

**C. PIPING JOINTS**

**Copper Tubing:** Joints in hard temper tubing shall be soldered joints using lead-free 95/5 solder except where tubing is installed below grade or below the base slab, in which case joints shall be soldered with silver solder (Si-Fo). Joints in soft temper copper tubing shall be of the flared type installed in compliance with the fitting manufacturer's recommendations.

**Cast Iron Pipe Below Grade:** Joints in ball and spigot cast iron waste and vent pipe shall be neoprene compression gaskets. Tyeasl or equal.

**Cast Iron Pipe Above Grade:** Joints in hubless pipe shall be standard CISPI 310 NSF certified by Anaco, Ideal, Misson or Tyler. Joints in storm piping, including connections to roof drains, shall be heavy duty couplings meeting ASTM C1540 and FM 1880, Anaco Husky #SD-2000, Clamp-All "Hi Torque" 80 in. lb. Ideal Tridon "HD" or Misson "Heavyweight".

**Pipe Adapters:** Make connection of new waste pipe to new or existing dissimilar waste pipe using adapter couplings. Provide Fernco, Proflex 3000 Series or Mission Flexseal MRS6 Series with neoprene adapter gasket with stainless steel shield and hose clamps for connecting dissimilar pipes above grade. Provide Fernco, 1056 Series or Mission Sewer Couplings with neoprene adapter gasket and hose clamps for connecting dissimilar pipes below grade and coat stainless steel bands with mastic.

**D. Threaded Steel Pipe:** Threaded joints shall be full and clean, cut with not more than three (3) threads exposed beyond the fittings. Make joints tight with graphite base pipe joint compound and paint exposed threads of ferrous pipe with acid-resisting paint after piping has been tested and proven tight. No caulking, lamp-wick or other material will be permitted for correction of defective joints.

**E. PIPING INSTALLATION**

**General:** Clean pipe thoroughly prior to installation. Ream ends of pipe to remove burrs. Cut pipe accurately to measurements taken on the job. Install with adequate clearance for installation of coverings where required. Pipe shall not be sprung or bent. Neatly align pipe, connect it securely, and support it from the building structure with hangers as specified below. Provide chrome-plated escutcheons on pipes passing through ceilings, floors or walls of finished spaces. Run pipes freely through floor and wall penetrations using pipe sleeves. Do not grout in place unless required for structural fire integrity. Install pipe concealed in finished spaces wherever possible. Use a dielectric union where ferrous and copper pipe connect. Dielectric union shall have a zinc-plated steel body, a threaded nylon insert, and insulating pressure gasket. No ferrous metal-to-copper connection made without insulating unions will be allowed.

**Hanger & Supports:** Pipe hangers shall be as described in the specifications by B-Line or equal by Anvil, Michigan, Truscon, or Unistut. Connect hangers to the structure with side beam connectors and all thread hanger rods. Provide engineered support struts between joists and other structural members as required to provide a rigid hanging installation. Do not hang pipes from other pipes, conduits or ductwork. Provide hanger rods and space hangers at intervals as specified in "Hanger Spacing". Provide support within 1 foot of each elbow and tee. Provide supports within 1 foot of each equipment connection. Provide two nuts on threaded supports to securely fasten the support. Install hanger ties or supports for various pipe as follows:

**Copper Tube:** Adjustable band hangers for bare copper tube 3 inches and smaller shall be B-Line #B3170 CT copper plated adjustable band swivel ring type. Adjustable band hangers for insulated copper tube 3 inches and smaller shall be B-Line #B3170 NF adjustable band swivel ring type. Clevis hangers for insulated copper tube 4 inches and larger shall be B-Line #B3100 galvanized steel clevis type. Support exposed copper tube 2 inches and smaller to walls or in chases with B-Line #B3198RCT copper coated extension split ring pipe clamps. 3/8 inch threaded rod and B-Line #B3199CT ceiling fanges. Support copper tube in chases and walls at plumbing fixtures with plastic or copper brackets secured to structure and U-bolts sized to bare on the pipe. Riser clamps to support vertical copper tube shall be B-Line #B3373CT copper coated steel, cut insulation, seal vapor barrier, and attach to bare tube.

**Cast Iron Pipe:** Adjustable band hangers for 2 inch and smaller. Clevis hangers for 3 inch and larger shall be B-Line #B3100 galvanized steel clevis type. Riser clamps to support vertical pipe shall be B-Line #B3373 galvanized steel.

