

15400 Plumbing

1. General

A. Reasonable efforts have been made to coordinate electrical requirements of plumbing equipment with the electrical systems serving that equipment. Differences among manufacturers of plumbing equipment make it impossible to produce a single electrical design which will satisfy the varying electrical requirements of those manufacturers. Consequently, the contractor shall coordinate the electrical requirements of the plumbing equipment designed on this project with the equipment actually furnished on this project and provide electrical systems required by that equipment. This coordination effort shall be completed prior to the installation of either the plumbing equipment or the electrical systems serving that equipment. Electrical system revisions required to coordinate with the plumbing equipment actually furnished shall be provided at no extra cost to the owner.

B. The drawings are generally diagrammatic and indicative of all requirements for material and installation listed in the 2015 International Plumbing Code including all state and local regulations are minimum standards. Where requirements on the drawings or specifications exceed the minimum code requirements, the drawings or specifications shall govern.

C. It is the intent of the drawings and specifications that the plumbing contractor shall furnish and install all equipment, products, fixtures, piping, fittings, materials, etc. except where indicated otherwise as required including all miscellaneous items necessary for completion of the installation whether or not specified or shown on the drawings to provide a complete and properly functioning plumbing installation free of all defects acceptable to the owner and architect.

D. The power ratings of motors and other mechanical equipment and the electrical characteristics of electrical systems serving them have been established as minimums which allow that equipment to function properly to produce the required capacities. Power ratings include reasonable safety factors to accommodate common differences between design parameters and field construction practices. Equipment with power ratings less than those indicated on the drawings shall not be permitted.

E. Reasonable efforts have been made to coordinate electrical requirements of mechanical equipment with the electrical systems serving that equipment. Differences among manufacturers of mechanical equipment make it impossible to produce a single electrical design which will satisfy the varying electrical requirements of those manufacturers. Consequently, the contractor shall coordinate the electrical requirements of the mechanical equipment actually provided. Exact locations of equipment and points of termination shall be approved by the architect/engineer. The drawings are not intended to show exact locations or to show every pipe, fitting, valve, or appurtenance required for a complete installation. The contractor shall provide all items and/or material as necessary.

F. Drawings indicate general locations of apparatus, equipment, piping and ductwork. Changes on location shall be made to accommodate existing or new building conditions and coordination with other trades, including HVAC, plumbing, electrical, fire protection, structural, and architectural shall be made without additional cost to the owner.

G. All plumbing work shall be installed in a first-class, neat and workmanlike manner by personnel experienced in the trade involved using the latest methods and practices accepted in the industry and shall also be acceptable to the architect/engineer.

H. Debris and demolished materials shall be cleared from the site at frequent intervals. Do not allow debris to accumulate to the extent that it will interfere with work or passage of the employees. Disposal of all debris shall be the responsibility of the plumbing contractor. All unwanted construction materials and equipment shall be legally disposed of, off the site, unless noted otherwise.

I. Do not install piping or equipment in electrical rooms, elevator rooms, or elevator shafts, unless explicitly indicated on the drawings. Piping, ductwork, and equipment (switchgear, switchboards, panels, motor control centers, variable frequency drives, transformers or starters) shall not be installed directly above or 42" in front of electrical equipment from the floor to the structure above.

J. Unless indicated otherwise, equipment and materials shall be new and of the customary standard and quality furnished by the designated manufacturer for that catalog number.

K. Support piping independently of equipment. Hanger rods shall be suspended from the structure. Do not suspend from other piping, equipment or ductwork.

L. In areas where structure is exposed and without finished ceilings, all ductwork, piping, conduit, etc. shall be installed in a neat and orderly manner to the satisfaction of the architect. All items shall run parallel or perpendicular to the structural steel.

M. No pipe shall be installed vertically or horizontally in exterior wall cavity, except for items such as wall hydrants, rainwater conductors, electrical fixtures, etc., for which penetrations shall be horizontal minimum (perpendicular through cavity) to meet the intended installation at masonry veneer. Such conduit or pipe shall be vertical through masonry unit cores or intended chases of masonry backup wall.

N. The manufacturers and model numbers listed on the schedules and data are the basis of design for this project and shall set the minimum standard for quality, capacity, performance and features, and is not intended to include other equal manufacturers submission for review.

O. Paint mechanical systems or portions of mechanical systems that are installed in exposed areas of location exposed to view from occupancies. Finish color and materials shall be as specified by architect.

P. Install all equipment and material in accordance with manufacturer's printed installation instructions and recommendations. Where there is a conflict between the manufacturer and the code shall apply. The manufacturer is more restrictive. Provide clearances for clearances to maintain and service equipment, valves, and controls. All dimensions shall be taken as certified manufacturer dimensions. Installation sheets and rough in dimensions.

