

SECTION 1 – SUPPLEMENTARY CONDITIONS FOR MECHANICAL WORK
1.1.1 GENERAL CONDITIONS

A. All work covered by this section of these specifications shall be accomplished in accordance with the respective drawings, information of instructions to bidders, general requirements and the supplementary general conditions of these specifications.

B. Bidders shall determine the contents of a complete set of drawings and specifications and be aware that they may be bidding from a partial set of drawings, applicable only to the various separate contract, subcontracts or trades as may be issued for bidding purposes only. The contract documents are the combined Architectural, Structural, Plumbing, Heating, Ventilating and Air Conditioning and Electrical drawings and specifications. All drawings and specifications are on file in the Architect's office, and each Bidder shall thoroughly acquaint himself with all of the details of the complete set of drawings and specifications before submitting his bid. All drawings and specifications form a part of the contract documents for each separate contract. They shall be considered as bound therewith in the event partial sets of plans and specifications shall be deemed evidence of the review and examination of all drawings, specifications and addenda issued for this project. No allowances will be made because of the Contractor's unfamiliarity with any portion of the complete set of documents.

C. All equipment and materials shall be manufactured in the United States of America.

1.1.2 SCOPE

A. The work included under this specification consists of the furnishing of all labor, materials, tools, transportation, services, etc. which are applicable and necessary to complete the installation of the systems specified herein; all as described in these specifications, as illustrated on the accompanying drawings, or as directed by the Architect.

B. In general, the various lines and ducts to be installed by the various trades under this specification shall be run as indicated on specified herein, as required by particular conditions at the site and as required to conform to the generally accepted standards so as to complete the work in a neat and satisfactorily workable manner. Run work parallel or perpendicular to the lines of the building unless otherwise noted.

C. The construction details for the building are illustrated on the Architectural and Structural Drawings. Each Contractor shall thoroughly acquaint himself with the details before submitting his bid, as no allowance will be made because of the Contractor's unfamiliarity with these details. Place all inserts to accommodate the ultimate installation of pipe hangers in the forms before concrete is poured. Set sleeves in place in forms before concrete is poured, and in masonry walls while they are under construction. All concealed lines shall be installed as required by the pace of the general construction to precede that general construction.

1.1.3 INSPECTION OF SITE

A. The Contractors shall visit the site, verify all existing items shown on plans or specified herein, and familiarize himself with the working conditions, hazards, existing grades, actual formations, soil conditions, and local requirements involved. Submission of bids shall be deemed evidence of such visit. All proposals shall take the existing conditions into consideration, and the lack of specific information on the drawings shall not relieve the Contractor of any responsibility.

1.1.4 UTILITIES, LOCATIONS AND ELEVATIONS

A. Locations and elevations of the various utilities included within the scope of this work have been obtained from City and/or other substantially reliable sources and are offered separately from the Contract Documents, as a general guide only, without guarantee as to accuracy. The Contractor shall examine the site, shall verify to their own satisfaction the locations, elevations and availability of all utilities and services required and shall adequately inform themselves as to their relation to the work; the submission of bids shall be deemed evidence thereof.

1.1.5 CODE REQUIREMENTS

A. All work shall comply with the provisions of these specifications, as illustrated on the accompanying drawings, or as directed by the Architect, and shall satisfy all applicable local codes, ordinances, or regulations of the governing bodies, and all authorities having jurisdiction over the work, or services thereto. In all cases where alterations to, or deviations from the drawings and specifications are required by the authority having jurisdiction, the Contractor shall report same in writing to the Owner and secure his approval before proceeding. Upon completion of the work, the Contractor shall provide complete utility service connections, as directed, and submit, as required, all necessary drawings; he shall secure all permits and inspections necessary in connection with his work and pay all legal fees on account thereof. In the absence of other applicable local codes acceptable to the Architect, the National Electrical Code and International Plumbing Code shall apply to this work.

1.1.6 RECORDS FOR THE OWNER

A. The Contractor shall obtain at his own expense a complete, full-size set of prints on which he shall keep an accurate record of the installation of all materials and systems covered by his contractual agreement. The record shall indicate the location of all equipment and the routing of all systems. All conduit buried in concrete slabs, walls, and below grade shall be located by dimension unless a surface mounted device in each space indicates the exact location. He shall then obtain at his expense one complete reproducible set of the original drawings on which he shall neatly transfer his notations and deliver these drawings to the Engineer at job completion before the final payment for delivery to the Owner.

B. In addition to the above, the Contractor shall accumulate during the job progress the following data in duplicate prepared in a neat brochure or pocket folder bonding for subsequent delivery to the Owner. The Contractor shall include in his bid the cost of binding into a book:

1. All warranties, guarantee, and manufacturer's directions on equipment and material covered by the Contract.
2. Copies of approved shop drawings and submittals.
3. Copies of sequence of operations for all equipment covered by Contract.