**Insulation Protection Shields:** B-Line #B3151 of 18 gauge galvanized sheet metal. Shield shall cover half of the circumference of the pipe and shall be of length indicated by manufacturer for pipe size and thickness of insulation.

**Hanger Spacing, Rod Sizes & Connectors:** Connect rods to steel beams or joists with B-Line #B3031 or #B3033 beam clamps as required. Connect rods to concrete with B-Line #B3014 malleable iron single type inserts with malleable iron nut. Connect rods in wood construction with B-Line #B3058 side beam connectors. Hang and support piping with spacing and rod sizes as follows:

**Copper Tube:** 1-1/2 inch and smaller - every 6 feet with 3/8 inch hanger rods; 2 inch - every 10 feet with 3/8 inch hanger rods; 2-1/2 inch - every 10 feet with 3/8 inch hanger rods; 3 inch - every 10 feet with 1/2 inch rods; 4 inch - every 10 feet with 5/8 inch hanger rods. Support vertical copper tube every 10 feet.

**Cast Iron Pipe:** Every 10 feet and within 1 foot of each joint. 2 inch and smaller with 3/8 inch hanger rods; 3 inch with 1/2 inch hanger rods; 4 inch with 5/8 inch hanger rods; 6 inch with 3/4 inch hanger rods; 8 inch and larger with 7/8 inch hanger rods. Support vertical cast iron pipe every 15 feet.

**Below Ground Installation for Soil, Waste, and Storm:** Install soil and waste piping to a uniform slope of not less than 1/8 inch per foot for piping 4 inch or larger, and not less than 1/4 inch per foot for piping 3 inch or smaller. Slope storm piping at 1/8 inch per foot. Lay pipe at uniform slope, free from sags, with hub end upstream. Make changes in direction from horizontal to vertical, at future branches and other branch connections with sanitary "tees" or short sweep "ells". Make changes in direction from vertical to horizontal or horizontal to horizontal with long radius fittings, long sweeping "ells", combination "Y" and 1/8 bend fittings, or 45 degree "ells" (1/8 bend fittings), 1/8 bend or 1/16 bend and "Y" fittings. Install pipe with the barrel of the pipe on firm ground, with the center length, and excavate holes for the pipe bells. Lay pipe in a straight line and install with the grade to line with the pipe ends not more than 24" apart. Close open ends of pipe with a stopper when pipe laying is not in progress. Center the pipe on the hole for uniform caulking. Provide a smooth and uniform invert in the system. Drilling or tapping of holes and waste lines in concrete, masonry, hubs and bands are not permitted. Locate and install soil and waste lines as indicated on the drawings. Do not terminate exact location in such a manner as to maintain proper clearance. Prior to installation of any building drain pipe, verify alignment of connection point of existing sewer, service line or existing tenant connections indicated on the drawings. If the installation will require the indicated invert elevation point while maintaining proper fall, notify the contractor of the alternative may be determined.

**Above Ground Installation for Soil, Waste, and Storm:** Install soil and waste piping to a uniform slope of not less than 1/8 inch per foot for piping 4 inch or larger, and not less than 1/4 inch per foot for piping 3 inch or smaller. Slope storm piping at 1/8 inch per foot. Lay pipe at uniform slope free from sags. Support pipe within 2 feet of each joint. Make changes in direction from horizontal to vertical, at future branches and other branch connections with sanitary "tees" or short sweep "ells". Make changes in direction from vertical to horizontal or horizontal to horizontal with long radius fittings, long sweeping "ells", combination "Y" and 1/8 bend fittings, or 45 degree "ells" (1/8 bend fittings), 1/8 bend or 1/16 bend and "Y" fittings. Provide a smooth and uniform invert in the system. Drilling or tapping of soil and waste lines, and saddle tees and bungs are not permitted. Locate and install soil and waste lines as indicated on the drawings. Determine exact locations for each manhole as to maintain proper clearance.

**Plumbing Vent:** Connect plumbing vent pipes to future drains indicated on the drawings or as required by the installation practices adopted and enforced by local codes official, and extend vent pipes full size through the roof line. Grade pipe to a uniform slope so as to drain back to the drainage piping system. Vents passing through the roof shall be minimum 3 inch size except in tropical areas. Turn flashings into stacks at least 2 inches, and extend flashing 24 inches in all directions from the edge of the roof line. Apply white lead paint to steel pipe threads. Vent lines shall be air and water tight. Vent floor drains in finished areas to a horizontally vented line as shown on the drawings.

