard two-coat, baked-on finish consisting of prime coat and thermosetting topcoat to achieve a minimum dry film thickness of 2 mils.
 - 1. Color and Gloss: As selected by Architect from manufacturer's full range.

2.07 WOOD FINISHES

- A. Finishing: Apply manufacturer's standard, baked, clear finish consisting of a sealer and a UV-curing resin topcoat. Sand and wipe clean between applications of sealer and topcoat.

2.08 ACCESSORIES

- A. Floor Anchors: Galvanized steel, post-installed expansion anchors power-actuated fasteners or threaded concrete screws.
- B. Wall Anchors: Manufacturer's standard galvanized-steel anchors.
- C. Top Bracing: Minimum 1- by 1-3/4-inch transverse struts, 0.048-inch- thick steel channels, welded or bolted to top of stack units and securely fastened to structure.

- D. Filler Panels: Provide corner peninsula and intermediate wall filler panels; 0.048-inch-thick cold-rolled steel, with fitted caps, in color and finish to match shelving. Locate where indicated to fill gaps at abutting shelving units.
- E. Adjustable Shelf Dividers: One-piece, steel shelf partitions, with hooks or tabs to fit in slots in divider shelves.
 - 1. Provide five per shelf.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine areas, with Installer present, for compliance with requirements for installation tolerances, location of framing and reinforcements, and other conditions affecting performance of library stack systems.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Vacuum finished floor and wet mop resilient flooring over which shelving is to be installed.
- B. Before installing wood-case shelving or veneer-faced panels, condition materials to average prevailing humidity in installation areas for a minimum of 48 hours unless longer conditioning is recommended by manufacturer.

3.03 INSTALLATION

- A. Install library stack systems at locations indicated on Drawings and according to manufacturer's written instructions.
- B. Enclosure Panels: Install end panels and canopy tops with concealed fasteners.
- C. Level and plumb bookstack units to a tolerance of 1/8 inch in 96 inches.
- D. Filler Panels: Install corner peninsula and intermediate wall filler panels where indicated to fill gaps at abutting shelving units.
- E. Install type of shelves at locations indicated and at spacing indicated or, if not indicated, at equal spacing in each unit.

3.04 ANCHORAGE

- A. Bookstack Anchorage: Install bookstacks using floor anchors, wall anchors, or top bracing in locations recommended by manufacturer and as indicated on Shop Drawings.

3.05 CLEANING AND PROTECTING

- A. Repair or remove and replace defective work as directed on completion of installation.
- B. Clean finished surfaces, touch up as required, and remove or refinish damaged or soiled areas to match original factory finish, as approved by Architect.
- C. Protect installed products from damage during remainder of the construction period.

END OF SECTION

SECTION 11 52 13

PROJECTION SCREENS

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Projection screens.
 - 1. Manually operated.

1.02 SUBMITTALS

- A. Shop Drawings: Showing case dimensions, mounting requirements and materials.
- B. Product Data: Showing fabric dimensions, finish, border type and accessories.
- C. Manufacturer's Installation Instructions: Indicating installation procedures and component installation sequence, clearances and tolerances from adjacent construction and maintenance.

1.03 FIELD MEASUREMENTS

- A. Verify that field measurements are as indicated on Shop Drawings.

1.04 COORDINATION

- A. Coordinate Work with ceiling construction.

1.05 FIRE CLASSIFICATION REQUIREMENTS

- A. Materials shall be inherently fire-retardant or treated with flame retardant solution approved by the State Fire Marshal in accordance with Title 19, CCR Division 01, Chapter 8, Article 8.
- B. ASTM E84 all materials shall have flame spread of less than 25 and smoke developed of less than 450.
- C. California Fire Code, Section 807.4.2.2. Class B required, 26 - 75 Flame Spread.
- D. NFPA 701- Standard Methods of Fire Tests Flame-Resistant Textiles and Films.
- E. FS 191A/5760 Mildew Resistant of Textile Materials.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Products of following manufacturers form basis for design and quality intended.
 - 1. DA-LITE Screen Co., Inc., Warsaw, IN.
 - 2. Bretford Manufacturing Inc., Van Nuys, CA.
 - 3. Draper Inc., Spiceland, IN.
- B. Or equal as approved in accordance with Division 01, General Requirements for substitutions.

2.02 COMPONENTS

- A. Product: DA-LITE Advantage Manual.
 - 1. RECESSED ceiling mounting type. Recessed in Ceiling, unit hanger-bracket suspended from 3/8" threaded rods attached from building structure. Provide attachment hardware to complete suspension.
 - 2. Screen: Flame retardant, mildew resistant Matte White with black masking borders standard on flame retardant and mildew resistant fabric, mounted on ball bearing rigid steel spring roller (1-3/4" diameter for widths 70" or less, 3" diameter for widths 84" and over).
 - 3. Equip with Controlled Screen Return (CSR) to control return speed of screen surface back into case. Fabric to be permanently attached to roller by metal clips on fabric edge being forced into groove in roller. Provide clip every 3 inches along fabric edge and double clips shall be used on ends.
 - 4. Top, front, and back of case to be made of extruded aluminum. End caps : Heavy gauge steel with provisions for attaching mounting hardware. Bottom of case to have removable access door. Entire case: Painted white. Bottom of case to be self-trimming, with built-in flange around bottom of case.
 - 5. Bottom of screen shall be formed into pocket holding tubular metal slat. An extruded aluminum saddle with zinc plated steel pull shall be attached to slat by four screws on each end. Heavy-duty plastic caps shall protect ends of slat.
 - 6. Metal bumper stops, padded with sponge rubber, shall be built into case to prevent slat wedging inside case. Roller mounting brackets to be adjustable to allow centering or offsetting the screen within case.
 - 7. Provide pull rod.
- B. ACCESSORIES
 - 1. Manufacturer's Hardware: Wall Mounted, mounting brackets and with hangers, hanger length as selected by Architect. [Ceiling Mounted, suspension from building structure with 3/32 stainless steel aircraft cable, thimbles, wire grips, stainless steel grommets and cable anchors or 12 gauge hanger wires.]

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify site conditions.
- B. Verify that prepared openings are ready to receive work and opening dimensions are as indicated on shop drawings.
- C. Verify that structure above ceiling is accessible to secure cable suspension system.

3.02 INSTALLATION

- A. Install mounting hardware, minimum two suspension assemblies per unit. Attach anchorages to building structure.
 - 1. Suspend from building structure with 3/32 stainless steel aircraft cables, thimbles, wire grips, stainless steel grommets, cable anchors and hooks. Install 4 wires in splay manner at 90 degrees to each other and 45 degrees from vertical.
- B. Install unit assembly in accordance with manufacturer's instructions.

3.03 ERECTION TOLERANCES

- A. Maximum Variation of Unit From Plumb: 1/4 inch.

END OF SECTION

SECTION 12 24 13

ROLLER SHADES

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Light-filtering shades.
- B. Manual Operation.
- C. Metal housings.

1.02 REFERENCES

- A. Chapters 8, 2010 California Building Code.

1.03 SYSTEM DESCRIPTION

- A. Shades installed at window openings, manual control of raising and lowering.

1.04 SUBMITTALS

- A. Shop drawings indicating opening sizes, tolerances required, installation of shade at window opening, method of attachment, clearances and operation.
- B. Product data indicating physical and dimensional characteristics and operating features.
- C. Three samples illustrating materials and finish.
- D. Manufacturer's installation instructions and maintenance instructions.

1.05 QUALITY ASSURANCE

- A. Manufacturer: Company specializing in manufacturing the products specified in this Section with minimum five years experience.
- B. Fire Classification Requirements
 - 1. Flame Resistant Requirements: All materials shall be "Nonflammable" or "Flame retardant" materials in accordance with requirements of CCR Title 19, Division 1, Chapter 1 Article 3.08 and Chapter 8 Regulations Relating to Flame-Retardant Chemicals, Fabrics and Application Concerns. Flame-Retardant Materials: Permanently attach label to each curtain indicating whether curtain is permanently and inherently flame retardant or whether it will require re-treatment after dry cleaning, and the following:
 - a. The Seal of Registration of the State Fire Marshal of California.

- b. Name and registration number of the concern responsible for the job or production.
 - c. Name of the registered chemical used or the registered fabric or material.
 - d. Date of the chemical was applied, or the fabric or material was produced.
 - e. The statement: "This article must be re-treated after washing or drycleaning by systems with soap and water added" (if treated with a "Type II" chemical).
2. ASTM E84 and Chapter 8 California Building Code for Fire Resistive Standards. UBC Standard No. 8-1, all materials shall have flame spread of less than 25 and smoke developed of less than 450.

C. Field Samples

1. Construct a field sample panel for one opening illustrating complete shade assembly with operable hardware and accessories.
2. Provide field sample after submitted shop drawings are approved.
3. Locate where approved.
4. If accepted, field sample will demonstrate minimum standard for the Work. Field sample may remain as part of the Work.

1.06 DELIVERY, STORAGE AND HANDLING

- A. Deliver shades wrapped and crated in a manner to prevent damage to components or marring of surfaces.
- B. Store in a clean, dry area, laid flat and blocked off ground to prevent sagging, twisting or warping.

1.07 WARRANTIES

- A. Operating Components: 5 years from Date of Certified Completion and contain provisions that installation is to remain operational without fault for the warranty period and include all operating parts, including shade-cloth.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Products of the following manufacturers form the basis for design and quality intended.
 1. Castec Inc, North Hollywood, CA
 2. Draper Inc, Spiceland, IN
 3. Hauser Shade Co, Richmond, CA
 4. Hunter Douglas Fabrication Co, Poway, CA
 5. Mariak Contract, Rancho Dominguez, CA
 6. MechoShade Systems Inc, Long Island City, NY
 7. Skyco Shading Systems Inc, Santa Ana, CA
 8. Solar Shading Systems, Costa Mesa, CA

- B. Or equal as approved in accordance with Division 01 General Requirements for substitutions.

2.02 FABRIC

- A. Fire retardancy: Federal Specification CCC-C-521E, NFPA 701, anti-microbial without topical treatment. Class A Flame Spread ASTM E84.
- B. Bottom Hem: Backstitched with corrosive-resistant metal hem bar, concealed. Closed ends.
- C. Shade Orientation: Regular roll.
- D. Colors: refer to Section 09 06 00 Schedules of Finishes.

2.03 CONTROLS

A. Manual Control:

1. Drive Bracket / Brake Assembly: MechoShade Model M5 or equal, integrated with unit accessories.
2. Roller Tube: Minimum sized; 1-1/2 inch O.D. aluminum 6063-T5 tube for shades up to 65 square feet or 2-1/2 inch O.D. aluminum 6063-T5 for shades up to 85 square feet [1 inch steel roller for shades up to 65 square feet], reversible for left or right operation.
3. Clutch mechanism: Manufacturer's recommended for 1 inch roller and 2 in. tube or equal.
4. Shade Mounting Spline: Extruded vinyl "Snap-Loc" spline with asymmetrical insertion-locking channels and embossed shade cloth guide, enabling shade cloth to be removed without having to remove the tube from the retainer brackets.
5. Control Loop: Endless #10 Stainless Steel ball chain.

B. Components

1. Brackets: Minimum 0.125 inch thick steel.
2. Bottom Weight: 1 x 1/8 inch aluminum, hemmed in fabric.
3. Fascia Panel: Snap type, minimum 0.062 inch thick extruded aluminum angle, and removable closures, baked enamel finish, 3-inch profile, fully concealed brackets. Color to be selected by Architect.

- C. Mounting: surface-mounted unit, with closure end caps at surface mounted. Interior of pocket: painted flat black.

- D. Corners: 45 degree, miter-cut inside and outside corners.

2.04 ACCESSORIES

- A. Fascia: continuous removable extruded fascia that attaches to shade mounting brackets without the use of adhesives, magnetic strips or exposed fasteners. Fascia shall be able to be installed across two or more shade bands in one piece. Fully concealed brackets. Notching of fascia for manual chain shall not be acceptable.
- B. Closure and Closure Mounts: aluminum, 2 inches closure and closure mounts with tile support.

2.05 FINISHES

- A. Aluminum Components: baked enamel, color to be selected by Architect.
- B. Steel Components: Factory color coated with manufacture's baked-enamel finish. Color to be selected by Architect.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify that openings are ready to receive the work.
- B. Do not commence fabrication until field measurements are confirmed.
- C. Ensure structural supports are correctly placed.
- D. Beginning of installation means installer accepts existing surfaces.

3.02 INSTALLATION

- A. Install shades in accordance with manufacturer's instructions.
- B. Secure in place with flush countersunk fasteners.

3.03 TOLERANCES

- A. Maximum Variation of Gap at Window Opening Perimeter: 1/4 inch.
- B. Maximum Offset From Level: 1/8 inch.

