SECTION 221100 - PLUMBING PIPING, EQUIPMENT AND ACCESSORIES

PART 1 - GENERAL (Not Applicable)

PART 2 - PRODUCTS

2.1 PIPING MATERIALS AND FITTINGS

A. Piping used throughout project shall conform to the following specifications. Piping shall be plainly marked with manufacturers name and weight. All materials listed may not be required on this project. Piping materials shall be as follows:

1. Copper Tube:
    a. Provide hard temper copper water tube conforming to requirements of current ASTM Specification B-88. Tubing shall be Type K, L, or M as listed in schedule.
    b. Tubing joints shall be soldered or brazed. See schedule for joining method to be used.
    c. Pipe by Anaconda, Cerro, Chase, Mueller or Revere Copper.
2. PVC Pipe:
    a. Below grade/exterior pipe and fittings shall be ABS solid wall pipe extra strength conforming to ASTM D2661, F628
    b. Below slab pipe and fittings shall be PVC-DWV conforming to ASTM D-2665.
    c. Above grade pipe and fittings shall meet schedule 40 PVC ASTM D-2665 standards or cellular core PVC conforming to ASTM F1488. Provide cast iron where in the ceiling areas of the commercial or amenity areas..
    d. Provide socket fittings meeting ASTM D2665 and solvent meeting D2564.
3. Cross-Linked Polyethylene:
    a. Provide piping conforming to ASTM F 877-97 and F877-96a with compression fittings per ASTM F 1807-97.
4. Carbon Steel Pipe (1/2" thru 2"):
    a. Provide seamless carbon steel conforming to ASTM specification A-106 scheduled.
    b. Pipe joints shall be threaded conforming to ANSI Standard B2.1.
    c. Pipe ends shall be beveled for welding.
    d. Pipe by Armco, Jones and Laughlin Steel Corp., Youngstown Sheet and Tube Co., or United States Steel.
5. Carbon Steel Pipe (2-1/2" and above):
    a. Provide furnace butt-welded carbon steel pipe conforming to ASTM Specification A-53.
    b. Pipe ends shall be beveled for welding.
    c. Pipe by Armco, Jones and Laughlin Steel Corp., Youngstown Sheet and Tube Co., or United States Steel.

6. CPVC Pipe:
    a. Provide CPVC plastic pipe and tubing meeting ASTM D2846, F441 for 2" and below.
    b. For 2 ½" and larger provide CPVC (Corzan) Sc. 40 meeting ASTM D-1784.
    c. Fittings shall be matching CPVC meeting ASTM F437, 438.

2.2 PIPE SCHEDULE

SYSTEM	SIZE	TYPE	FITTINGS	DURATION
Condensate Drain	All	Sch. 40 PVC	PVC-DWV	---
Dom. Water	<2"	PEX/CPVC	Compression	150 psi/1 hr.
Dom. Water	2" and Above	CPVC-Sch 40	Solvent	150 psi/1 hr
Waste/Vent	All	Sch. 40 PVC	PVC-DWV	10 ft./1/2 hr.
Gas Above Grade	All	Sch. 40 Blk Steel	Malleable	100 psi/ 1 hr
Gas Below Grade	All	Polyethylene	Fusion	100 psi/1 hr
Refrigerant	All	Copper	Silver solder	400 psi/1hr
Roof Drain	All	Sch. 40 PVC	PVC-DWV	10 ft/1/2 hr

2.3 VALVES

A. General

1. Provide necessary valves within piping systems to provide required flow control and to allow isolation for inspection, maintenance and repair of each piece of equipment or fixture, and on each main and branch service loop.
2. Valves installed in piping systems shall be compatible with system maximum test pressure, pipe materials, pipe joining method, and fluid or gas conveyed in system.
3. Each valve shall be installed so that it is easily accessible for operation, visual inspection, and maintenance.
4. Equivalent valves listed on current comparison charts of specified valve manufacturers by Apollo, Crane, Nibco, Dyna Quip, Keystone, Milwaukee, Griswold, Nexus are acceptable.

B. Ball Valves

1. Ball valves shall be scheduled as type "BLV" valves. Valve specifications by type number shall be as follows:

    BLV-1 2-1/2" valves and smaller, Apollo bronze full port ball valve 150PSI-SWP, teflon seats, chrome plated ball, blowout proof stem, silicon bronze stem, with end connections compatible to PEX or CPVC as per application.