Q. All piping shall be installed as shown on the drawings, connecting to all plumbing and mechanical equipment requiring water, and with outlets adjacent to and under other contracts requiring connections. All piping shall be concealed in walls, partitions, or above ceilings except in mechanical equipment rooms and elsewhere as noted.

R. Plumbing contractor is responsible for cutting and patching of remaining walls, floors, ceiling, and ceiling assembly as necessary to install their work. Patching around this work shall maintain one hour ratings at stair tower walls and floor or ceiling assemblies.

Plumbing contractor is responsible to make all arrangements with the code officials for inspections and obtain all permits required by state and local authorities having jurisdiction for this project. Repair and provide construction and as-built drawings as required.

2. Coordination Requirements

A. Before starting work the contractor shall make a thorough examination of those portions of the structure in which the work is to be performed. All existing field conditions and dimensions shall be verified and confirmed on the project site.

B. Report to the professional any and all conditions which may interfere with or otherwise affect or prevent the proper execution and completion of the work. Do not start the work until such conditions have been examined and a course of action mutually agreed upon. Coordinate location and installation of mechanical work with other trades to avoid conflicts and interferences. Modifications due to field conditions shall be made as required.

C. Coordinate final locations of mechanical equipment with architectural plans. Do not scale drawings. Refer to the architectural drawings for all exact dimensions and confirm all dimensions in the field.

3. Pipe Insulation

A. All copper piping: closed cell flexible elastomeric type: ASTM C534 Type I; flexible, water resistant, non-absorbent, ozone resistant; maximum K value of 0.25 at 75 degrees F mean temperature, maximum service temperature of 220 degrees F and shall be UL listed and FM approved.

B. All cast iron piping: closed cell flexible elastomeric type: ASTM C534 Type I; flexible, water resistant, non-absorbent, ozone resistant; maximum K value of 0.25 at 75 degrees F mean temperature, maximum service temperature of 220 degrees F and shall be UL listed and FM approved.

C. Install insulation materials with smooth and even surfaces. Insulate each continuous run of piping with full length units of insulation, with single cut piece to complete run. Do not use cut pieces or scraps abutting each other. Butt insulation joints firmly to ensure complete, tight fit over all piping surfaces.

D. Penetrations: extend piping insulation without interruption through walls, floors and similar penetrations. Continue insulation vapor barrier through penetrations.

E. Support piping systems 3" in diameter or less using saddles of the proper length and spacing under the insulation, per the insulating manufacturer's requirements.

F. Piping insulation schedule:

- i. Cold Water: 1" thick
- ii. Hot Water: 1" thick
- iii. Hot Water Return: 1" thick
- iv. Storm Piping: 1" thick

4. Domestic Water Piping

A. Fittings and joints 4" and under: wrought copper conforming to ASME B16.15 and B16.18, solder joints in accordance with ASTM B828. Solder shall conform with ASTM B32 and NSF 61, flux shall conform with ASTM B813 and NSF 61.

B. Fittings and joints over 2": wrought fittings conforming to ASME B16.50 with brazed joints in accordance with AS 8.

5. Sanitary Sewer and Vent Piping

A. Schedule 40 PVC pipe: class 12454-B, ASTM D-1784 with DWV fittings.

B. Joints, solvent weld conforming to ASTM D 2855 with purple primer conforming to ASTM F656.

C. Slope on sanitary piping 2-1/2" and greater shall be 1% (1/8" per foot) in direction of flow. Sanitary piping 2" and smaller shall be 2% (1/4" per foot) in direction of flow.

D. All vent piping shall be slope as to allow condensation to flow back to the fixture's waste piping.

6. Storm Piping

A. Cast iron pipe: service weight, ASTM A-74, ASTM A-888 with ASTM fittings.

i. Joints, no-hub or bell and spigot: ASTM B16, ASTM A-74, ASTM A-888.

B. PVC: schedule 40, solid-wall, ASTM D 2565 with ASTM fittings.

i. Joints, solvent welding conforming to ASTM D 2564.

C. Slope or storm piping 2-1/2" and greater shall be 1% (1/8" per foot) in direction of flow. Storm piping 2" and smaller shall be 2% (1/4" per foot) in direction of flow.

7. Gas Piping

A. Steel pipe: ASTM A53/AS3M, black steel, schedule 40, type E or Grade B.

i. Malleable-iron threaded fittings: ASME B16.3, Class 30, standard pattern.

ii. Wrought-steel welding fittings: ASTM A234/A234M, butt, 30 and socket welding.

iii. Unions: ASME B16.39, Class 150, malleable iron with cast-iron seat, ground joint and threaded ends.

B. Valve: iron body, cast iron stem, tested and tested to comply with ANSI/ASME B31.2, Class 150, for use in gas piping systems up to 125 PSIG.