**Dielectric Unions:** Arrange cold, hot and hot water recirculation piping to drain at the lowest point in each system. Install at least one dielectric union between dissimilar materials, at connection points of each piece of equipment, and throughout the system where required to allow for expansion and contraction. Provide unions of the ground joint type. Make allowance for expansion and contraction where required by the manufacturer. Where water piping occurs in exterior walls, hold pipe as close as possible to the interior face of wall and insulate with other insulation (minimum R-8) between piping and the exterior wall face.

**Steel Pipe:** Adjustable band hangers for 2 inch and smaller shall be B-Line #B3170 NF adjustable band swivel ring type. Clevis hangers for 2-1/2 inch and larger shall be B-Line #B3100 galvanized steel clevis type. Riser clamps to support vertical pipe shall be B-Line #B3373 galvanized steel.

**Supports on Roof:** Support piping on roof with pre-engineered roof pipe supports manufactured by B-Line, Erica, Miro or Portable Pipe Hangers. 4 inch x 4 inch x 12 inch closed cell polyethylene blocks with embossed pre-engineered support struts or pre-engineered support struts with factory plastic bases. Two piece straps shall be caprivated at the shoulder when attachment nut is tightened and designed for use with strut system. All nuts, brackets and clamps shall have the same finish as the channels. Support pipe with spacing as described above at a minimum 7 inches above the roof. Set supports on 18 inch x 18 inch x 3/16 inch thick roof walkway material compatible with actual roof material.

**Natural Gas:** Pitch natural gas piping and provide accessible dirt logs at the low points. Take branch pipes off the top or sides of main pipes to prevent accumulation of water in the branches. Install gas piping valves and unions only in accessible locations. Do not install gas pipe below the base slab.

**F. PIPING SANITIZATION**

Sanitize the entire domestic water piping system (cold, hot, and hot water return) with a solution containing not less than 50 ppm available chlorine. Keep solution in the system for a minimum of 24 hours, with each valve being operated several times during the period. After completion, flush system with city water until chlorine residual is lowered to incoming city water level.

**G. PIPE AND VALVE MARKERS**

Provide manufacturer's standard pre-printed, semi-rigid snap-on or permanent adhesive, pressure-sensitive vinyl pipe markers. Pipe markers shall be color-coded complying with ANSA A13.1.

Install pipe markers on each plumbing piping system and include arrows to show normal direction of flow.

Locate pipe markers and color bands wherever piping is exposed to view in occupied spaces, machine rooms, accessible maintenance spaces (shafts, tunnels, plenums) and exterior non-concealed locations.

Provide plastic laminate or brass valve tag on every valve, cock and control device in each plumbing piping system; exclude check valves, valves within factory-fabricated equipment units, plumbing fixtures faucets, convenience and lawn-watering hose bibbs, and shut-off valves at plumbing fixtures and similar rough-in connections of end-use fixtures and units.

**H. WATER HAMMER ARRESTORS AND TRAPS**

Provide water hammer arrestors at valves or batteries of fixtures as indicated on the drawings to prevent water hammer. Arrestors shall be Josam, Sioux Chief, Smith, Precision Plumbing Products, Profo, Wade, Watts, or Zurn, stainless steel bellows type, or O-ring sealed and lubricated acetal piston. Install water hammer arrestors per the Plumbing and Drainage Institute (PDI) WH-201 installation instructions. Installation of arrestors at batteries of fixtures precludes the requirement for individual air chambers at each battery fixture. Submit certification that water hammer arrestors comply with NSF 61 Annex G and/or NSF 372.

Provide water-seal traps on floor drains, fixtures and equipment with drain connections, including traps not furnished in combination with fixtures and equipment. Place trap as close to the fixture or drain as possible. Exposed traps in finished spaces shall be chrome-plated brass.

Provide conventional "P" type trap, water-sealed self-cleaning design. Full "S" traps or trap standards shall be used only where specifically called for on the drawings or elsewhere in this specification. Trap water seals shall be not less than 2 inches, and deep seal traps shall be provided where specified or indicated. Each trap not integral with the fixture or floor drain or installed below the base slab shall be provided with an accessible cleanout of adequate size. Provide trap primers where required by code and where indicated on the drawings.

**I. CLEANOUTS, FLOOR DRAINS AND ROOF DRAINS**

**Cleanouts, floor drains and roof drains** shall be by one manufacturer if possible. Acceptable manufacturers are Josam, Sioux Chief, Smith, Wade, Watts, and Zurn. Acceptable manufacturers of plastic floor drains are Sioux Chief, Josam, Oatey, Jonespec or Plastic Odifiles. Provide long sweep fittings for cleanout extensions; short sweeps at start of runs or change in direction and combination wye and eight bend fittings in horizontal runs. Install cleanouts with a minimum of 18 inches clear all around, consult local codes for other requirements, for easy system maintenance. Install plug with Teflon joint compound.