C. Balancing Valves

1. Balancing valves shall be scheduled as Type "BAV" valves. All balancing valves may be installed on the return or supply side of coils and shall be line sized. Provide proper sized valves for the specified flows. Provide strainers at all valves. Valve specification by type number shall be as follows:

    BAV-1 3/4" thru 2 1/2": Flow Design Inc. model AC automatic type of forged brass with ball valve, flow cartridge, 400 PSIG at 250oF rating and sweat or screw connections as required.

D. Check Valves

1. Silent check valves shall be scheduled as Type "SCV" valves. Valve specifications by type number shall be as follows:

   SCV-1 2" valves and smaller Stockham Fig. No. B-310T or B-320T bronze check valve, 125 PSI-WOG, spring, brass stem, teflon disc and seat ring, screwed or solder ends as required.

   SCV-2 2-1/2" and larger Muessco #101-DT iron body stainless steel trim check valve 150 PSI-ASA with flanged ends.

E. Butterfly Valves

1. Butterfly valves shall be scheduled as Type "BFV" valves. Valve specifications by type number shall be as follows:

   BFV-1 3" thru 6", Nibco #LD-200, 200 PSI ductile iron drilled lug body, lever operator aluminum/bronze disc, type 416 stainless steel stem and EPDM sleeve valve shall be bubble tight and designed for dead end service.

F. Plug Valves

1. Plug valves shall be scheduled as type PLV valves. Valve specifications by type number shall be as follows:

   PLV-1 1" valves and smaller Hays 7400 series iron body gas cock, 175 PSI-WOG bronze plug washer and nut, screwed ends.

   PLV-2 1-1/4" thru 2-1/2" valves, Rockwell-Nordstrom Fig. 142, semi-steel lubricated plug valve, 175 PSI-WOG coated plug, two bolt cover, short pattern screwed ends. Provide complete with standard pattern cast handle.

G. Valve Schedule

SYSTEM	SIZE	STOP	CHECK	BALANCE
Domestic Water	1/2"-2"	BLV-1	SCV-1	BAV-1
Domestic Water	2 ½"	BLV-1	SCV-2	BAV-1
Domestic Water	3" & Up	BFV-1	SCV-2	BAV-2
Gas	1" & Below	PLV-1		
Gas	1 ¼" & Up	PLV-2		

2.4 PIPE SLEEVES AND SEALS

A. Furnish proper type and size pipe sleeves to General Contractor for installation in concrete or masonry walls or floors. Sleeves are not required for supply and waste piping through wall supporting plumbing fixtures or for cast iron soil pipe passing through concrete slab or grade except where penetrating a membrane waterproof floor. Mechanical Contractor shall supervise installation of sleeves to insure proper location and installation.

B. Each sleeve shall be continuous through wall floor or roof and shall be cut flush on each side except where indicated otherwise. Sleeves shall not be installed in structural member except where indicated or approved.

C. Pipe insulation shall run continuous through pipe sleeves with 1/4" minimum clearance between insulation and pipe sleeve. Provide metal jackets over insulated pipes passing

through fire walls, floors and smoke partitions. Jacket shall be 0.018 stainless steel extending 12 inches on either side of barrier and secured to insulation with 3/8" wide band. Seal annular space between jacket and pipe sleeves with Thunderline High Temperature Link Seal.

D. Provide pipes passing through roof of floor waterproof membranes with flashing sleeve. Seal pipe to sleeve with fire caulk.

E. Where piping passes through walls serving as supply or exhaust air plenums or chases, seal annular space between pipe and sleeve air tight with caulk; fire rated if appropriate.

2.5 PIPE HANGERS AND SUPPORTS

A. Provide and be responsible for locations of piping hangers, supports and inserts, etc., required for installation of piping under this contract. Design of hangers and supports shall conform to industry standard, manufacturer's recommendations and City Code. Contractor to submit.

B. Pipe hangers shall be capable of supporting piping in all conditions of operation. They shall allow free expansion and contraction of piping, and prevent excessive stress resulting from transferred weight induced into pipe or connected equipment. Support horizontal or vertical pipes at locations of least vertical movement.