1.1.7 MATERIALS AND WORKMANSHIP

A. All materials, unless otherwise specified, shall be new, free from any defects and of the best quality of their respective kinds. All like materials used shall be of the same manufacturer, model and quality, unless otherwise specified.

B. All manufactured articles, materials and equipment shall be applied, installed, connected, erected, used, cleaned, adjusted and conditioned as recommended by the Manufacturers, or all indicated in their published literature, unless specifically herein specified to the contrary. All work under this contract shall be performed by competent workmen and executed in a neat and workmanlike manner providing a thorough and complete installation. Work shall be properly protected during construction, including the shielding of soft or fragile materials and the temporary plugging of open lines during construction. At completion, the installation shall be thoroughly cleaned, and all tools, equipment, obstruction or debris present as a result of this Contract shall be removed from the premises.

1.1.8 STORAGE AND PROTECTION

A. Provide adequate facilities for items furnished under these specifications which are subject to damage if exposed to elements. Take such precautions as necessary to properly protect apparatus from damage. Failure to comply with this provision will be sufficient cause for rejection of the particular apparatus involved.

1.1.9 COOPERATION

A. All work under these specifications shall be accomplished in conjunction with other trades on this project in a manner which will allow each trade adequate time at the proper stage of construction to fulfill his work.

B. Maintaining contact and being familiar with the progress of the general construction and the timely installation of sleeves and inserts, etc., before concrete is placed shall be the responsibility of this trade, as will the installation of the required systems in their several stages, at the proper time to expedite this contract and avoid unnecessary delays in the progress of other contracts, and meet all requirements of progress schedules set up by the Architect.

C. Should any question arise between trades as to the placing of lines, ducts, conduits, fixtures or equipment, or should it appear desirable to remove any general construction which would affect the appearance or strength of the structure, reference shall be made to the Architect for instruction.

1.1.10 SCHEDULE OF MATERIAL AND EQUIPMENT

A. The Contractor shall submit for approval a complete schedule of material and equipment which is to be installed under the contract. The schedule shall be submitted within 30 days after the award of this contract and prior to the installation or fabrication of any of the material involved. The schedule shall include for materials the Manufacturer's name, Catalog Number, Type and Trade Name; in addition, for equipment, attach Manufacturer's Engineering Data and Specification Sheet.

1.1.11 SHOP DRAWINGS AND SUBMITTALS:

A. Provide Submittals and Shop Drawings (3 copies minimum) for the following equipment and layout:

1. Ductwork fabrication details and layout at 1/4" = 1'-0" scale.
2. Mechanical equipment cut sheets including all performance characteristics, accessories, drawings, wiring diagrams, etc. Accessories shall be clearly labeled to show what is and is not provided.
3. Underlayment showing materials used and joining/sealing methods.

4. Piping layout at 1/4" = 1'-0" scale.
B. Equipment shall not be ordered until approved by the Architect and Engineer of Record. The Contractor shall allow two (2) weeks for design team review of submittals.

1.1.12 DRAWINGS AND SPECIFICATIONS

A. The drawings show, diagrammatically, the locations of the various lines, ducts, conduits, fixtures and equipment and the method of connecting and controlling them. It is not intended to show every condition in detail and all fittings required for a complete system. The systems shall include, but are not limited to, the items shown on the drawings. Exact locations of these items shall be determined by reference to the general plans and measurements at the building and in cooperation with other sub-contractors and, in all cases, shall be subject to the approval of the Contractor. The Contractor reserves the right to make any reasonable change in the location of any part of this work without additional cost to the Owner.

B. Should any changes be deemed necessary by the Contractor in items shown on the contract drawings, shop drawings and descriptions, the reason for the proposed changes shall be submitted to the Owner for approval.

C. Exceptions and inconsistencies in plans and specifications shall be brought to the contractor's attention before bids are submitted; otherwise, the Contractor shall be responsible for the cost of any and all changes and additions that may be necessary to accommodate his particular apparatus.

D. The Contractor shall lay out his work maintaining all lines, grades and dimensions according to these drawings with due consideration for other trades and verify all dimensions at the site prior to any fabrication or installation. Should the layout be impractical, the Contractor shall be notified before any installation or fabrication, and the existing conditions shall be investigated and proper changes effected without any additional cost.

E. Titles of Sections and Paragraphs in these specifications are introduced merely for convenience and are not to be construed as a contract or complete segregation to tabulation of the various units of material and/or work. The Architect does not assume any responsibility, either direct or implied, for omissions or duplications by the Contractor or any Sub-contractor due to real or alleged error in the arrangement of matter in the Contract Documents.