3.04 ADJUSTING

- A. Adjust shades for smooth operation.

3.05 CLEANING

- A. Touch up and repair minor damage. Remove and replace damaged units that cannot be satisfactorily repaired in the opinion of the Owner.
- B. Clean exposed surfaces per manufacturer's instructions.

END OF SECTION

SECTION 12 35 59

DISPLAY CASEWORK DOORS

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Glass doors and hardware for display cases.
- B. Trim and accessories.

1.02 SUBMITTALS

- A. Shop drawings indicating, wall elevations, dimensions, joint locations, special anchor details.
- B. Product data.
- C. Three samples illustrating materials and finish, color and texture of materials.
- D. Manufacturer's installation instructions.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Products of following manufacturers form basis for design and quality intended.
 - 1. Blumcraft of Pittsburgh, Pittsburg, PA.
- B. Or equal as approved in accordance with Section 01 60 00 for substitutions.

2.02 MATERIALS

- A. Steel: Stainless steel, satin finish. Model: Glass door series 1301-SM.
- B. Glass Doors: 1/4 inch tempered safety glass furnished under this section.
- C. Doors Hardware: 1-1/4 x 1-1/4 rails frames and accessory components and anchoring, rigidity independent of glass, fitted with lever type cam lock No. 7150.
- D. Glass Shelves: 1/4 inch tempered safety glass, polished edges. Provided under separate section.

2.03 ACCESSORIES

- A. Manufacturer's standard size and type for model specified.

2.04 FINISHES

- A. Stainless Steel: satin finish.

PART 3 - EXECUTION

3.01 INSPECTION

- A. Verify that surfaces and internal wall blocking are ready to receive work.
- B. Beginning of installation means acceptance of substrate construction.

3.02 INSTALLATION

- A. Install cases in accordance with manufacturer's instructions.
- B. Establish unit height and locations.
- C. Secure units level and plumb.

3.03 CLEANING

- A. Clean glass and steel surfaces in accordance with manufacturer's instructions.
- B. Cover glass surfaces with protective cover, taped to frame.
- C. Remove protective cover at Date of Certified Completion.

END OF SECTION

SECTION 12 48 13

ENTRANCE MATS

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Aluminum frame entrance mats.

1.02 REFERENCES

A. ASTM International

1. E 648 Standard Test Method for Critical Radiant Flux of Flooring Systems Using a Radiant Energy Source.
2. E 662 Test Method for Specific Optical Density of Smoke Generated by Solid Materials.
3. D 2047 Standard Test Method for Static Coefficient of Friction as Measured by the James Machine.
4. F 710 Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring.
5. F 1482 Standard Guide to Wood Underlayment Products Available for Use Under Resilient Flooring.
6. D-2859 Standard Test Method for Ignition Characteristics of Finished Textile Floor Covering Materials.
7. D-1630 Standard Test Method for Rubber Property-Abrasion Resistance (Footwear Abrader)

B. Other Referenced Documents

1. National Fire Protection Association (NFPA): NFPA 255, Test Method for Critical Radiant Flux of Floor Covering Systems Using a Radiant Energy Source.
2. National Fire Protection Association (NFPA): NFPA 258 Test Method for Specific Density of Smoke Generated by Solid Materials.
3. California State Title 24, Section 3306 (r).
4. California Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65).
5. The Collaborative for High Performance Schools (CHPS)
6. Title 16, CFR Chapter II, Subchapter D, Part 1630, Standard for the Surface Flammability of Carpets and Rugs (FF-70):

1.03 SUBMITTALS

- A. Shop drawings.
- B. Product data indicating mat characteristics, component dimensions recessed frame and details, and manufacturer's list of standard colors.
- C. Two samples illustrating pattern, color, finish and edging for mat materials and frame members.

- D. Maintenance data from manufacturer including cleaning instructions, stain removal procedures and location of replacement materials.

1.04 WARRANTY

- A. Provide manufacturer's two year warranty from date of acceptance.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Products of following manufacturer or supplier form basis for design and quality intended:
 - 1. Aluminum Frame
 - a. Construction Specialties, Inc., San Marcos, CA
 - b. Pawling Corporation, Wassaic, NY
 - c. Reese Enterprises, Huntington Beach, CA
 - d. Balco, Inc., Wichita, KS
 - e. Arden Architectural Specialties, Inc., Saint Paul, MN
 - f. Bolar Inc. Quebec, Canada.

- B. Or equal as approved in accordance with Division 01, General Requirements for substitutions.

2.02 MATERIALS

- A. Aluminum Frame
 - 1. Basis of Design: Construction Specialties, Inc. CS Pedisystems.
 - 2. PEDIGRID G1: Recessed, Level Base Frame
 - a. Tread Rails: Aluminum, 6063 T52 alloy, structurally joined to aluminum key lock bars, alloy 6061 T6, spaced 10 inches on centers maximum. No welding or bolting permitted. Finish: Standard natural mill finish.
 - b. Framing: 6063 T52 aluminum alloy, coped at corners and assembled with No. 14 stainless steel screws. Surfaces in contact with masonry shall receive one shop coat of zinc chromate primer. Finish: Standard mill.
 - c. Loading: Minimum 200 pounds per square foot. required.
 - d. Series 1500A Abrasive Tread, color to be selected from manufacturer's standard list.
 - e. Grid Module Size: 1-1/2 inch deep, 1-1/2 inch wide.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify that floor openings are ready to receive work.
- B. Verify field measurements are as shown on shop drawings.
- C. Beginning of installation means acceptance of existing conditions.

3.02 PREPARATION

- A. Verify size of floor recess before fabricating mats.
- B. Vacuum clean floor recess.

3.03 INSTALLATION

- A. Install mat frames integrally with principal pour of concrete floor system. Locate, align and level frame members accurately. Position grooves transverse to direction of traffic.
- B. Install recessed frames and entrance mats to comply with manufacturer's instructions at locations indicated and with top of frames and mats in proper relationship to one another and to adjoining finished flooring. Set mat tops at proper height for most effective cleaning actions; coordinate top of mat surfaces with doors that swing across mats. To provide under door clearance.
 - 1. Where frame is embedded in grout, provide necessary shims, spacers and anchorages for proper location and secure attachment.
 - 2. Provide anchorage according to 2010 CBC Section 1133B.1.1.1.3.
- C. Install surface type units to comply with manufacturers instructions at locations indicated and coordinate with entrance locations and traffic patterns.
- D. Protection: Upon completion of frame installation and concrete work, provide temporary filler of plywood or fiberboard in mat recesses and cover frame with plywood protective flooring. Maintain protection until construction traffic ended and project is near time of Certified Completion.

3.04 TOLERANCES

- A. Maximum Gap Allowed Between Recessed Frame and Adjacent Flooring: 1/16 inch.

END OF SECTION

SECTION 12 52 19

BUILT-IN SEATING UNITS

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Special fabricated seating units.
- B. Built-in and freestanding seating units.
- C. Upholstered Seating.
- D. Related Section: Section 09 06 00 Schedules for Finishes.

1.02 REFERENCES

- A. PS 1 - Construction and Industrial Plywood.
- B. HPVA-1 – Hardwood and Veneer Association, Hardwood and Decorative Plywood .
- C. PS 58 - Basic Hardwood.
- D. Chapters 8, 16 and 11 Section 1104B.3, California Building Code.
- E. Technical Bulletins 116, 117 and 133, Bureau of Home Furnishings and Thermal Insulation, Department of Consumer Affairs, State of California.
- F. ADA – Americans with Disabilities Act of 1990
 - 1. ADA Standards – ADA Title II Regulations and the 2010 ADA Standards for Accessible Design.
- G. CACRM - California Access Compliance Reference Manual, based on the 2010 California Building Code.

1.03 SUBMITTALS

- A. Shop Drawings showing materials, component profiles and elevations, assembly methods, joint details and fastening methods.
- B. Three samples illustrating surface materials.
- C. Certification that materials comply with technical Bulletins 116, 117 and 133, Bureau of Home Furnishings.
- D. Submit 5-year experience certification.

1.04 QUALITY ASSURANCE

- A. Statement shall appear prominently on the shop drawings certifying that all casework construction complies the structural requirements of Table 1607.1 California Building Code, Horizontal Force Factor for Anchorage of Non-Structural Components.
- B. Surface materials shall comply with Table 803.5 California Building Code, minimum Class II, flame spread less than 75.

1.05 QUALIFICATIONS

- A. Fabricator: Company specializing in manufacturing the products specified in this section with minimum five years experience.

1.06 PRE-INSTALLATION CONFERENCE

- A. Convene two weeks prior to commencing work of this section.

1.07 DELIVERY, STORAGE AND HANDLING

- A. Protect units from moisture and damage.

1.08 FIELD MEASUREMENTS

- A. Verify field measurements.

1.09 COORDINATION

- A. Coordinate the work with electrical rough-in and floor finish sections.

1.10 WARRANTY

- A. Submit under Provisions of Division 01, General Requirements.
- B. The entire installation shall be guaranteed against faulty materials and workmanship for a period of five years from date of Certified Completion.

PART 2 - PRODUCTS

2.01 WOOD MATERIALS

- A. Hardwood Lumber: PS 58; species as selected by manufacturer.

2.02 SHEET MATERIALS

- A. Softwood Plywood: HPVA -1; APA A-D, Group 1, Exposure 1, 3/4 inch thick.

2.03 MANUFACTURERS - SEATING

- A. Products of the following manufacturers form the basis for design and quality intended.
 - 1. Shelby Williams Industries, Inc., Chicago, IL.
 - 2. Universal Seating Co., Newport Beach, CA.
 - 3. Hauser Industries, Ontario, Canada.
- B. Or equal as approved in accordance with Division 01, General Requirements for substitutions.

2.04 MATERIALS

- A. Backs:
 - 1. Back Supports: Plywood back supports.
 - 2. Upholstery Panel: Minimum 7/16 inch plywood, compound formed.
 - 3. Pad: Polyurethane foam, 4 inches thick, tufted, fabric cement-bonded to plywood upholstery panel.
- B. Seats:
 - 1. Plywood base covered with polyurethane foam and fabric.
 - 2. Permanent Seat Pads: Polyurethane foam, 4 inches thick, variable density, clipped or stapled to pan; fabric cement-bonded to pad and bottom of steel seat pan.
- C. Refer to Section 09 06 00 Schedules for Finishes.

2.05 UPHOLSTERY MATERIALS

- A. Fabric: As scheduled in Section 09 06 00.
- B. Moisture Barrier Backing: Vinyl barrier laminated to the back of upholstery fabrics, moisture proof. By SBI Fabric and Textile Finishing Services, Athens, TX. Or equal.
- C. Adhesive: Contact adhesive type recommended by manufacturer, water resistant.
- D. Fasteners: Size and type to suit application, concealed.
- E. Bolts, Nuts, Washers, Lags, Pins and Screws: Of size and type to suit application, concealed.
- F. Polyurethane Foam lining recommended by manufacturer, over coil springs.

2.06 FINISHING MATERIALS

- A. Stain, Varnish and Finishing Materials: as specified in Section 09 90 00.

2.07 FABRICATION

- A. Shop assemble upholstered units for delivery to site in units easily handled and to permit passage through building openings.
- B. When necessary to cut and fit on site, provide materials with ample allowance for cutting. Provide trim for scribing and site cutting.
- C. Fit corners and joints hairline, secure with concealed fasteners.
- D. Fully upholstered top and sides with double stitched detail around perimeter and vertical corners.
- E. Fabricate units with removable seats. Conform to profiles and dimensions indicated on drawings.
- F. Feet are maple solids in all standard finishes.

2.08 FINISHING

- A. Sand exposed woodwork smooth and set exposed nails and screws.
- B. Apply wood filler in exposed nail and screw indentations.
- C. Seal surfaces in contact with cementitious materials.

PART 3 - EXECUTION

3.01 INSPECTION

- A. Verify adequacy of backing and furniture support framing.

3.02 INSTALLATION

- A. Set and secure upholstered units in place rigid, plumb and level. Secure units to walls or floors or both.
- B. Use fixture attachments in concealed locations for wall-mounted components.
- C. Use concealed joint fasteners to align and secure adjoining units.
- D. Carefully scribe casework abutting other components with maximum gaps of 1/32 inch. Do not use additional overlay trim for this purpose.
- E. Secure units to floor using appropriate angles, cleats and anchorages.

3.03 CLEANING

A. Clean fabric.

3.04 SCHEDULE

A. Furniture Units: as noted in drawings

END OF SECTION

SECTION 21 13 13

WET-PIPE SPRINKLER SYSTEMS

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. Pipes, fittings, and specialties.
 2. Fire-protection valves.
 3. Fire-department connections.
 4. Sprinklers.
 5. Alarm devices.
 6. Manual control stations.
 7. Control panels.
 8. Pressure gages.