C. Where horizontal piping movements are such that hanger rod angularity from vertical is greater than 4 degrees from cold to hot position of pipe, offset hanger, pipe, and structural attachments to that rod is vertical in hot position. Hangers shall not become disengaged by movements of supported pipe.

D. Provide sufficient hangers to adequately support piping system at specified spacing, at changes in piping direction and at concentrated loads. Hangers shall provide for vertical adjustment to maintain pitch required for proper drainage, and for longitudinal travel due to expansion and contraction of piping. Fasten hangers to building structural members wherever practicable.

E. Hangers in direct contact with copper pipe or tubing shall be copper plated.

F. Unless indicated otherwise on drawings or in manufacturer's literature, support horizontal piping as follows:

NOM. TUBING SIZE	ROD DIAMETER	MAXIMUM SPACING
Up to 1"	3/8"	6 Ft.
1-1/4" to 1-1/2"	3/8"	8 Ft.
2"	3/8"	9 Ft.

G. Provide continuous threaded hanger rods wherever possible. No chain, wire, or perforated straps shall be used. Hanger rods shall be subject to tensile loading only, where lateral or axial pipe movement occurs provide suitable linkage to permit swing. Provide pipe support channels with galvanized finish for concealed locations and painted finish for exposed locations. Submit design for multiple pipe supports indicating pipe sizes, service and support detail to Architect/Engineer for review prior to fabrication.

H. Provide Grinnell Fig. 194, 195, or 199 steel wall brackets for piping suspended or supported from walls. Brackets shall be prime coated carbon steel.

I. Mount hangers for insulated piping on outside of pipe insulation sized to allow for full thickness of pipe insulation. Provide Grinnell Fig. 167 insulation protection shields sized so that line compressive load does not exceed one-third of insulation compressive strength. Shield shall be galvanized steel and support lower 180 degrees of pipe insulation on copper tubing.

J. Structural attachments for pipe hangers shall be as follows:

1. Concrete Structure: Provide Grinnell Fig. No. 285 concrete insert for loads up to 400 lbs. and Grinnell Fig. 281 wedge type concrete insert for loads up to 1200 lbs.
2. Steel Beam Structure: Provide Grinnell Fig. No. 86 malleable iron C-clamp for pipe size 2" and smaller and Grinnell Fig. 229 malleable iron beam clamp for pipe size 2-1/2" and larger.

K. Equivalent hangers and supports by Auto-Grip, Basic Engineer, Elcen, Fee & Mason, Fluorcarbon Company, Unistrut or Super Strut Inc., B-Line.

2.6 CONCRETE INSERTS AND ANCHORS

A. In new construction where attachment points can be predetermined provide Fee & Mason Fig. 9000 continuous concrete insert of Fig. 186 Universal Steel concrete insert.

B. Equivalent by B-Line.

2.7 CLEANOUTS

A. Provide cleanout the full size of soil pipe served up to 4" I.D. Cleanouts for soil lines larger than 4" shall be 4". Provide cleanouts in base of soil pipe stacks, ends of sewer main, at changes in direction of over 45 degrees and in horizontal pipe runs exceeding 100 feet at 50 foot intervals.

B. Install cleanouts so they are accessible by extending them through walls, floors, to outside of building or to above grade as required.

C. Where exterior cleanouts do not occur in sidewalks, paved roadways, etc., provide a concrete pad with top 1-1/2" above finished grade, see detail on drawings.

For Clubhouse / Commons Areas:

1. Floor (Concrete Floor Finish): Zurn #ZN 1405-3 "Supremo Level-Trol Tuf-Top" dura-coated iron cleanout with square, heavy duty, scoriated Zurn nickel bronze with adjustable above to finished floor.
2. Floor (Quarry Tile Floor Finish): Same as concrete floor finish.
3. Floor (Tile Floor Finish): Zurn #ZN-1405.7 "Supremo-Level-Trol-Tuf-Top" dura-coated cast iron cleanout with square heavy duty Zurn nickel bronze top, recessed for tile and adjustable to finished floor.
4. Floor (Carpet Floor Finish): Zurn #ZN-1405.14" "Supremo-Level-Trol-Tuf Top" dura-coated cast iron cleanout with round, heavy duty Zurn nickel bronze top with carpet retainer and adjustable to finished floor after concrete has set.
5. Wall: Zurn ZN-1440.4 "Supremo" cleanout with dura-coated cast iron ferrule and cadmium plated cast iron counter-sunk plug complete with square smooth Zurn nickel bronze wall access cover and flush over-wall frame.