1.1.13 ARCHITECT'S APPROVAL

A. In any statement under this contract where "approval" is required or required to be understood that such approval must be obtained from the Architect in writing before proceeding with the proposal, and an adequate number of copies of any such proposal shall be submitted to the Architect.

B. The approval by the Architect of any materials, changes, drawings, etc., submitted by the Contractor will be considered as general only and to aid the Contractor in expediting his work, such approval may be given does not in any way relieve the Contractor from the necessity of furnishing the materials and performing all work as required by the drawings and specifications.

1.1.14 LOCAL RESTRICTIONS

A. The Contractor shall become familiar with all rules and regulations of the City, County and State, or any other authority having jurisdiction over this project. If it is the Contractor's opinion that any work or materials shown on the drawings or specifications do not comply with these rules and regulations as to size, type, capacity and quality, he must make it known prior to the submission of his bid, which shall be deemed evidence of compliance; otherwise, the Contractor shall be responsible for the approval of all work or material and, in the event that such Authority should indicate disapproval, he shall correct same with materials approved by the Architect at no additional cost to the Owner.

1.1.15 ELECTRICAL WIRING

A. Except for such items as are normally wired up at their point of manufacture and so delivered, and unless specifically noted to the contrary herein, the Electrical Subcontractor will do all electrical wiring of every character for power supply. The Mechanical Subcontractor shall erect all motors in place ready for connections and shall furnish with each such motor a starter of the type specified and deliver it in good condition to the Electrical Subcontractor at the job. The Electrical Subcontractor will mount all such starters, as directed, furnishing supporting structures where necessary. The Contractor shall furnish with each item requiring electrical connections, the necessary instructions and wiring diagrams to the Electrical Subcontractor. The Electrical Subcontractor shall refer to the Specifications to determine the Scope of the Work.

1.1.16 LARGE APPARATUS AND EQUIPMENT

A. All large apparatus and equipment which is specified or shown to be furnished or installed under this Contract, and which may be too large to be moved into its final position through the normal building openings planned, shall be placed by this Subcontractor in its approximate final position. This shall be accomplished through cooperation and coordination with other Subcontractors before any obstructing structure is installed. All apparatus shall be cribbed up from the floor by this Subcontractor and cared for as specified under "Storage and Protection" or as directed by the Architect.

1.1.17 RESPONSIBILITY

A. The Contractor will be held responsible for the satisfactory and complete execution of all work included. He shall produce complete finished operating systems and provide all incidental items required as part of his work, regardless of whether such item is particularly specified or indicated.

1.1.18 CLEAN UP

A. Clean up trash and debris caused by the work of this Section, keeping premises, streets, sidewalks and adjacent areas clean and neat at all times.
B. Dispose of such materials outside the limits of the project site to approved locations.

1.1.19 PAINTING

A. Upon completion, clean all pipes and equipment before painting. Painting of mechanical equipment and piping is specified in architectural Painting Section.

1.1.20 ACCESS DOORS

A. Access doors are to be provided by the Contractor. Contractor will closely coordinate locations of valves, etc. in order to have access to all concealed portions of the systems requiring periodic service. Prepare shop drawings for coordination of all access doors, locating same for installation by General Contractor. Access door locations shall be approved by Architect or Owner before installation.

1.1.21 FLAME SPREAD PROPERTIES OF MATERIALS

A. All materials and adhesives used for acoustical linings and insulation, jackets, tapes, etc. shall conform to Interim Federal Standard Flame-Spread Properties of Materials, Inc. Fed. Std. No. 00336A (comm. NBS). The classification shall not exceed No. 2, with the range of indices between 0 and 25 for these classifications as listed in the Federal Specifications for the basic materials, the finishes, adhesives, etc. specified for each system, and shall be such that when completely assembled the total will not exceed an index of 50 in Classification 111 as listed in the Federal Specifications. Modifications shall be made to insulating materials, etc. as required to comply with the Federal Specifications.

1.1.22 GUARANTEE

A. The Contractor shall furnish a written guarantee in triplicate, warranting all materials, equipment and labor furnished by him to be free of all defects for a period of one year from date of final acceptance by the Owner. He shall further guarantee that all equipment shall meet the characteristics, capacities and workmanship specified and within the warranty period, the defects and/or equipment will be repaired or made good without cost to the Owner. The Contractor further agrees to correct warranty deficiencies within 48 hours of notification by management.
B. REFERENCE DOCUMENTS: Conditions of the Contract and Division 01 "General Requirements" are made a part of this section whether attached hereto or not.

SECTION 2 – PLUMBING SYSTEMS

2.1.1 UNDERGROUND DOMESTIC WATER PIPING AND FITTINGS

A. Pipe and fittings outside building lines shall be Class 160, Type 1, Grade 1, polyvinyl chloride (PVC). This pipe shall be supplied with all appropriate fittings and shall be assembled in accordance with manufacturer's instructions.