1.3 DEFINITIONS

- A. Standard-Pressure Sprinkler Piping: Wet-pipe sprinkler system piping designed to operate at working pressure of 175 psig maximum.

1.4 SYSTEM DESCRIPTIONS

- A. Wet-Pipe Sprinkler System: Automatic sprinklers are attached to piping containing water and that is connected to water supply through alarm valve. Water discharges immediately from sprinklers when they are opened. Sprinklers open when heat melts fusible link or destroys frangible device. Hose connections are included if indicated.

1.5 PERFORMANCE REQUIREMENTS

- A. Standard-Pressure Piping System Component: Listed for 175-psig minimum working pressure.

B. Delegated Design: Design sprinkler system(s), including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

1. Available fire-hydrant flow test records indicate the following conditions:

- a. Date: TBD.
- b. Time: TBD.
- c. Performed by: Idyllwild Water District.
- d. Test location: TBD.
- e. Static Pressure at Residual Fire Hydrant R: TBD.
- f. Measured Flow at Flow Fire Hydrant F: TBD
- g. Residual Pressure at Residual Fire Hydrant R: TBD.

C. Sprinkler system design shall be approved by authorities having jurisdiction.

1. Margin of Safety for Available Water Flow and Pressure: 10 percent, including losses through water-service piping, valves, and backflow preventers.

2. Sprinkler Occupancy Hazard Classifications:

- a. Building Service Areas: Ordinary Hazard, Group 1
- b. Electrical Equipment Rooms: Ordinary Hazard, Group 1
- c. General Storage Areas: Ordinary Hazard, Group 1
- d. Libraries except Stack Areas: Light Hazard
- e. Library Stack Areas: Ordinary Hazard, Group 2
- f. Machine Shops: Ordinary Hazard, Group 2
- g. Mechanical Equipment Rooms: Ordinary Hazard, Group 1
- h. Office and Public Areas: Light Hazard
- i. Printing Plants: Extra Hazard, Group 1

3. Minimum Density for Automatic-Sprinkler Piping Design:

- a. Light-Hazard Occupancy: 0.10 gpm over 1500-sq. ft. area.
- b. Ordinary-Hazard, Group 1 Occupancy: 0.15 gpm over 1500-sq. ft. area.
- c. Ordinary-Hazard, Group 2 Occupancy: 0.20 gpm over 1500-sq. ft. > area.
- d. Extra-Hazard, Group 1 Occupancy: 0.30 gpm over 2500-sq. ft. area.
- e. Extra-Hazard, Group 2 Occupancy: 0.40 gpm over 2500-sq. ft. > area.
- f. Special Occupancy Hazard: As determined by authorities having jurisdiction.

4. Maximum Protection Area per Sprinkler: Per UL listing.

5. Maximum Protection Area per Sprinkler:

- a. Office Spaces: 225 sq. ft.
- b. Storage Areas: 130 sq. ft.
- c. Mechanical Equipment Rooms: 130 sq. ft.

- d. Electrical Equipment Rooms: 130 sq. ft.
 - e. Other Areas: According to NFPA 13 recommendations unless otherwise indicated.
6. Total Combined Hose-Stream Demand Requirement: According to NFPA 13 unless otherwise indicated:
- a. Light-Hazard Occupancies: 100 gpm for 30 minutes.
 - b. Ordinary-Hazard Occupancies: 250 gpm for 60 to 90 minutes.
 - c. Extra-Hazard Occupancies: 500 gpm for 90 to 120 minutes
- D. Seismic Performance: Sprinkler piping shall withstand the effects of earthquake motions determined according to NFPA 13.

1.6 SUBMITTALS

- A. Product Data: For each type of product indicated. The Contractor shall submit a product data submittal with the shop drawings. Manufacturer's Data Sheets shall show the type and model of all equipment or material proposed. This information shall include type of pipe, bracing, hangers, valves, pipe fittings/joining methods, sprinklers, water-flow devices, supervisory devices, fire department connections, escutcheons, signage, and other equipment and components that are proposed for the Project. When a Data Sheet shows more than one product, the specific proposed product shall be clearly indicated by arrows or other suitable means.
- B. Shop Drawings: For wet-pipe sprinkler systems. Include plans, elevations, sections, details, and attachments to other work.
- 1. Wiring Diagrams: For power, signal, and control wiring.
- C. Delegated-Design Submittal: For sprinkler systems indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
- D. Coordination Drawings: Sprinkler systems, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:
- 1. Domestic water piping.
 - 2. Items penetrating finished ceiling include the following:
 - a. Lighting fixtures.
 - b. Air outlets and inlets.
- E. Qualification Data: For qualified Installer.

- F. Approved Sprinkler Piping Drawings: Working plans, prepared according to NFPA 13, that have been approved by authorities having jurisdiction, including hydraulic calculations if applicable.
- G. Welding certificates.
- H. Fire-hydrant flow test report.
- I. Field Test Reports and Certificates: Indicate and interpret test results for compliance with performance requirements and as described in NFPA 13. Include "Contractor's Material and Test Certificate for Aboveground Piping."
- J. Field quality-control reports.
- K. Operation and Maintenance Data: For sprinkler specialties to include in emergency, operation, and maintenance manuals.

1.7 QUALITY ASSURANCE

- A. Installer Qualifications:
 - 1. Installer's responsibilities include designing, fabricating, and installing sprinkler systems and providing professional engineering services needed to assume engineering responsibility. Base calculations on results of fire-hydrant flow test.
 - a. Engineering Responsibility: Preparation of working plans, calculations, and field test reports by a qualified professional engineer.
- B. Welding Qualifications: Qualify procedures and operators according to ASME Boiler and Pressure Vessel Code.
- C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- D. NFPA Standards: Sprinkler system equipment, specialties, accessories, installation, and testing shall comply with the following:
 - 1. NFPA 13, "Installation of Sprinkler Systems."
 - 2. NFPA 24, "Installation of Private Fire Service Mains and Their Appurtenances."
 - 3. NFPA 72, "National Fire Alarm Code"
 - 4. NFPA 70, "National Electrical Code"

1.8 PROJECT CONDITIONS

- A. Interruption of Existing Sprinkler Service: Do not interrupt sprinkler service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary sprinkler service according to requirements indicated:
1. Notify Construction Manager and Owner no fewer than two days in advance of proposed interruption of sprinkler service.
 2. Do not proceed with interruption of sprinkler service without Construction Manager's and Owner's written permission.

1.9 COORDINATION

- A. Coordinate layout and installation of sprinklers with other construction that penetrates ceilings, including light fixtures, HVAC equipment, and partition assemblies.

1.10 EXTRA MATERIALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
1. Sprinkler Cabinets: Finished, wall-mounted, steel cabinet with hinged cover, and with space for minimum of six spare sprinklers plus sprinkler wrench. Include number of sprinklers required by NFPA 13 and sprinkler wrench. Include separate cabinet with sprinklers and wrench for each type of sprinkler used on Project.

PART 2 - PRODUCTS

2.1 PIPING MATERIALS

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

2.2 STEEL PIPE AND FITTINGS

- A. Standard Weight, Galvanized and Black Steel Pipe: ASTM A 53/A 53M, Type E Pipe ends may be factory or field formed to match joining method.

- B. Schedule 30, Galvanized and Black-Steel Pipe: ASTM A 135; ASTM A 795/A 795M, Type E or ASME B36.10M, wrought steel; with wall thickness not less than Schedule 30 and not more than Schedule 40. Pipe ends may be factory or field formed to match joining method.
- C. Schedule 10, Black-Steel Pipe: ASTM A 135 or ASTM A 795/A 795M, Schedule 10 in NPS 5 and smaller; and NFPA 13-specified wall thickness in NPS 6 to NPS 10 plain end.
- D. Galvanized and Black-Steel Pipe Nipples: ASTM A 733, made of ASTM A 53/A 53M, standard-weight, seamless steel pipe with threaded ends.
- E. Galvanized and Uncoated, Steel Couplings: ASTM A 865, threaded.
- F. Galvanized and Uncoated, Gray-Iron Threaded Fittings: ASME B16.4, Class 125, standard pattern.
- G. Malleable- or Ductile-Iron Unions: UL 860.
- H. Cast-Iron Flanges: ASME 16.1, Class 125.
- I. Steel Flanges and Flanged Fittings: ASME B16.5, Class 150.
- J. Steel Welding Fittings: ASTM A 234/A 234M and ASME B16.9.
- K. Grooved-Joint, Steel-Pipe Appurtenances:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following
 - a. Anvil International, Inc.
 - b. Corcoran Piping System Co.
 - c. National Fittings, Inc.
 - d. Shurjoint Piping Products.
 - e. Tyco Fire & Building Products LP.
 - f. Victaulic Company.
 - 2. Pressure Rating: 300 psig minimum.
 - 3. Galvanized and Uncoated, Grooved-End Fittings for Steel Piping: ASTM A 47/A 47M, malleable-iron casting or ASTM A 536, ductile-iron casting; with dimensions matching steel pipe.
 - 4. Grooved-End-Pipe Couplings for Steel Piping: AWWA C606 and UL 213, rigid pattern, unless otherwise indicated, for steel-pipe dimensions. Include ferrous housing sections, EPDM-rubber gasket, and bolts and nuts.

L. Steel Pressure-Seal Fittings: UL 213, FM-approved, 175-psig pressure rating with steel housing, rubber O-rings, and pipe stop; for use with fitting manufacturers' pressure-seal tools.

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

a. Victaulic Company.

2.3 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.

1. Class 125, Cast-Iron Flanges and Class 150, Bronze Flat-Face Flanges: Full-face gaskets.

2. Class 250, Cast-Iron Flanges and Class 300, Steel Raised-Face Flanges: Ring-type gaskets.

B. Metal, Pipe-Flange Bolts and Nuts: ASME B18.2.1, carbon steel unless otherwise indicated.

C. Brazing Filler Metals: AWS A5.8/A5.8M, BCuP Series, copper-phosphorus alloys for general-duty brazing unless otherwise indicated.

D. Welding Filler Metals: Comply with AWS D10.12M/D10.12 for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.

2.4 COVER SYSTEM FOR SPRINKLER PIPING

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

1. DecoShield Systems, Inc.

B. Description: System of support brackets and covers made to protect sprinkler piping.

C. Brackets: Glass-reinforced nylon.

2.5 LISTED FIRE-PROTECTION VALVES

A. General Requirements:

1. Valves shall be UL listed or FM approved.
2. Minimum Pressure Rating for Standard-Pressure Piping: 175 psig.

B. Ball Valves:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Nibco
 - b. United
2. Standard: UL 1091 except with ball instead of disc.
3. Valves NPS 1-1/2 and Smaller: Bronze body with threaded ends.
4. Valves NPS 2 and NPS 2-1/2: Bronze body with threaded ends or ductile-iron body with grooved ends.
5. Valves NPS: Ductile-iron body with grooved ends.

C. Bronze Butterfly Valves:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Fivalco Inc.
 - b. Global Safety Products, Inc.
 - c. Milwaukee Valve Company.
2. Standard: UL 1091.
3. Pressure Rating: 175 psig.
4. Body Material: Bronze.
5. End Connections: Threaded.

D. Iron Butterfly Valves:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Anvil International, Inc.
 - b. Fivalco Inc.
 - c. Global Safety Products, Inc.
 - d. Kennedy Valve; a division of McWane, Inc.

- e. Milwaukee Valve Company.
 - f. NIBCO INC.
 - g. Pratt, Henry Company.
 - h. Shurjoint Piping Products.
 - i. Tyco Fire & Building Products LP.
 - j. Victaulic Company.
2. Standard: UL 1091.
 3. Pressure Rating: 175 psig.
 4. Body Material: Cast or ductile iron.
 5. Style: Lug or wafer.
 6. End Connections: Grooved.

E. Check Valves:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. AFAC Inc.
 - b. American Cast Iron Pipe Company; Waterous Company Subsidiary.
 - c. Anvil International, Inc.
 - d. Clow Valve Company; a division of McWane, Inc.
 - e. Crane Co.; Crane Valve Group; Crane Valves.
 - f. Crane Co.; Crane Valve Group; Jenkins Valves.
 - g. Crane Co.; Crane Valve Group; Stockham Division.
 - h. Fire-End & Croker Corporation.
 - i. Fire Protection Products, Inc.
 - j. Fivalco Inc.
 - k. Globe Fire Sprinkler Corporation.
 - l. Groeniger & Company.
 - m. Kennedy Valve; a division of McWane, Inc.
 - n. Matco-Norca.
 - o. Metraflex, Inc.
 - p. Milwaukee Valve Company.
 - q. Mueller Co.; Water Products Division.
 - r. NIBCO INC.
 - s. Potter Roemer.
 - t. Reliable Automatic Sprinkler Co., Inc.
 - u. Shurjoint Piping Products.
 - v. Tyco Fire & Building Products LP.
 - w. United Brass Works, Inc.
 - x. Venus Fire Protection Ltd.
 - y. Victaulic Company.
 - z. Viking Corporation.
 - aa. Watts Water Technologies, Inc.