**Floor Drains:** As scheduled on the drawings.

**Wall Cleanouts:** As scheduled on the drawings. Install wall cleanouts at points as noted on the drawings; at the foot of each soil, waste or interior downflow stack; at horizontal soil and waste branches longer than five feet not served by a floor cleanout; consult local codes for installation at specific fixture types. Install wall cleanouts above the flood rim of the fixture served within four feet of the floor and install extensions from the cleanout tee to the wall to locate the plug within 2 inch of the wall where required. Install cleanouts on urinals and sinks where required by code.

**J. VALVES, STRAINERS, HOSE BIBBS, AND UNIONS**

Plumbing system valves shall be designed for 125 psi steam working pressure and 200 psi cold water pressure. Install valves on the hot and cold water lines at the water heater connections and other items of equipment, at branches from mains serving fixtures, and at other places indicated or required by the installation to allow ease of future maintenance. Submit certification that valves, fittings and specialties comply with NSF 61 Annex G and/or NSF 372. Except for the following: Hoseports, hydrants, backflow preventers isolating irrigation or mechanical make-up systems, emergency mixing valves and trap primers.

**Gate Valves 2 inch and Smaller:** Class 125, rising stem, soldered lead free cast bronze body and parts, sweat ends with wedge disc. By Apollo # 1026-LF, Hammond # UP-668, Milwaukee # UP688 or Nibco # S-113-LF.

**Ball Valves 2 inch and Smaller (may be used in lieu of gate valves up to 2 inch):** Class 150, two piece lead free cast bronze body, with sweat ends, chrome plated bronze ball with conventional port. 600 psi, 2000 psi or 3000 psi stem by Apollo # 70-LF-200, Hammond # UP8501, Milwaukee # UPBA-150.

**Globe Valves 2 inch and Smaller:** Class 125, lead free cast bronze body and brass disc with sweat ends by Apollo # 1026-LF, Hammond # UP-688, Milwaukee # UP688 or Nibco # S-113-LF.

**Swing Check Valves 2 inch and Smaller:** Class 125, lead free cast bronze body and with sweat ends by Apollo # 1633-LF, Milwaukee #UP-1509, or Nibco # S-413-LF. Install in horizontal pipe runs.

**LR Check Valves 2 inch and Smaller:** Class 125, lead free cast bronze body, stainless steel spring and with sweat ends by Hammond # LP-947 or Nibco # S-413-LF. Install in horizontal pipe or in horizontal runs where required.

**Point of Use Thermostatic Mixing Valves:** Thermostatic mixing valves shall be Powers as scheduled on the drawings by Powers or equal by Acorn Engineering Co. or Lark Thermostatic ASSE 1000 series lead free brass body, non-corrosive internal parts, tamper resistant temperature adjustment. Unions shall be chrome plated. Check stops and strainers. Install valve at public lavatories and handwashing sink locations in accessible location. Set temperature as scheduled on the drawings.

**Unions:** Ferrous unions shall be Crano or equal, combination iron and brass, ground joint with screw end. Copper unions shall be steam tight, integral, cast bronze sweat type with ground joint. Ferrous to copper unions shall be universal controls or equal, dielectric type with Teflon insert.

**Cook, Wash and Dish:** Class 150, full port brass body with chrome-plated brass ball, TFE seats, threaded ends and UL listed for gas service by Inco Industries, Inc. # 80-100-YRPV, Ginnel # GF-171-N or Nibco # T-585-70-UL-YRPV.

**K. SYSTEM ACCESSORIES**

Thermometers shall be American 3 inch bi-metal dial type with separable socket, and shall be installed where indicated or required.

Pressure gauges shall be Ashcroft 3 inch dial type with shut-off cock, and shall be installed where indicated or required.

Trap primers shall be as specified on the drawings, Precision Plumbing Products "Prime Rite" or equal by Mifab or Sioux Chief with brass body and integral vacuum breaker. Provide distribution box where more than one trap is indicated to be primed on the drawings. Provide access panel where required.