8. Valves - General

i. All valves shall have a full port stainless steel ball for shut-off and to isolate equipment for all systems and at the base of all vertical risers.

ii. Install ball valves with a standard port, memory stop and locking handle for locking, manual, or manual flow control services.

C. Provide adequate space for actuator handle in the open and closed position and for packing replacement. All valving installation shall be accessible with extended operator shafts as required to clear piping insulation.

D. Valves shall be provided at all branches from the hot and cold water mains and risers.

9. Hangers and Supports

A. Overhead supports: provide one of the following types of hanger for overhead support of horizontal piping:

- i. For copper tubing where hangers are in direct contact with tubing, use devis type steel hanger, copper plated with supporting rod to suit.
- ii. For all other piping 4" and smaller, use devis type hangers, provide supporting rods for hangers of diameter as indicated by the hanger manufacturer with locknuts for each.

B. Where hangers are below ceilings in finished areas, provide cast iron ceiling plates with set screws.

C. Piping shall be supported at distances not exceeding the space as specified in Section 309 of the International Plumbing Code and in accordance with MSS SP-69.

10. Fire Stopping

A. Use either factory built (firestop devices) or field erected (through penetration firestop systems) to form a specific building system maintaining required integrity of the fire barrier and stop the passage of gases or smoke.

B. Through-penetration firestop systems and firestop devices tested in accordance with ASTM E814 or UL 1479 using the "F" or "T" rating to maintain the same rating and integrity as the fire barrier being sealed. "T" ratings are not required for penetrations smaller than or equal to 4" nominal

pipe or 16 square inches in overall cross-sectional area.

C. Firestop sealants used for firestopping or smoke sealing shall have the following properties:

- i. Contain no flammable or toxic solvents.
- ii. Have no dangerous or flammable out gassing during the drying or curing of products.
- iii. Be water resistant after drying or curing and unaffected by high humidity, condensation or transient water exposure.
- iv. When used in exposed areas shall be capable of being sanded and finished with similar surface treatments as used on the surrounding wall or floor surface.

D. N, UL, WH, rated or tested by an approved laboratory in accordance with ASTM E814. With a maximum flame spread of 25 and smoke development of 50 in accordance with ASTM E84.

E. Provide firestopping at all penetrations of sanitary and vent piping into gypsum board ceiling into the attic space and at floor penetrations.

11. Domestic Water Service - Protection

A. Domestic water supply lines into the suite shall be protected by an approved reduced pressure principle back flow preventer valve.

B. All domestic water supply lines to the building or suite having a line pressure in excess of 65 ps shall be provided with an approved pressure reducing valve.

12. Testing and Cleaning

A. The sanitary system shall be tested as per the International Plumbing Code.

B. The water system shall be tested to two times the building system pressure but not more than 160 psi and as directed by the International Plumbing Code. The system shall be thoroughly flushed and chlorinated per International Plumbing Code and American Water Works or American AWWA.

13. Submittals - Shop Drawings and Catalog Data

A. The contractor shall submit seven (7) copies of shop drawings, catalog data, etc. of all proposed equipment and materials to the engineer for review. Shop drawings not approved by the architect/engineer shall be re-submitted until satisfactory. No work shown on any shop drawings shall be executed until such drawings are reviewed and released for the contractor's use.

B. Review is only for conformance with the design concept of the project and for compliance with requirements of the contract documents. Deviations from requirements of the contract documents which have not been expressly identified by contractor in writing are not approved. Contractor is solely responsible for verification of field conditions, for accuracy and completeness of dimensions and quantities, fabrication, construction means, methods, techniques, sequences and procedures, and coordinating all portions of the work. Review does not relieve the contractor from these or other obligations under the contract.

14. Warranty and Guarantee

A. This contractor shall warrant the materials and workmanship used in the erection of this installation as herein specified. Contractor shall correct any defects in same which become apparent within one year from date of substantial completion of work. Retaining such materials or workmanship to be faulty materials or workmanship.