2. Standard: UL 312.
3. Pressure Rating: 300 psig.
4. Type: Swing check.
5. Body Material: Cast iron.
6. End Connections: Flanged or grooved.

F. Bronze OS&Y Gate Valves:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Crane Co.; Crane Valve Group; Crane Valves.
 - b. Crane Co.; Crane Valve Group; Stockham Division.
 - c. Milwaukee Valve Company.
 - d. NIBCO INC.
 - e. United Brass Works, Inc.
2. Standard: UL 262.
3. Pressure Rating: 175 psig.
4. Body Material: Bronze.
5. End Connections: Threaded.

G. Iron OS&Y Gate Valves:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. American Cast Iron Pipe Company; Waterous Company Subsidiary.
 - b. American Valve, Inc.
 - c. Clow Valve Company; a division of McWane, Inc.
 - d. Crane Co.; Crane Valve Group; Crane Valves.
 - e. Crane Co.; Crane Valve Group; Jenkins Valves.
 - f. Crane Co.; Crane Valve Group; Stockham Division.
 - g. Hammond Valve.
 - h. Milwaukee Valve Company.
 - i. Mueller Co.; Water Products Division.
 - j. NIBCO INC.
 - k. Shurjoint Piping Products.
 - l. Tyco Fire & Building Products LP.
 - m. United Brass Works, Inc.
 - n. Watts Water Technologies, Inc.
2. Standard: UL 262.
3. Pressure Rating: 300 psig.

4. Body Material: Cast or ductile iron.
5. End Connections: Flanged or grooved.

H. Indicating-Type Butterfly Valves:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Anvil International, Inc.
 - b. Fivalco Inc.
 - c. Global Safety Products, Inc.
 - d. Kennedy Valve; a division of McWane, Inc.
 - e. Milwaukee Valve Company.
 - f. NIBCO INC.
 - g. Shurjoint Piping Products.
 - h. Tyco Fire & Building Products LP.
 - i. Victaulic Company.
2. Standard: UL 1091.
3. Pressure Rating: 175 psig minimum.
4. Valves NPS 2 and Smaller:
 - a. Valve Type: Ball or butterfly.
 - b. Body Material: Bronze.
 - c. End Connections: Threaded.
5. Valves NPS 2-1/2 and Larger:
 - a. Valve Type: Butterfly.
 - b. Body Material: Cast or ductile iron.
 - c. End Connections: Flanged, grooved, or wafer.
6. Valve Operation: Integral electrical, 115-V ac, prewired, single-circuit, supervisory switch electrical, 115-V ac, prewired, two-circuit, supervisory switch visual indicating device.

I. NRS Gate Valves:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. American Cast Iron Pipe Company; Waterous Company Subsidiary.
 - b. American Valve, Inc.
 - c. Clow Valve Company; a division of McWane, Inc.
 - d. Crane Co.; Crane Valve Group; Stockham Division.

- e. Kennedy Valve; a division of McWane, Inc.
 - f. Mueller Co.; Water Products Division.
 - g. NIBCO INC.
 - h. Tyco Fire & Building Products LP.
2. Standard: UL 262.
 3. Pressure Rating: 300 psig
 4. Body Material: Cast iron with indicator post flange.
 5. Stem: Nonrising.
 6. End Connections: Flanged or grooved.

J. Indicator Posts:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. American Cast Iron Pipe Company; Waterous Company Subsidiary.
 - b. American Valve, Inc.
 - c. Clow Valve Company; a division of McWane, Inc.
 - d. Crane Co.; Crane Valve Group; Stockham Division.
 - e. Kennedy Valve; a division of McWane, Inc.
 - f. Mueller Co.; Water Products Division.
 - g. NIBCO INC.
 - h. Tyco Fire & Building Products LP.
2. Standard: UL 789.
3. Type: Horizontal for wall mounting.
4. Body Material: Cast iron with extension rod and locking device.
5. Operation: Wrench

2.6 TRIM AND DRAIN VALVES

A. General Requirements:

1. Standard: UL's "Fire Protection Equipment Directory" listing or "Approval Guide," published by FM Global, listing.
2. Pressure Rating: 175 psig minimum.

B. Angle Valves:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Fire Protection Products, Inc.

- b. United Brass Works, Inc.

C. Ball Valves:

- 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Affiliated Distributors.
 - b. Anvil International, Inc.
 - c. Barnett.
 - d. Conbraco Industries, Inc.; Apollo Valves.
 - e. Fire-End & Croker Corporation.
 - f. Fire Protection Products, Inc.
 - g. Flowserve.
 - h. FNW.
 - i. Jomar International, Ltd.
 - j. Kennedy Valve; a division of McWane, Inc.
 - k. Kitz Corporation.
 - l. Legend Valve.
 - m. Metso Automation USA Inc.
 - n. Milwaukee Valve Company.
 - o. NIBCO INC.
 - p. Potter Roemer.
 - q. Red-White Valve Corporation.
 - r. Southern Manufacturing Group.
 - s. Stewart, M. A. and Sons Ltd.
 - t. Tyco Fire & Building Products LP.
 - u. Victaulic Company.
 - v. Watts Water Technologies, Inc.

D. Globe Valves:

- 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Fire Protection Products, Inc.
 - b. United Brass Works, Inc.

E. Plug Valves:

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

- a. Southern Manufacturing Group.

2.7 SPECIALTY VALVES

A. General Requirements:

1. Standard: UL's "Fire Protection Equipment Directory" listing or "Approval Guide," published by FM Global, listing.
2. Pressure Rating:
 - a. Standard-Pressure Piping Specialty Valves: 175 psig minimum.
 - b. High-Pressure Piping Specialty Valves: 300 psig .
3. Body Material: Cast or ductile iron.
4. Size: Same as connected piping.
5. End Connections: Flanged or grooved.

2.8 FIRE-DEPARTMENT CONNECTIONS

Fire department connections shall be located on the front access side of buildings, fully visible and recognizable from the street or nearest point of fire department vehicle access or as otherwise approved by the fire Chief. The location of fire department connections shall be approved and installed in accordance with Section as follows:

1. Within 50 feet of an approved roadway or driveway and arranged so that hose lines can be readily attached to the inlets without interference from any nearby objects including buildings, fences, posts, plantings, or other fire department connections and or otherwise approved by the Fire Chief.
2. Within 200 feet of an approved hydrant.
3. So that the inlet height shall not be less than 18 inches or more than 48 inches above grade.
4. Guard posts or other approved means may be required to protect fire department inlet connections from vehicular damage.
5. Fire department connection shall not be allowed in the rear of any building.

All FDC installations shall be "stand alone" all connections will join the sprinkler systems above the check valve in accordance with NFPA 13 "Handbook" 2002 Exhibit 8.29.

Fire Department Connections shall be properly supported per section 5.9.1.2.

B. Exposed-Type, Fire-Department Connection:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
2. Basis-of-Design Product: Subject to compliance with requirements, provide [product indicated on Drawings] <Insert manufacturer's name; product name or designation> or comparable product by one of the following:
 - a. AFAC Inc.
 - b. Elkhart Brass Mfg. Company, Inc.
 - c. Fire-End & Croker Corporation.
 - d. Fire Protection Products, Inc.
 - e. GMR International Equipment Corporation.
 - f. Guardian Fire Equipment, Inc.
 - g. Tyco Fire & Building Products LP.
 - h. Wilson & Cousins Inc.
3. Standard: UL 405.
4. Type: Exposed, projecting, for wall mounting.
5. Pressure Rating: 175 psig (1200 kPa) minimum.
6. Body Material: Corrosion-resistant metal.
7. Inlets: Brass with threads according to NFPA 1963 and matching local fire-department sizes and threads. Include extension pipe nipples, brass lugged swivel connections, and check devices or clappers.
8. Caps: Brass, lugged type, with gasket and chain.
9. Escutcheon Plate: Round, brass, wall type.
10. Outlet: Back, with pipe threads.
11. Number of Inlets: Two.
12. Escutcheon Plate Marking: Similar to "AUTO SPKR."
13. Finish: Polished chrome plated.
14. Outlet Size: NPS 4.
15. All FDC installations

C. Flush-Type, Fire-Department Connection:

1. Manufacturers: Subject to compliance with requirements, [provide products by one of the following] [available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following]:
2. Basis-of-Design Product: Subject to compliance with requirements, provide [product indicated on Drawings] <Insert manufacturer's name; product name or designation> or comparable product by one of the following:
 - a. AFAC Inc.
 - b. Elkhart Brass Mfg. Company, Inc.
 - c. GMR International Equipment Corporation.
 - d. Guardian Fire Equipment, Inc.
 - e. Potter Roemer.
 - f. <Insert manufacturer's name>.

3. Standard: UL 405.
4. Type: Flush, for wall mounting.
5. Pressure Rating: 175 psig (1200 kPa) minimum.
6. Body Material: Corrosion-resistant metal.
7. Inlets: Brass with threads according to NFPA 1963 and matching local fire-department sizes and threads. Include extension pipe nipples, brass lugged swivel connections, and check devices or clappers.
8. Caps: Brass, lugged type, with gasket and chain.
9. Escutcheon Plate: Rectangular, brass, wall type.
10. Outlet: With pipe threads.
11. Body Style: Vertical.
12. Number of Inlets: Two.
13. Outlet Location: Bottom.
14. Escutcheon Plate Marking: Similar to "AUTO SPKR."
15. Finish: Polished chrome plated.
16. Outlet Size: NPS 4.

D. Yard-Type, Fire-Department Connection:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
2. Basis-of-Design Product: Subject to compliance with requirements, provide [product indicated on Drawings] <Insert manufacturer's name; product name or designation> or comparable product by one of the following:
 - a. AFAC Inc.
 - b. Elkhart Brass Mfg. Company, Inc.
 - c. Fire-End & Croker Corporation.
 - d. Fire Protection Products, Inc.
 - e. GMR International Equipment Corporation.
 - f. Guardian Fire Equipment, Inc.
 - g. Wilson & Cousins Inc.
3. Standard: UL 405.
4. Type: Exposed, freestanding.
5. Pressure Rating: 175 psig minimum.
6. Body Material: Corrosion-resistant metal.
7. Inlets: Brass with threads according to NFPA 1963 and matching local fire-department sizes and threads. Include extension pipe nipples, brass lugged swivel connections, and check devices or clappers.
8. Caps: Brass, lugged type, with gasket and chain.
9. Escutcheon Plate: Round, brass, floor type.
10. Outlet: Bottom, with pipe threads.
11. Number of Inlets: Two.
12. Sleeve: Brass.
13. Sleeve Height: 18 inches.
14. Escutcheon Plate Marking: Similar to "AUTO SPKR."

15. Finish, Including Sleeve: Polished chrome plated.
16. Outlet Size: NPS 4.

2.9 SPRINKLER SPECIALTY PIPE FITTINGS

A. Branch Outlet Fittings:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Anvil International, Inc.
 - b. National Fittings, Inc.
 - c. Shurjoint Piping Products.
 - d. Tyco Fire & Building Products LP.
 - e. Victaulic Company.
 - f. Merit
2. Standard: UL 213.
3. Pressure Rating: 175 psig minimum.
4. Body Material: Ductile-iron housing with EPDM seals and bolts and nuts.
5. Type: Mechanical-T and -cross fittings.
6. Configurations: Snap-on and strapless, ductile-iron housing with branch outlets.
7. Size: Of dimension to fit onto sprinkler main and with outlet connections as required to match connected branch piping.
8. Branch Outlets: Grooved, plain-end pipe, or threaded.

B. Flow Detection and Test Assemblies:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. AGF Manufacturing Inc.
 - b. Reliable Automatic Sprinkler Co., Inc.
 - c. Tyco Fire & Building Products LP.
 - d. Victaulic Company.
2. Standard: UL's "Fire Protection Equipment Directory" listing or "Approval Guide," published by FM Global, listing.
3. Pressure Rating: 175 psig minimum
4. Body Material: Cast- or ductile-iron housing with orifice, sight glass, and integral test valve.
5. Size: Same as connected piping.
6. Inlet and Outlet: Threaded.

C. Branch Line Testers:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Elkhart Brass Mfg. Company, Inc.
 - b. Fire-End & Croker Corporation.
 - c. Potter Roemer.
2. Standard: UL 199.
3. Pressure Rating: 175 psig .
4. Body Material: Brass.
5. Size: Same as connected piping.
6. Inlet: Threaded.
7. Drain Outlet: Threaded and capped.
8. Branch Outlet: Threaded, for sprinkler.