6. Yard: Zurn Z-1460-15 round dura-coated cast iron cleanout housing with integral seepage pan. Housing shall be complete with secured scoriated cover with lifting device.

For Apartments:

1. Provide adjustable ABS/PVC body unit with nickel bronze cover, Sioux Chief #852 series.

D. Verify floor materials used from Architectural plans and provide proper cleanout tops, where they occur in carpet, quarry tile, vinyl tile or ceramic tile.

E. Equivalent cleanout by Sioux Chief, J.R. Smith, Wade, Ancon or Josam.

2.8 SHOCK ARRESTORS

A. Provide Zurn Z-1700 bellows type water hammer arrestor on all banks shown sized for manufacturer's recommendations.

B. Install with shut-off in accessible location.

C. Equivalent by Josam, Smith, Wade, Amtrol.

2.9 FLOOR DRAINS

A. Unless otherwise noted, provide each drain with deep seal P-trap at the drain.

B. See schedule on drawings.

2.10 WALL HYDRANT

A. Woodford #17 anti-siphon auto draining exposed unit with cast bronze face, key operation, all bronze parts.

B. Equivalent by Wade, Smith, Josam.

2.11 BACKFLOW PREVENTERS

A. Where shown and where required by code, provide Watts 709-S-QT or 909-S-QT device with strainer and ball valve isolators.

B. Equivalent by Febco, ITT, Zurn.

2.12 WATER HEATERS

A. See drawings. Equivalent by Bradford White, American, State, Rheem.

2.13 SUMP PUMP/SEWAGE EJECTOR

A. Elevator: Zoeller #152 submersible cast iron pump with Oil Smart Ssytem with stainless steel strainer, float control, 1750 rpm sealed motor, permanently lubricated bearings. Unit to have simplex #8112, 8230 tethered float with piggyback cord, adjustable setpoints. Provide 24" Ø by 24" deep sump with split cover. Set cover up off rim ½" with bolts to allow drainage into sump. Pump to provide 50 gpm at 18 ft. head with 1/2 hp 120v motor. Provide with check valve, 2" discharge pipe to exterior.

2.14 DOWNSPOUT NOZZLE

A. Zurn #ZANB-199 nickel bronze body, threaded inlet, decorative wall flange and nozzle.

B. Equivalent by Wade, Josam, Smith, Sioux Chief.

2.15 ROOF DRAINS

A. See drawings.

B. Equivalent drains by J.R. Smith, Zurn, or Josam.

PART 3 - EXECUTION

3.1 PIPING INSTALLATION

A. Piping systems materials and installation shall conform to the latest standards and codes. Mechanical contractor shall take full responsibility for the final selection, installation and integrity of the piping support system.

B. Pipe sizes indicated on plans and as specified refer to nominal size in inches for steel pipe, cast iron pipe and copper tubing, unless otherwise indicated. Pipes are sized to nearest 1/2". In no case shall piping smaller than size specified be used.

C. Contractor shall provide and be responsible for proper location of pipe sleeves, hangers, supports, and inserts. Install hangers, supports, inserts, etc., as recommended by manufacturer and as specified and detailed on drawings. Verify construction types and provide proper hangers, inserts and supports for construction used. Install inserts, hangers and supports in accordance with manufacturers load ratings and provide for thermal expansion of piping without exceeding allowable stress on piping or supports.

D. Install piping parallel with building lines and parallel with other piping to obtain a neat and orderly appearance of piping system. Secure piping with approved anchors and provide guides where required to insure proper direction of piping expansion. Piping shall be installed so that allowable stress for piping, valves and fittings used are not exceeded during normal operation or testing of piping system.

E. Install piping so that systems can be completely drained. Provide piping systems with valve drain connections at all low pipe and ahead of all sectionalizing valves whether shown on plans or not.

END OF SECTION 22 1100