**4. PLUMBING FIXTURES AND EQUIPMENT**

**A. PLUMBING FIXTURES**

Furnish and install commercial grade plumbing fixtures, see the drawings for quantities and descriptions. Provide china fixtures as scheduled by American-Standard or approved equal by Gerber, Kohler, Sloan Valve Co. Toto-Kiki or Zurn. Provide stainless steel sinks as scheduled by Elkay or equal by Just. Provide electric water heaters as scheduled by Elkay or approved equal by Acorn / Aqua, Halsey Taylor or Haves. Provide mop sinks as scheduled by Stom-Williams or equal by Acorn Engineering Co., Fiat or Florestone. Provide emergency equipment as scheduled by Bradley or equal by Chicago, Encon, Guardian, Haves or Speakman. Provide fixtures of same manufacturer where possible.

Fixtures shown on the drawings or specified herein shall be furnished and installed, set firm and true, connected to required piping services, thoroughly cleaned, left clean and ready for use. Exposed fittings and piping at the fixtures shall be chrome-plated, and water supply piping shall be valved at each fixture.

Vitreous china fixtures shall be of the best grade vitreous ware, without pit holes or blemishes, and the outlines shall be generally true. The engineer reserves the right to reject any pieces which, in his opinion, are faulty. Fixtures set against walls shall have ground backs and shall be caulked with silicone sealant of a matching color.

**B. PLUMBING FIXTURE TRIM**

Submit certification that faucets and trim comply with NSF 61 Annex G and / or NSF 372. Except for the following: Faucets not used for drinking water or cooking, shower valves and heads or flush valves.

Fixture trim shall have the manufacturer's name stamped clearly and visibly on each item.

Provide faucets as scheduled on drawings by Chicago, Delta-Commercial, Speakman, T&S Brass or Zurn.

Provide electronic faucets as scheduled on the drawings by Sloan or equal by Zurn.

Fixture P-traps shall be 17 gauge brass body with cleanout, 17 gauge seamless tubular wall bond with cast brass slip nut, shallow steel flange, all chrome plated by McGuire, Brass Craft, Dearborn Brass, EBC, Profo, Watts Brass and Tubular or Zurn.

Lavatory, sink, and water closet supplies shall be solid brass angle or straight type with full turn brass stem, wheel handle, or loose key types as noted on drawings, shallow steel flange, 3/8 inch copper riser flange, all chrome plated, final connection as required by McGuire, Brass Craft, EBC, Profo or Zurn.

Lavatory drains shall be grid type chrome plated 17 gauge brass open grid with 1-1/4 inch x 6 inch long seamless brass tailpiece and brass locknut with heavy rubber basin washer and floor friction washer, by McGuire, Brass Craft, Dearborn Brass, EBC, Profo, Watts Brass and Tubular or Zurn.

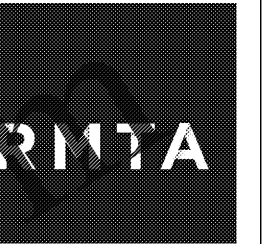
Provide handcap insulation kits for lavatories and sinks on exposed water and waste pipes and fittings, including offset drain and continuous waste covers where required by Brocat, McGuire, Plumberex "Pro-2000", Profo, Trap-Wrap or Tru-Bro.

**C. WATER HEATER**

Water heater shall be by A.O. Smith, Bradford-White, Lochinvar, State, Rheem or Ruid with capacity as scheduled on the drawings. Unit shall be electric glass-lined tank type complete with steel jacket, fiberglass insulation, magnesium anode, integral thermostats and controls, and temperature & pressure relief valve. Water heater shall be UL listed and meet ASHRAE 90.1B standards for thermal efficiency and standby heat loss.

Recirculation Pump: By B&G as scheduled on the drawings, or equal by Armstrong, Grundfos or Taco, of all bronze construction with Aqualast and/or liner.

Expansion Tank: Expansion tank shall be Amtrol "Therm-X-Tror" as scheduled on the drawings or equal by Armstrong, Bell & Gossett, Profo, Taco, or Watts. Unit shall be constructed of welded carbon steel listed for 150 psig working pressure, with NDA approved butyl rubber diaphragm, tape for pressure gage, air charging fitting, and drain fitting. Support as detailed on the drawings. Charge tank with air pressure equal to the static water pressure.



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SHEET NUMBER: 10 OF 106  
MEC  
CHECKED BY: ASK  
DATE: JANUARY 5, 2017

**PLUMBING SPECIFICATIONS**

PROJECT NUMBER: 2017014-056  
SHEET NUMBER: 10 OF 106  
MEC  
DATE: JANUARY 5, 2017  
SHEET NUMBER: P-5  
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