D. Sprinkler Inspector's Test Fittings:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. AGF Manufacturing Inc.
 - b. Triple R Specialty.
 - c. Tyco Fire & Building Products LP.
 - d. Victaulic Company.
 - e. Viking Corporation.
 - f. <Insert manufacturer's name>.
2. Standard: UL's "Fire Protection Equipment Directory" listing or "Approval Guide," published by FM Global, listing.
3. Pressure Rating: 175 psig minimum .
4. Body Material: Cast- or ductile-iron housing with sight glass.
5. Size: Same as connected piping.
6. Inlet and Outlet: Threaded.

E. Adjustable Drop Nipples:

1. Manufacturers: Subject to compliance with requirements, [provide products by one of the following] [available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following]:
 - a. CECA, LLC.
 - b. Corcoran Piping System Co.
 - c. Merit Manufacturing; a division of Anvil International, Inc.

d.

2. Standard: UL 1474.
3. Pressure Rating: 250 psig minimum.
4. Body Material: Steel pipe with EPDM-rubber O-ring seals.
5. Size: Same as connected piping.
6. Length: Adjustable.
7. Inlet and Outlet: Threaded.

F. Flexible, Sprinkler Hose Fittings:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Fivalco Inc.
 - b. FlexHead Industries, Inc.
 - c. Gateway Tubing, Inc.
2. Standard: UL 1474.
3. Type: Flexible hose for connection to sprinkler, and with bracket for connection to ceiling grid.
4. Pressure Rating: 175 psig minimum
5. Size: Same as connected piping, for sprinkler.

2.10 SPRINKLERS

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

1. AFAC Inc.
2. Globe Fire Sprinkler Corporation.
3. Reliable Automatic Sprinkler Co., Inc.
4. Tyco Fire & Building Products LP.
5. Venus Fire Protection Ltd.
6. Victaulic Company.
7. Viking Corporation.

B. General Requirements:

1. Standard: UL's "Fire Protection Equipment Directory" listing or "Approval Guide," published by FM Global, listing.
2. Pressure Rating for Residential Sprinklers: 175 psig maximum.

3. Pressure Rating for Automatic Sprinklers: 175 psig minimum.

C. Automatic Sprinklers with Heat-Responsive Element:

1. Nonresidential Applications: UL 199
2. Characteristics: Nominal 1/2-inch orifice with Discharge Coefficient K of 5.6, and for "Ordinary" temperature classification rating unless otherwise indicated or required by application.

D. Sprinkler Finishes:

1. Chrome plated.
2. Bronze.
3. Painted.

E. Special Coatings:

1. Wax.
2. Lead.
3. Corrosion-resistant paint.

F. Sprinkler Escutcheons: Materials, types, and finishes for the following sprinkler mounting applications. Escutcheons for concealed, flush, and recessed-type sprinklers are specified with sprinklers.

1. Ceiling Mounting: Chrome-plated steel, one piece, flat, Chrome-plated steel, two piece, with 1-inch vertical adjustment..
2. Sidewall Mounting: Chrome-plated steel one piece, flat.

G. Sprinkler Guards:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Reliable Automatic Sprinkler Co., Inc.
 - b. Tyco Fire & Building Products LP.
 - c. Victaulic Company.
 - d. Viking Corporation.
2. Standard: UL 199.
3. Type: Wire cage with fastening device for attaching to sprinkler.

2.11 ALARM DEVICES

A. Alarm-device types shall match piping and equipment connections.

B. Electrically Operated Alarm Bell:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Fire-Lite Alarms, Inc.; a Honeywell company.
 - b. Notifier; a Honeywell company.
 - c. Potter Electric Signal Company.
2. Standard: UL 464.
3. Type: Vibrating, metal alarm bell.
4. Size: 8-inch minimum diameter.
5. Finish: Red-enamel factory finish, suitable for outdoor use.

C. Water-Flow Indicators:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. ADT Security Services, Inc.
 - b. McDonnell & Miller; ITT Industries.
 - c. Potter Electric Signal Company.
 - d. System Sensor; a Honeywell company.
 - e. Viking Corporation.
 - f. Watts Industries (Canada) Inc.
2. Standard: UL 346.
3. Water-Flow Detector: Electrically supervised.
4. Components: Two single-pole, double-throw circuit switches for isolated alarm and auxiliary contacts, 7 A, 125-V ac and 0.25 A, 24-V dc; complete with factory-set, field-adjustable retard element to prevent false signals and tamperproof cover that sends signal if removed.
5. Type: Paddle operated.
6. Pressure Rating: 250 psig
7. Design Installation: Horizontal or vertical.

D. Valve Supervisory Switches:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Fire-Lite Alarms, Inc.; a Honeywell company.
 - b. Kennedy Valve; a division of McWane, Inc.
 - c. Potter Electric Signal Company.

- d. System Sensor; a Honeywell company.
2. Standard: UL 346.
3. Type: Electrically supervised.
4. Components: Single-pole, double-throw switch with normally closed contacts.
5. Design: Signals that controlled valve is in other than fully open position.

E. Indicator-Post Supervisory Switches:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Potter Electric Signal Company.
 - b. System Sensor; a Honeywell company.
2. Standard: UL 346.
3. Type: Electrically supervised.
4. Components: Single-pole, double-throw switch with normally closed contacts.
5. Design: Signals that controlled indicator-post valve is in other than fully open position.

2.12 MANUAL CONTROL STATIONS

- A. Description: UL listed or FM approved, hydraulic operation, with union, NPS 1/2 (DN 15) pipe nipple, and bronze ball valve. Include metal enclosure labeled "MANUAL CONTROL STATION" with operating instructions and cover held closed by breakable strut to prevent accidental opening.

2.13 CONTROL PANELS

- A. Description: Single-area, two-area, or single-area cross-zoned control panel as indicated, including NEMA ICS 6, Type 1 enclosure, detector, alarm, and solenoid-valve circuitry for operation of deluge valves. Panels contain power supply; battery charger; standby batteries; field-wiring terminal strip; electrically supervised solenoid valves and polarized fire-alarm bell; lamp test facility; single-pole, double-throw auxiliary alarm contacts; and rectifier.
 1. Panels: UL listed and FM approved when used with thermal detectors and Class A detector circuit wiring. Electrical characteristics are 120-V ac, 60 Hz, with 24-V dc rechargeable batteries.
 2. Manual Control Stations: Electric operation, metal enclosure, labeled "MANUAL CONTROL STATION" with operating instructions and cover held closed by breakable strut to prevent accidental opening.
 3. Manual Control Stations: Hydraulic operation, with union, NPS 1/2 (DN 15) pipe nipple, and bronze ball valve. Include metal enclosure labeled "MANUAL

CONTROL STATION" with operating instructions and cover held closed by breakable strut to prevent accidental opening.

2.14 PRESSURE GAGES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. AMETEK; U.S. Gauge Division.
 - 2. Ashcroft, Inc.
 - 3. Brecco Corporation.
 - 4. WIKA Instrument Corporation.
- B. Standard: UL 393.
- C. Dial Size: 3-1/2- to 4-1/2-inch diameter.
- D. Pressure Gage Range: 0 to 300 psig
- E. Water System Piping Gage: Include "WATER" or "AIR/WATER" label on dial face.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Perform fire-hydrant flow test according to NFPA 13 and NFPA 291. Use results for system design calculations required in "Quality Assurance" Article.
- B. Report test results promptly and in writing.

3.2 SERVICE-ENTRANCE PIPING

- A. Connect sprinkler piping to water-service piping for service entrance to building. Comply with requirements for exterior piping in Division 21 Section "Facility Fire-Suppression Water-Service Piping."
- B. Install shutoff valve, check valve, pressure gage, and drain at connection to water service.

3.3 WATER-SUPPLY CONNECTIONS

- A. Connect sprinkler piping to building's interior water-distribution piping. Comply with requirements for interior piping in Division 22 Section "Domestic Water Piping."
- B. Install shutoff valve, backflow preventer, pressure gage, drain, and other accessories indicated at connection to water-distribution piping. Comply with requirements for backflow preventers in Division 22 Section "Domestic Water Piping Specialties."
- C. Install shutoff valve, check valve, pressure gage, and drain at connection to water supply.

3.4 PIPING INSTALLATION

- A. Locations and Arrangements: Drawing plans, schematics, and diagrams indicate general location and arrangement of piping. Install piping as indicated, as far as practical.
 - 1. Deviations from approved working plans for piping require written approval from authorities having jurisdiction. File written approval with Architect before deviating from approved working plans.
- B. Piping Standard: Comply with requirements for installation of sprinkler piping in NFPA 13.
- C. Install seismic restraints on piping. Comply with requirements for seismic-restraint device materials and installation in NFPA 13.
- D. Use listed fittings to make changes in direction, branch takeoffs from mains, and reductions in pipe sizes.
- E. Install unions adjacent to each valve in pipes NPS 2 and smaller.
- F. Install flanges, flange adapters, or couplings for grooved-end piping on valves, apparatus, and equipment having NPS 2-1/2 and larger end connections.
- G. Install "Inspector's Test Connections" in sprinkler system piping, complete with shutoff valve, and sized and located according to NFPA 13 and in an owner approved location.
- H. Install sprinkler piping with drains for complete system drainage.
- I. Install automatic (ball drip) drain valve at each check valve for fire-department connection, to drain piping between fire-department connection and check valve. Install drain piping to and spill over floor drain or to outside building.
- J. Install alarm devices in piping systems.

- K. Install hangers and supports for sprinkler system piping according to NFPA 13. Comply with requirements for hanger materials in NFPA 13.
- L. Install pressure gages on riser or feed main, at each sprinkler test connection, and at top of each standpipe. Include pressure gages with connection not less than NPS 1/4 and with soft metal seated globe valve, arranged for draining pipe between gage and valve. Install gages to permit removal, and install where they will not be subject to freezing.
- M. Fill sprinkler system piping with water.
- N. Install sleeves for piping penetrations of walls, ceilings, and floors. Comply with requirements for sleeves specified in Division 21 Section "Sleeves and Sleeve Seals for Fire-Suppression Piping."
- O. Install sleeve seals for piping penetrations of concrete walls and slabs. Comply with requirements for sleeve seals specified in Division 21 Section "Sleeves and Sleeve Seals for Fire-Suppression Piping."
- P. Install escutcheons for piping penetrations of walls, ceilings, and floors. Comply with requirements for escutcheons specified in Division 21 Section "Escutcheons for Fire-Suppression Piping."

3.5 JOINT CONSTRUCTION

- A. Install couplings, flanges, flanged fittings, unions, nipples, and transition and special fittings that have finish and pressure ratings same as or higher than system's pressure rating for aboveground applications unless otherwise indicated.
- B. Install unions adjacent to each valve in pipes NPS 2 and smaller.
- C. Install flanges, flange adapters, or couplings for grooved-end piping on valves, apparatus, and equipment having NPS 2-1/2 and larger end connections.
- D. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.
- E. Remove scale, slag, dirt, and debris from inside and outside of pipes, tubes, and fittings before assembly.
- F. Flanged Joints: Select appropriate gasket material in size, type, and thickness suitable for water service. Join flanges with gasket and bolts according to ASME B31.9.
- G. 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.
- H. Welded Joints: Construct joints according to AWS D10.12M/D10.12, using qualified processes and welding operators according to "Quality Assurance" Article.
1. Shop weld pipe joints where welded piping is indicated. Do not use welded joints for galvanized-steel pipe.
- I. Steel-Piping, Cut-Grooved Joints: Cut square-edge groove in end of pipe according to AWWA C606. Assemble coupling with housing, gasket, lubricant, and bolts. Join steel pipe and grooved-end fittings according to AWWA C606 for steel-pipe joints.
- J. Steel-Piping, Roll-Grooved Joints: Roll rounded-edge groove in end of pipe according to AWWA C606. Assemble coupling with housing, gasket, lubricant, and bolts. Join steel pipe and grooved-end fittings according to AWWA C606 for steel-pipe grooved joints.
- K. Dissimilar-Material Piping Joints: Make joints using adapters compatible with materials of both piping systems.

3.6 INSTALLATION OF COVER SYSTEM FOR SPRINKLER PIPING

- A. Install cover system, brackets, and cover components for sprinkler piping according to manufacturer's "Installation Manual" and with NFPA 13 for supports.

3.7 VALVE AND SPECIALTIES INSTALLATION

- A. Install listed fire-protection valves, trim and drain valves, specialty valves and trim, controls, and specialties according to NFPA 13 and authorities having jurisdiction.
- B. Install listed fire-protection shutoff valves supervised open, located to control sources of water supply except from fire-department connections. Install permanent identification signs indicating portion of system controlled by each valve.
- C. Install check valve in each water-supply connection. Install backflow preventers instead of check valves in potable-water-supply sources.
- D. Specialty Valves:
1. General Requirements: Install in vertical position for proper direction of flow, in main supply to system.