PLUMBING GENERAL NOTES

1. Provide all labor and materials needed for a complete and properly operational plumbing system.
2. The drawings as prepared are diagrammatic but shall be followed as closely as construction of the project and the work of the trades will permit. Equipment locations indicated are approximate. Coordinate exact locations and required clearances with equipment supplier and all trades prior to installation. Do not scale location dimensions from these drawings.
3. The contractor is responsible for checking and verifying all conditions and dimensions and for coordination of work with that of other trades. Perform work in an orderly manner and with the least possible interference.
4. All contractors shall examine the site and review the drawings and specifications prior to submitting a proposal.
5. Contractor shall verify depth, size, and location of all existing utilities in field prior to starting work.
6. Work shall be subject to the approval of the architect and owner.
7. Work shall conform to or meet the requirements of the latest edition building codes accepted by the authority having jurisdiction.
8. Valves and fittings shall have a maximum lead content of 8% and lead free solder shall conform to ASTM B 32 and flux shall conform to ASTM B 813. Soldered joints must be done in accordance with STM B 828. Lead free shall mean a chemical composition equal to or less than 0.2% lead.
9. Contractor shall protect the piping from stress and strain. Contractor shall protect the in-slab piping from corrosion and stress and strain to conform.
10. All materials, equipment, and devices shall, at a minimum, meet the requirements of UL where UL requirements are established for these items. All items shall be listed and labeled by UL as suitable for the purpose used.
11. All equipment and materials incorporated in this work shall be new unless specifically noted otherwise and shall be current products by manufacturers regularly engaged in the production of such products.
12. All factory applied coatings and finishes shall be provided without rust, scratches, or dents.
13. The plumbing contractor shall obtain and pay for all permits and inspections as required to complete installations indicated on these drawings.
14. Provide owner with certificates of final inspections and acceptance from the authority having jurisdiction.

PLUMBING COORDINATION REQUIREMENTS

1. Coordinate location and installation of plumbing work with other trades to avoid conflicts and interferences. Modifications due to field conditions shall be completely resolved by contractor in accordance with recommendations of the construction manager or general contractor.
2. Coordinate final locations of plumbing equipment with architectural plans.
3. Provide to the construction manager or general contractor dimensional locations and size of all required floor, wall, and roof openings. Provide for installation of sleeves and framing as required.

PLUMBING INSTALLATION REQUIREMENTS

1. Install all equipment and material in accordance with manufacturers printed installation instructions and recommendations. Maintain manufacturer recommended clearances as required to maintain and service equipment, valves, and controls.
2. All installation and work shall be performed in a neat, workmanlike manner so as not to damage any surfaces, equipment, or materials.
3. All equipment and piping shall be supported in an approved manner from the building structure and include hangers and restraints in accordance with all applicable codes and seismic restraint requirements.
4. Provide pipe escutcheons at all exposed penetrations of floor, walls, and ceilings.
5. All piping shall be concealed in hung ceilings, chases, and furred spaces unless specifically otherwise noted.
6. The manufacturers and model numbers listed on the schedules and details are the basis of design for this project. This information is provided for reference purposes only and is not intended to preclude submittal of other manufacturers of equal quality subject to approval by the construction manager or general contractor.
7. Pipe sizes are in inches unless specifically noted otherwise.
8. Slope sanitary and storm sewer piping a minimum of 1/4" per foot for piping 2" and smaller and 1/8" per foot for piping larger than 2".
9. Runouts to equipment shall be sized as indicated and increased or reduced at point of final connection to equipment.
10. All systems shall be tested for proper operation in accordance with applicable code or regulation.
11. Plumbing contractor shall seal all pipe penetrations through walls, floor, and roofs watertight. Seal all pipe penetrations through fire-rated partitions with UL rated fire retardant caulking compound.
12. Plumbing contractor shall provide trap primers or trap seal on all floor drains as per applicable code.
13. Any cutting or patching necessary to permit the installation of any work under this contract shall be the responsibility of the plumbing contractor.
14. The plumbing contractor shall provide gas and domestic water shutoff valves at all take off branches and at connection to each fixture or piece of equipment.
15. The plumbing contractor shall provide access doors for cleanouts, domestic water, gas shutoff valves, etc.
16. The plumbing contractor is required to visit the site to determine any field conditions that may affect his bid.
17. All PVC sanitary and vent piping located in return air plenums shall be wrapped with 3M fire barrier plenum wrap rated for return air plenums. Refer to mechanical drawings for return air plenum locations.
18. All storm piping located in return air plenums shall be wrapped with 3M fire barrier plenum wrap rated for return air plenums. Refer to mechanical drawings for return air plenum locations.
19. The plumbing contractor shall provide all indirect waste piping from equipment to floor drains and floor sinks. Insulated all drain piping from ice machines.

PLUMBING FOOD SERVICE NOTES

1. All piping above commercial areas where food is stored, displayed, prepared, or served shall be made with the least number of joints and shall be connected to a vertical stack at the nearest wall of vertical building support and the construction shall be performed as follows:
 - A. Piping subject to operation at temperatures that form condensation on the exterior of the pipe shall be thermally insulated with minimum 2" thick rigid fiberglass insulation with all service jacket.
 - B. Where piping is run in ceilings above these areas the ceiling shall be of the removable type or shall be provided with access panels to provide a ready access for inspection of piping.
2. All exposed piping in the food service area, including piping exposed under countertops and along walls beneath sinks and equipment, shall be chrome plated or stainless steel.

No.	Description	Date

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SEAL:

PLUMBING SPECIFICATIONS

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