3.8 SPRINKLER INSTALLATION

- A. Install sprinklers in suspended ceilings in center of acoustical ceiling panels or at twelve inches from edge of panel..
- B. Install sprinklers into flexible, sprinkler hose fittings and install hose into bracket on ceiling grid.

3.9 FIRE-DEPARTMENT CONNECTION INSTALLATION

Fire department connections shall be located on the front access side of buildings, fully visible and recognizable from the street or nearest point of fire department vehicle access or as otherwise approved by the fire Chief. The location of fire department connections shall be approved and installed in accordance with Section as follows:

- 1. Within 50 feet of an approved roadway or driveway and arranged so that hose lines can be readily attached to the inlets without interference from any nearby objects including buildings, fences, posts, plantings, or other fire department connections and or otherwise approved by the Fire Chief.
- 2. Within 200 feet of an approved hydrant.
- 3. So that the inlet height shall not be less than 18 inches or more than 48 inches above grade.
- 4. Guard posts or other approved means may be required to protect fire department inlet connections from vehicular damage.
- 5. Fire department connection shall not be allowed in the rear of any building.

All FDC installations shall be "stand alone" all connections will join the sprinkler systems above the check valve in accordance with NFPA 13 "Handbook" 2002 Exhibit 8.29.

Fire Department Connections shall be properly supported per section 5.9.1.2.

- B. Install wall-type, fire-department connections.
- C. Install yard-type, fire-department connections in concrete slab support. Comply with requirements for concrete in Division 03 Section "Cast-in-Place Concrete".
 - 1. Install two protective pipe bollards around each fire-department connection. Comply with requirements for bollards in Division 05 Section "Metal Fabrications".
- D. Install automatic (ball drip) drain valve at each check valve for fire-department connection.

3.10 IDENTIFICATION

- A. Install labeling and pipe markers on equipment and piping according to requirements in NFPA 13.
- B. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Division 26 Section "Identification for Electrical Systems."

3.11 FIELD QUALITY CONTROL

- A. Perform tests and inspections.
- B. Tests and Inspections:
 - 1. Leak Test: After installation, charge systems and test for leaks. Repair leaks and retest until no leaks exist.
 - 2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
 - 3. Flush, test, and inspect sprinkler systems according to NFPA 13, "Systems Acceptance" Chapter.
 - 4. Energize circuits to electrical equipment and devices.
 - 5. Coordinate with fire-alarm tests. Operate as required.
 - 6. Coordinate with fire-pump tests. Operate as required.
 - 7. Verify that equipment hose threads are same as local fire-department equipment.
- C. Sprinkler piping system will be considered defective if it does not pass tests and inspections.
- D. Prepare test and inspection reports.

3.12 CLEANING

- A. Clean dirt and debris from sprinklers.
- B. Remove and replace sprinklers with paint other than factory finish.

3.13 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain valves.

3.14 PIPING SCHEDULE

- A. Piping between Fire-Department Connections and Check Valves: Galvanized, standard-weight steel pipe with threaded ends; cast-iron threaded fittings; and threaded joints.
- B. Sprinkler specialty fittings may be used, downstream of control valves, instead of specified fittings.
- C. Standard-pressure, wet-pipe sprinkler system, NPS 1-1/2 and smaller, shall be the following:
 - 1. Schedule 40, black-steel pipe with threaded ends; uncoated, gray-iron threaded fittings; and threaded joints.
- D. Standard-pressure, wet-pipe sprinkler system, NPS 2 to NPS 4 shall be the following:
 - 1.
 - 2. Schedule 10 black-steel pipe with roll-grooved ends; uncoated, grooved-end fittings for steel piping; grooved-end-pipe couplings for steel piping; and grooved joints.
- E. Standard-pressure, wet-pipe sprinkler system, NPS 5 shall be one of the following:
 - 1. [
 - 2. Schedule 10, black-steel pipe with roll-grooved ends; uncoated, grooved-end fittings for steel piping; grooved-end-pipe couplings for steel piping; and grooved joints.

3.15 SPRINKLER SCHEDULE

- A. Use sprinkler types in subparagraphs below for the following applications:
 - 1. Rooms without Ceilings: Upright sprinklers
 - 2. Rooms with Suspended Ceilings: Pendent, recessed, flush, and concealed sprinklers as indicated.
 - 3. Wall Mounting: Sidewall sprinklers.
 - 4. Special Applications: quick-response sprinklers where indicated

B. Provide sprinkler types in subparagraphs below with finishes indicated.

1. Concealed Sprinklers: Rough brass, with factory-painted white cover plate.
2. Flush Sprinklers: Bright chrome, with painted white escutcheon.
3. Recessed Sprinklers: Bright chrome, with bright chrome escutcheon.
4. Upright Pendent and Sidewall Sprinklers: Chrome plated in finished spaces exposed to view; rough bronze in unfinished spaces not exposed to view; wax coated where exposed to acids, chemicals, or other corrosive fumes.

END OF SECTION

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SECTION 22 05 15

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 1 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, crawlspace, 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.

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 8 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.

2.2 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. Solder Filler Metals: ASTM B 32, lead-free alloys. Include water-flushable flux according to ASTM B 813.
- E. 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.
- F. Welding Filler Metals: Comply with AWS D10.12 for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.

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. Available Manufacturers:
 - a. Cascade Waterworks Mfg. Co.
 - b. Dresser Industries, Inc.; DMD Div.
 - c. Smith-Blair, Inc.
 - d. 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: 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, PVC four-part union. Include brass end, solvent-cement-joint end, rubber O-ring, and union nut.
 - 1. Available Manufacturers:

- a. NIBCO INC.
 - b. NIBCO, Inc.; Chemtrol Div.
- E. Flexible Transition Couplings for Underground Nonpressure 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. Available 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.
- 1. Available Manufacturers:
 - a. Capitol Manufacturing Co.
 - b. Central Plastics Company.
 - c. Epco Sales, Inc.
 - d. Watts Industries, Inc.; Water Products Div.
 - e. Zurn Industries, Inc.; Wilkins Div.
- D. Dielectric Flanges: Factory-fabricated, companion-flange assembly, for 150- or 300-psig minimum working pressure as required to suit system pressures.
- 1. Available Manufacturers:
 - a. Capitol Manufacturing Co.
 - b. Central Plastics Company.
 - c. Epco Sales, Inc.
 - d. Watts Industries, Inc.; Water Products Div.
- E. 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. Available 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.
- F. Dielectric Couplings: Galvanized-steel coupling with inert and noncorrosive, thermoplastic lining; threaded ends; and 300-psig minimum working pressure at 225 deg F.
 - 1. Available Manufacturers:
 - a. Calpico, Inc.
 - b. Lochinvar Corp.
- G. 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. Available 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. Available 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: Stainless 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. Underdeck Clamp: Clamping ring with set screws.

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. One-Piece, Floor-Plate Type: Cast-iron floor plate.
- E. Split-Casting, Floor-Plate Type: Cast brass with concealed hinge and set screw.

2.9 GROUT

- A. Description: ASTM C 1107, Grade B, nonshrink and nonmetallic, dry hydraulic-cement grout.
 - 1. Characteristics: Post-hardening, volume-adjusting, nonstaining, 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 1 Sections "Cutting and Patching" and "Selective 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 where indicated to be abandoned.
 - 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. Contractor shall submit deviations for approval.
- 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. Furnish drip pan under all piping running over electrical rooms, data rooms or telecommunication rooms with indirect drain line to spill over approved indirect waste receptor.
- H. Install piping at indicated slopes.
- I. Install piping free of sags and bends.

- J. Install fittings for changes in direction and branch connections.
- K. Install piping to allow application of insulation.
- L. Select system components with pressure rating equal to or greater than system operating pressure.
- M. 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. Bare Piping at Wall and Floor Penetrations in Finished Spaces: One-piece, cast-brass type with polished chrome-plated finish.
 - d. Bare Piping at Ceiling Penetrations in Finished Spaces: One-piece or split-casting, cast-brass type with polished chrome-plated finish.
 - e. Bare Piping in Unfinished Service Spaces: One-piece, cast-brass type with polished chrome-plated finish.
 - f. Bare Piping in Equipment Rooms: One-piece, cast-brass type.
 - g. 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 or exposed-rivet 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 Ceiling Penetrations in Finished Spaces: Split-casting, cast-brass type with chrome-plated finish.
 - e. Bare Piping in Unfinished Service Spaces: Split-casting, cast-brass type with polished chrome-plated finish.
 - f. Bare Piping in Equipment Rooms: Split-casting, cast-brass type.
 - g. Bare Piping at Floor Penetrations in Equipment Rooms: Split-casting, floor-plate type.
- N. Sleeves are not required for core-drilled holes. Provide sealant around annular space between pipe and core-drilled holes.
- 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 7 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 7 Section "Joint Sealants" for materials and installation.
- Q. Aboveground, 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 firestop materials. Refer to Division 7 Section "Through-Penetration Firestop Systems" 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.

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 9 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 3 Section "Cast-in-Place Concrete."

3.8 ERECTION OF METAL SUPPORTS AND ANCHORAGES

- A. Refer to Division 5 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

- 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

SECTION 22 05 19

METERS AND GAGES FOR PLUMBING PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Thermometers.
2. Gages.
3. Test plugs.

B. Related Sections:

1. Division 2 Section "Water Distribution" for domestic and fire-protection water service meters outside the building.
2. Division 22 Section "Domestic Water Piping" for domestic and fire-protection water service meters inside the building.
3. Division 22 Section "Facility Natural-Gas Piping" for gas meters.

1.3 DEFINITIONS

- A. CR: Chlorosulfonated polyethylene synthetic rubber.
- B. EPDM: Ethylene-propylene-diene terpolymer rubber.

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated; include performance curves.
- B. Shop Drawings: Schedule for thermometers and gages indicating manufacturer's number, scale range, and location for each.
- C. Product Certificates: For each type of thermometer and gage, signed by product manufacturer.

PART 2 - PRODUCTS

2.1 METAL-CASE, LIQUID-IN-GLASS THERMOMETERS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Palmer - Wahl Instruments Inc.
 - 2. Terice, H. O. Co.
 - 3. Weiss Instruments, Inc.
 - 4. Weksler Instruments Operating Unit; Dresser Industries; Instrument Div.
- B. Case: Chrome-plated brass, 9 inches long.
- C. Tube: Red or blue reading, organic-liquid filled, with magnifying lens.
- D. Tube Background: Satin-faced, nonreflective aluminum with permanently etched scale markings.
- E. Window: Plastic.
- F. Connector: Adjustable type, 180 degrees in vertical plane, 360 degrees in horizontal plane, with locking device.
- G. Stem: Copper-plated steel, aluminum, or brass for thermowell installation and of length to suit installation.
- H. Accuracy: Plus or minus 1 percent of range or plus or minus 1 scale division to maximum of 1.5 percent of range.

2.2 BIMETALLIC-ACTUATED DIAL THERMOMETERS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Ashcroft Commercial Instrument Operations; Dresser Industries; Instrument Div.
 - 2. Eugene Ernst Products Co.
 - 3. Palmer - Wahl Instruments Inc.
 - 4. Terice, H. O. Co.
 - 5. Weiss Instruments, Inc.
 - 6. Weksler Instruments Operating Unit; Dresser Industries; Instrument Div.
- B. Description: Direct-mounting, bimetallic-actuated dial thermometers complying with ASME B40.3.
- C. Case: Dry type, stainless steel with 3-inch diameter.

- D. Element: Bimetal coil.
- E. Dial: Satin-faced, nonreflective aluminum with permanently etched scale markings.
- F. Pointer: Red metal.
- G. Window: Plastic.
- H. Ring: Stainless steel.
- I. Connector: Adjustable angle type.
- J. Stem: Metal, for thermowell installation and of length to suit installation.
- K. Accuracy: Plus or minus 1 percent of range or plus or minus 1 scale division to maximum of 1.5 percent of range.

2.3 TEST PLUGS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Flow Design, Inc.
 - 2. National Meter, Inc.
 - 3. Trerice, H. O. Co.
 - 4. Watts Industries, Inc.; Water Products Div.
- B. Description: Corrosion-resistant brass or stainless-steel body with core inserts and gasketed and threaded cap, with extended stem for units to be installed in insulated piping.
- C. Minimum Pressure and Temperature Rating: 500 psig at 200 deg F.
- D. Core Inserts: One or two self-sealing rubber valves.
 - 1. Insert material for water service at 20 to 200 deg F shall be CR.
- E. Test Kit: Furnish one test kit(s) containing one pressure gage and adaptor, two thermometer(s), and carrying case. Pressure gage, adapter probes, and thermometer sensing elements shall be of diameter to fit test plugs and of length to project into piping.
 - 1. Pressure Gage: Small bourdon-tube insertion type with 2- to 3-inch- diameter dial and probe. Dial range shall be 0 to 200 psig.
 - 2. Low-Range Thermometer: Small bimetallic insertion type with 1- to 2-inch-diameter dial and tapered-end sensing element. Dial ranges shall be 25 to 125 deg F.

3. High-Range Thermometer: Small bimetallic insertion type with 1- to 2-inch-diameter dial and tapered-end sensing element. Dial ranges shall be 0 to 220 deg F.
4. Carrying case shall have formed instrument padding.

PART 3 - EXECUTION

3.1 THERMOMETER APPLICATIONS

- A. Install liquid-in-glass or bimetallic-actuated dial thermometers in the outlet of each domestic, hot-water storage tank.
- B. Install liquid-filled-case-type, bimetallic-actuated dial thermometers at suction and discharge of each pump.
- C. Provide the following temperature ranges for thermometers:
 1. Domestic Hot Water: 30 to 180 deg F, with 2-degree scale divisions.
 2. Domestic Cold Water: 0 to 100 deg F, with 2-degree scale divisions.

3.2 GAGE APPLICATIONS

- A. Install dry-case-type pressure gages for discharge of each pressure-reducing valve.
- B. Install dry-case-type pressure gages at suction and discharge of each pump.

3.3 INSTALLATIONS

- A. Install direct-mounting thermometers and adjust vertical and tilted positions.
- B. Install thermowells with socket extending to center of pipe and in vertical position in piping tees where thermometers are indicated.
- C. Install direct-mounting pressure gages in piping tees with pressure gage located on pipe at most readable position.
- D. Install needle-valve and snubber fitting in piping for each pressure gage.
- E. Install test plugs in tees in piping.
- F. Install permanent indicators on walls or brackets in accessible and readable positions.
- G. Install connection fittings for attachment to portable indicators in accessible locations.
- H. Install thermometers and gages adjacent to machines and equipment to allow service and maintenance for thermometers, gages, machines, and equipment.

- I. Adjust faces of thermometers and gages to proper angle for best visibility.

END OF SECTION

SECTION 22 05 23

GENERAL-DUTY VALVES FOR PLUMBING 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. Bronze angle valves.
2. Bronze ball valves.
3. Bronze swing check valves.
4. Bronze gate valves.
5. Bronze globe valves.
6. Lubricated plug valves.

B. Related Sections:

1. Division 22 plumbing piping Sections for specialty valves applicable to those Sections only.
2. Division 22 Section "Identification for Plumbing Piping and Equipment" for valve tags and schedules.
3. Division 33 water distribution piping Sections for general-duty and specialty valves for site construction piping.

1.3 DEFINITIONS

- A. CWP: Cold working pressure.
- B. EPDM: Ethylene propylene copolymer rubber.
- C. NBR: Acrylonitrile-butadiene, Buna-N, or nitrile rubber.
- D. NRS: Nonrising stem.
- E. OS&Y: Outside screw and yoke.
- F. RS: Rising stem.

G. SWP: Steam working pressure.

1.4 SUBMITTALS

A. Product Data: For each type of valve indicated.

1.5 QUALITY ASSURANCE

A. Source Limitations for Valves: Obtain each type of valve from single source from single manufacturer.

B. ASME Compliance:

1. ASME B16.10 and ASME B16.34 for ferrous valve dimensions and design criteria.
2. ASME B31.1 for power piping valves.
3. ASME B31.9 for building services piping valves.

C. NSF Compliance: NSF 61 for valve materials for potable-water service.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Prepare valves for shipping as follows:

1. Protect internal parts against rust and corrosion.
2. Protect threads, flange faces, grooves, and weld ends.
3. Set angle, gate, and globe valves closed to prevent rattling.
4. Set ball and plug valves open to minimize exposure of functional surfaces.
5. Set butterfly valves closed or slightly open.
6. Block check valves in either closed or open position.

B. Use the following precautions during storage:

1. Maintain valve end protection.
2. Store valves indoors and maintain at higher than ambient dew point temperature. If outdoor storage is necessary, store valves off the ground in watertight enclosures.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS FOR VALVES

A. Refer to valve schedule articles for applications of valves.

B. Valve Pressure and Temperature Ratings: Not less than indicated and as required for system pressures and temperatures.

- C. Valve Sizes: Same as upstream piping unless otherwise indicated.
- D. Valve Actuator Types:
 - 1. Handwheel: For valves other than quarter-turn types.
 - 2. Handlever: For quarter-turn valves NPS 6 and smaller except plug valves.
 - 3. Wrench: For plug valves with square heads. Furnish Owner with 1 wrench for every 5 plug valves, for each size square plug-valve head.
- E. Valves in Insulated Piping: With 2-inch stem extensions and the following features:
 - 1. Gate Valves: With rising stem.
 - 2. Ball Valves: With extended operating handle of non-thermal-conductive material, and protective sleeve that allows operation of valve without breaking the vapor seal or disturbing insulation.
- F. Valve-End Connections:
 - 1. Grooved: With grooves according to AWWA C606.
 - 2. Solder Joint: With sockets according to ASME B16.18.
 - 3. Threaded: With threads according to ASME B1.20.1.
- G. Valve Bypass and Drain Connections: MSS SP-45.

2.2 BRONZE ANGLE VALVES

- A. Class 125, Bronze Angle Valves with Bronze Disc:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Hammond Valve.
 - b. Milwaukee Valve Company.
 - 2. Description:
 - a. Standard: MSS SP-80, Type 1.
 - b. CWP Rating: 200 psig.
 - c. Body Material: ASTM B 62, bronze with integral seat and screw-in bonnet.
 - d. Ends: Threaded.
 - e. Stem and Disc: Bronze.
 - f. Packing: Asbestos free.
 - g. Handwheel: Malleable iron, bronze, or aluminum.
- B. Class 125, Bronze Angle Valves with Nonmetallic Disc:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. American Valve, Inc.
 - b. NIBCO INC.

2. Description:

- a. Standard: MSS SP-80, Type 2.
- b. CWP Rating: 200 psig.
- c. Body Material: ASTM B 62, bronze with integral seat and screw-in bonnet.
- d. Ends: Threaded.
- e. Stem: Bronze.
- f. Disc: PTFE or TFE.
- g. Packing: Asbestos free.
- h. Handwheel: Malleable iron, bronze, or aluminum.

2.3 BRONZE BALL VALVES

A. Two-Piece, Full-Port, Bronze Ball Valves with Stainless-Steel Trim:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

- a. Conbraco Industries, Inc.; Apollo Valves.
- b. Crane Co.; Crane Valve Group; Crane Valves.
- c. Hammond Valve.
- d. Lance Valves; a division of Advanced Thermal Systems, Inc.
- e. Milwaukee Valve Company.
- f. NIBCO INC.
- g. Watts Regulator Co.; a division of Watts Water Technologies, Inc.

2. Description:

- a. Standard: MSS SP-110.
- b. SWP Rating: 150 psig.
- c. CWP Rating: 600 psig.
- d. Body Design: Two piece.
- e. Body Material: Bronze.
- f. Ends: Threaded.
- g. Seats: PTFE or TFE.
- h. Stem: Stainless steel.
- i. Ball: Stainless steel, vented.
- j. Port: Full.

2.4 BRONZE LIFT CHECK VALVES

A. Class 125, Lift Check Valves with Bronze Disc:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

- a. Crane Co.; Crane Valve Group; Crane Valves.
- b. Crane Co.; Crane Valve Group; Jenkins Valves.
- c. Crane Co.; Crane Valve Group; Stockham Division.

2. Description:

- a. Standard: MSS SP-80, Type 1.
- b. CWP Rating: 200 psig.
- c. Body Design: Vertical flow.
- d. Body Material: ASTM B 61 or ASTM B 62, bronze.
- e. Ends: Threaded.
- f. Disc: Bronze.

2.5 BRONZE SWING CHECK VALVES

A. Class 125, Bronze Swing Check Valves with Bronze Disc:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

- a. American Valve, Inc.
- b. Crane Co.; Crane Valve Group; Crane Valves.
- c. Crane Co.; Crane Valve Group; Jenkins Valves.
- d. Crane Co.; Crane Valve Group; Stockham Division.
- e. Hammond Valve.
- f. Kitz Corporation.
- g. Milwaukee Valve Company.
- h. NIBCO INC.
- i. Powell Valves.
- j. Red-White Valve Corporation.
- k. Watts Regulator Co.; a division of Watts Water Technologies, Inc.

2. Description:

- a. Standard: MSS SP-80, Type 3.
- b. CWP Rating: 200 psig.
- c. Body Design: Horizontal flow.
- d. Body Material: ASTM B 62, bronze.
- e. Ends: Threaded.
- f. Disc: Bronze.

2.6 BRONZE GATE VALVES

A. Class 125, NRS Bronze Gate Valves:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

- a. American Valve, Inc.
- b. Crane Co.; Crane Valve Group; Crane Valves.
- c. Crane Co.; Crane Valve Group; Jenkins Valves.
- d. Crane Co.; Crane Valve Group; Stockham Division.
- e. Hammond Valve.

- f. Kitz Corporation.
- g. Milwaukee Valve Company.
- h. NIBCO INC.
- i. Powell Valves.
- j. Red-White Valve Corporation.
- k. Watts Regulator Co.; a division of Watts Water Technologies, Inc.

2. Description:

- a. Standard: MSS SP-80, Type 1.
- b. CWP Rating: 200 psig.
- c. Body Material: ASTM B 62, bronze with integral seat and screw-in bonnet.
- d. Ends: Threaded or solder joint.
- e. Stem: Bronze.
- f. Disc: Solid wedge; bronze.
- g. Packing: Asbestos free.
- h. Handwheel: Malleable iron.

B. Class 125, RS Bronze Gate Valves:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

- a. American Valve, Inc.
- b. Crane Co.; Crane Valve Group; Crane Valves.
- c. Crane Co.; Crane Valve Group; Jenkins Valves.
- d. Crane Co.; Crane Valve Group; Stockham Division.
- e. Hammond Valve.
- f. Kitz Corporation.
- g. Milwaukee Valve Company.
- h. NIBCO INC.
- i. Powell Valves.
- j. Watts Regulator Co.; a division of Watts Water Technologies, Inc.

2. Description:

- a. Standard: MSS SP-80, Type 2.
- b. CWP Rating: 200 psig.
- c. Body Material: ASTM B 62, bronze with integral seat and screw-in bonnet.
- d. Ends: Threaded or solder joint.
- e. Stem: Bronze.
- f. Disc: Solid wedge; bronze.
- g. Packing: Asbestos free.
- h. Handwheel: Malleable iron.
- i. Packing and Gasket: Asbestos free.

2.7 BRONZE GLOBE VALVES

A. Class 125, Bronze Globe Valves with Bronze Disc:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Crane Co.; Crane Valve Group; Crane Valves.
 - b. Crane Co.; Crane Valve Group; Stockham Division.
 - c. Hammond Valve.
 - d. Kitz Corporation.
 - e. Milwaukee Valve Company.
 - f. NIBCO INC.
 - g. Powell Valves.
 - h. Red-White Valve Corporation.
 - i. Watts Regulator Co.; a division of Watts Water Technologies, Inc.

2. Description:
 - a. Standard: MSS SP-80, Type 1.
 - b. CWP Rating: 200 psig.
 - c. Body Material: ASTM B 62, bronze with integral seat and screw-in bonnet.
 - d. Ends: Threaded or solder joint.
 - e. Stem and Disc: Bronze.
 - f. Packing: Asbestos free.
 - g. Handwheel: Malleable iron.

2.8 LUBRICATED PLUG VALVES

A. Class 125, Regular-Gland, Lubricated Plug Valves with Threaded Ends:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Nordstrom Valves, Inc.

2. Description:
 - a. Standard: MSS SP-78, Type II.
 - b. CWP Rating: 200 psig.
 - c. Body Material: ASTM A 48/A 48M or ASTM A 126, cast iron with lubrication-sealing system.
 - d. Pattern: Regular or short.
 - e. Plug: Cast iron or bronze with sealant groove.

B. Class 125, Regular-Gland, Lubricated Plug Valves with Flanged Ends:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Nordstrom Valves, Inc.
 - b.

2. Description:

- a. Standard: MSS SP-78, Type II.
- b. CWP Rating: 200 psig.
- c. Body Material: ASTM A 48/A 48M or ASTM A 126, cast iron with lubrication-sealing system.
- d. Pattern: Regular or short.
- e. Plug: Cast iron or bronze with sealant groove.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine valve interior for cleanliness, freedom from foreign matter, and corrosion. Remove special packing materials, such as blocks, used to prevent disc movement during shipping and handling.
- B. Operate valves in positions from fully open to fully closed. Examine guides and seats made accessible by such operations.
- C. Examine threads on valve and mating pipe for form and cleanliness.
- D. Examine mating flange faces for conditions that might cause leakage. Check bolting for proper size, length, and material. Verify that gasket is of proper size, that its material composition is suitable for service, and that it is free from defects and damage.
- E. Do not attempt to repair defective valves; replace with new valves.

3.2 VALVE INSTALLATION

- A. Install valves with unions or flanges at each piece of equipment arranged to allow service, maintenance, and equipment removal without system shutdown.
- B. Locate valves for easy access and provide separate support where necessary.
- C. Install valves in horizontal piping with stem at or above center of pipe.
- D. Install valves in position to allow full stem movement.
- E. Install check valves for proper direction of flow and as follows:
 1. Swing Check Valves: In horizontal position with hinge pin level.
 2. Center-Guided and Plate-Type Check Valves: In horizontal or vertical position, between flanges.
 3. Lift Check Valves: With stem upright and plumb.

3.3 ADJUSTING

- A. Adjust or replace valve packing after piping systems have been tested and put into service but before final adjusting and balancing. Replace valves if persistent leaking occurs.

3.4 GENERAL REQUIREMENTS FOR VALVE APPLICATIONS

- A. If valve applications are not indicated, use the following:
 - 1. Shutoff Service: Ball, butterfly, or gate valves.
 - 2. Throttling Service: Globe or angle valves.
- B. If valves with specified SWP classes or CWP ratings are not available, the same types of valves with higher SWP classes or CWP ratings may be substituted.
- C. Select valves, except wafer types, with the following end connections:
 - 1. For Copper Tubing, NPS 2 and Smaller: Threaded ends except where solder-joint valve-end option is indicated in valve schedules below.
 - 2. For Copper Tubing, NPS 2-1/2 to NPS 4: Flanged ends except where threaded valve-end option is indicated in valve schedules below.
 - 3. For Copper Tubing, NPS 5 and Larger: Flanged ends.
 - 4. For Steel Piping, NPS 2 and Smaller: Threaded ends.
 - 5. For Steel Piping, NPS 2-1/2 to NPS 4: Flanged ends except where threaded valve-end option is indicated in valve schedules below.
 - 6. For Steel Piping, NPS 5 and Larger: Flanged ends.
 - 7. For Grooved-End Copper Tubing and Steel Piping: Valve ends may be grooved.

3.5 DOMESTIC, HOT- AND COLD-WATER VALVE SCHEDULE

- A. Pipe NPS 2 and Smaller:
 - 1. Bronze Valves: May be provided with solder-joint ends instead of threaded ends.
 - 2. Bronze Angle Valves: Class 125, bronze disc.
 - 3. Ball Valves: Two piece, full port, bronze with stainless-steel trim.
 - 4. Bronze Swing Check Valves: Class 125, bronze disc.
 - 5. Bronze Gate Valves: Class 125, RS.
 - 6. Bronze Globe Valves: Class 125, bronze disc.

END OF SECTION

SECTION 22 05 29

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. Section Includes:

1. Metal pipe hangers and supports.
2. Trapeze pipe hangers.
3. Thermal-hanger shield inserts.
4. Fastener systems.
5. Pipe positioning systems.
6. Equipment supports.

- B. Related Sections:

1. Division 05 Section "Metal Fabrications" for structural-steel shapes and plates for trapeze hangers for pipe and equipment supports.
2. Division 21 fire-suppression piping Sections for pipe hangers for fire-suppression piping.
3. Division 22 Section "Expansion Fittings and Loops for Plumbing Piping" for pipe guides and anchors.
4. Division 22 Section "Vibration and Seismic Controls for Plumbing Piping and Equipment" for vibration isolation devices.

1.3 DEFINITIONS

- A. MSS: Manufacturers Standardization Society of the Valve and Fittings Industry Inc.

1.4 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Design trapeze pipe hangers and equipment supports, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

B. Structural Performance: Hangers and supports for plumbing piping and equipment shall withstand the effects of gravity loads and stresses within limits and under conditions indicated according to ASCE/SEI 7.

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

1.5 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: Signed and sealed by a qualified professional engineer. Show fabrication and installation details and include calculations for the following; include Product Data for components:

1. Trapeze pipe hangers.
2. Metal framing systems.
3. Equipment supports.

C. Delegated-Design Submittal: For trapeze hangers indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1. Detail fabrication and assembly of trapeze hangers.
2. Design Calculations: Calculate requirements for designing trapeze hangers.

D. Welding certificates.

1.6 QUALITY ASSURANCE

A. Structural Steel Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

B. Pipe Welding Qualifications: Qualify procedures and operators according to ASME Boiler and Pressure Vessel Code.

PART 2 - PRODUCTS

2.1 METAL PIPE HANGERS AND SUPPORTS

A. Carbon-Steel Pipe Hangers and Supports:

1. Description: MSS SP-58, Types 1 through 58, factory-fabricated components.

2. Galvanized Metallic Coatings: Pregalvanized or hot dipped.
3. Nonmetallic Coatings: Plastic coating, jacket, or liner.
4. Padded Hangers: Hanger with fiberglass or other pipe insulation pad or cushion to support bearing surface of piping.
5. Hanger Rods: Continuous-thread rod, nuts, and washer made of stainless steel.

B. Stainless-Steel Pipe Hangers and Supports:

1. Description: MSS SP-58, Types 1 through 58, factory-fabricated components.
2. Padded Hangers: Hanger with fiberglass or other pipe insulation pad or cushion to support bearing surface of piping.
3. Hanger Rods: Continuous-thread rod, nuts, and washer made of stainless steel.

2.2 TRAPEZE PIPE HANGERS

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

2.3 THERMAL-HANGER SHIELD INSERTS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
- B. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
1. Carpenter & Paterson, Inc.
 2. Clement Support Services.
 3. ERICO International Corporation.
 4. National Pipe Hanger Corporation.
 5. PHS Industries, Inc.
 6. Pipe Shields, Inc.; a subsidiary of Piping Technology & Products, Inc.
 7. Piping Technology & Products, Inc.
 8. Rilco Manufacturing Co., Inc.
 9. Value Engineered Products, Inc.
- C. Insulation-Insert Material for Cold Piping: ASTM C 552, Type II cellular glass with 100-psig or ASTM C 591, Type VI, Grade 1 polyisocyanurate with 125-psig minimum compressive strength and vapor barrier.
- D. Insulation-Insert Material for Hot Piping: ASTM C 552, Type II cellular glass with 100-psig or ASTM C 591, Type VI, Grade 1 polyisocyanurate with 125-psig minimum compressive strength.
- 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.

2.4 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.
- B. Mechanical-Expansion Anchors: Insert-wedge-type, stainless- steel anchors, for use in hardened portland cement concrete; with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

2.5 PIPE POSITIONING SYSTEMS

- A. Description: IAPMO PS 42, positioning system of metal brackets, clips, and straps for positioning piping in pipe spaces; for plumbing fixtures in commercial applications.

2.6 EQUIPMENT SUPPORTS

- A. Description: Welded, shop- or field-fabricated equipment support made from structural carbon-steel shapes.

2.7 MISCELLANEOUS MATERIALS

- A. Structural Steel: ASTM A 36/A 36M, carbon-steel plates, shapes, and bars; black and galvanized.
- B. Grout: ASTM C 1107, factory-mixed and -packaged, dry, hydraulic-cement, nonshrink and nonmetallic grout; suitable for interior and exterior applications.
 - 1. Properties: Nonstaining, noncorrosive, and nongaseous.
 - 2. Design Mix: 5000-psi, 28-day compressive strength.

PART 3 - EXECUTION

3.1 HANGER AND SUPPORT INSTALLATION

- A. Metal 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 the building structure.

- B. Metal 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 for individual pipe hangers.
 - 2. Field fabricate from ASTM A 36/A 36M, carbon-steel shapes selected for loads being supported. Weld steel according to AWS D1.1/D1.1M.
- C. Thermal-Hanger Shield Installation: Install in pipe hanger or shield for insulated piping.
- D. 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.
- E. Pipe Positioning-System Installation: Install support devices to make rigid supply and waste piping connections to each plumbing fixture. See Division 22 plumbing fixture Sections for requirements for pipe positioning systems for plumbing fixtures.
- F. Install hangers and supports complete with necessary attachments, inserts, bolts, rods, nuts, washers, and other accessories.
- G. Equipment Support Installation: Fabricate from welded-structural-steel shapes.
- H. 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.
- I. Install lateral bracing with pipe hangers and supports to prevent swaying.
- J. 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.
- K. Load Distribution: Install hangers and supports so that piping live and dead loads and stresses from movement will not be transmitted to connected equipment.
- L. Pipe Slopes: Install hangers and supports to provide indicated pipe slopes and to not exceed maximum pipe deflections allowed by ASME B31.9 for building services piping.

M. Insulated Piping:

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 allowed by 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.
5. Thermal-Hanger Shields: Install with insulation same thickness as piping insulation.

3.2 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 bearing surface smooth.
- C. Provide lateral bracing, to prevent swaying, for equipment supports.

3.3 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/D1.1M 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 so contours of welded surfaces match adjacent contours.

3.4 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.

3.5 PAINTING

- A. Touchup: 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 a minimum dry film thickness of 2.0 mils.
- B. Touchup: 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. Section "High-Performance Coatings."
- C. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

3.6 HANGER AND SUPPORT SCHEDULE

- A. Specific hanger and support requirements are 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 carbon-steel pipe hangers and supports and attachments for general service applications.
- F. Use copper-plated pipe hangers and copper attachments for copper piping and tubing.
- G. Use padded hangers for piping that is subject to scratching.
- H. Use thermal-hanger shield inserts for insulated piping and tubing.
- I. 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 up to 1050 deg F, pipes NPS 4 to NPS 24, 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 36, 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 noninsulated, stationary pipes NPS 3/4 to NPS 8.
 - 7. Adjustable, Steel Band Hangers (MSS Type 7): For suspension of noninsulated, 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 noninsulated, stationary pipes NPS 1/2 to NPS 8.
 - 10. Split Pipe Ring with or without Turnbuckle Hangers (MSS Type 11): For suspension of noninsulated, stationary pipes NPS 3/8 to NPS 8.
 - 11. Extension Hinged or Two-Bolt Split Pipe Clamps (MSS Type 12): For suspension of noninsulated, 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 or carbon-steel plate.
 - 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 or carbon-steel plate, 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 two 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 24, 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.
- J. 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 24.
 2. Carbon- or Alloy-Steel Riser Clamps (MSS Type 42): For support of pipe risers NPS 3/4 to NPS 24 if longer ends are required for riser clamps.
- K. 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.
- L. 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.
- M. 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.
- N. 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 allow 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 allow 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 allow 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.
- O. Comply with MSS SP-69 for trapeze pipe-hanger selections and applications that are not specified in piping system Sections.
- P. Comply with MFMA-103 for metal framing system selections and applications that are not specified in piping system Sections.
- Q. Use powder-actuated fasteners or mechanical-expansion anchors instead of building attachments where required in concrete construction.
- R. Use pipe positioning systems in pipe spaces behind plumbing fixtures to support supply and waste piping for plumbing fixtures.

END OF SECTION

SECTION 22 05 53

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.

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.
5. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

B. 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.

C. 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, details, 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, 1/16 inch thick, and having predrilled holes for attachment hardware.

B. Letter Color: Black.

C. Background Color: White.

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.

- H. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.
- I. Label Content: Include caution and warning information, plus emergency notification instructions.

2.3 PIPE LABELS

- A. General Requirements for Manufactured Pipe Labels: Preprinted, color-coded, with lettering indicating service, and showing flow direction.
- B. Pretensioned Pipe Labels: Precoiled, semirigid plastic formed to cover full circumference of pipe and to attach to pipe without fasteners or adhesive.
- C. Self-Adhesive Pipe Labels: Printed plastic with contact-type, permanent-adhesive backing.
- D. 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: Aluminum.
 - 2. Stencil Paint: Exterior, gloss, alkyd enamel black unless otherwise indicated. Paint may be in pressurized spray-can form.
 - 3. Identification Paint: Exterior, alkyd 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 numbers.
 - 1. Tag Material: Brass, 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.

- 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: Brass grommet and wire.
- 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 Section "Interior Painting."
- B. Stenciled Pipe Label Option: Stenciled labels may be provided instead of manufactured pipe labels, at Installer's option. Install stenciled pipe labels 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. Domestic Water Piping:
 - a. Background Color: White.
 - b. Letter Color: Black.
2. Sanitary Waste Piping:
 - a. Background Color: White.
 - b. Letter Color: Black.

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.
 2. Valve-Tag Color:
 - a. Cold Water: Natural.
 - b. Hot Water: Natural.
 3. Letter Color:

- a. Cold Water: Black.
- b. Hot Water: 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