B. Piping below building slabs shall be Type "L" copper with Sifos joints.
C. Underground domestic hot water distribution shall be pre-insulated pipe equal to Thermacor "Thermafab" with 1" thick polyurethane foam insulation and PVC jacket.

2.1.2 ABOVE GROUND AND INTERIOR DOMESTIC WATER PIPING

A. Pipe and fittings shall be Type "L" pipe with wrought fittings. All fittings, unless specifically noted, shall be solder type.

2.1.3 SANITARY SEWER PIPING SYSTEMS

A. Pipe and fittings outside building lines shall be Schedule 40, Type 1, Grade 1 polyvinyl chloride (PVC).
B. All pipe and fittings inside the buildings and to 5 feet outside the building line shall be service weight cast iron with cast fittings. Joints shall be made with neoprene gaskets.
C. At the contractor's option, and with written approval of the local code authorities, interior sanitary piping may be schedule 40 PVC with drainage fittings to a point 5 feet outside of building line.

2.1.4 GAS PIPING SYSTEMS

A. Pipe shall be Schedule 40 black steel with black malleable iron threaded joint fittings. If piping is installed below grade, pipe shall be mill wrapped.
B. At contractor's option, and with the approval of local ruling officials, the underground gas service lines may be polyethylene (PE 2306) natural gas yard piping conforming to ASTM d-2513 73, with a copper wire installed with it continuously so that it can be located with a metal detector.

2.1.5 CONDENSATE DRAINAGE PIPING

A. Aboveground, condensate drainage piping: Copper DWV tube: ASTM B 306, drainage tube, drawn temper; copper drainage fittings: ASME B16.23, cast copper or ASME B16.29, wrought copper, solder-joint fittings; or PVC pipe, ASTM D2665, solid-wall drain, PVC socket fittings, ASTM D2665, socket type, made to ASTM D3311, drain and waste patterns.

2.2.1 PLUMBING FIXTURES

A. Fittings and piping shall be brass and, wherever exposed, shall be polished chrome-plated. provide tight wall or floor escutcheons of chrome-plated brass where pipes pass through floors, walls or ceiling. All porcelain or vitreous china shall be clean, smooth and bright. All shall be warranted not to craze, crack or scale. All plumbing fixtures and water closet seats shall be white in color unless otherwise noted in plumbing fixture schedule. All hot and cold water supplies shall have chrome-plated process stops. Plumbing fixtures shall be of vitreous china unless specified otherwise and shall be furnished complete with all fittings, mounting flanges, carriers, cap setting compound, etc.

B. Refer to plumbing fixture schedule for additional instructions.

2.2.2 WATER HEATERS

A. Natural Gas-fired Instantaneous Water Heaters
1. Water heater(s) shall be a copper coil integral fin and tube construction with quick release brass or bronze waterways.
2. Heater(s) will be factory assembled and tested.
3. The heater shall be vented with stainless steel Category III vent pipe a distance not to exceed 50' (equivalent) feet terminating vertically or horizontally as prescribed. Intake air with optional direct vent kit may be of such material as PVC not to exceed a total of 50' (equivalent).

4. The heater(s) shall be controlled by onboard solid state printed circuit board monitoring incoming and outgoing temperatures with factory-installed thermistors, sensing and controlling flow rate to set point temperature with control both air and gas mixture inputs to maintain thermal combustion efficiency.
5. Unit also consists of ground fault interrupter, inline fusing, spark ignition and sensor system, aluminized stainless steel burners, air-fuel ratio rail, high-limit switch, modulating and proportional gas valves, freeze protection sensor and heating block and overhead cutoff fuses.

6. The water heater(s) shall be CSA listed and meet the energy efficiency requirements of ASHRAE 90.1b-1992.
7. Provide outdoor rated construction for units mounted outdoors or exposed to outdoor ambient temperatures/conditions.
8. Water heaters shall be A.O. Smith, or approved equal.

B. Instantaneous Electric Water Heaters

1. Thermostat-control: Comply with UL 499 for tankless electric (water heater) heating appliances.
2. Construction shall include copper piping or tubing complying with NSF 61 barrier materials for potable water, without storage capacity.
3. Pressure rating of 150 psig.
4. Electrical resistance heating system.
5. Temperature control shall be thermostatic.
6. Provide with high-temperature-limit cutoff device or system.
- 7.

2.3.1 INSULATION

A. Mineral-fiber, pipe insulation: Preformed pipe insulation complying with ASTM C 547, Type I, Grade A, with absorbent cloth factory applied to the entire inside surface of preformed pipe insulation and extended through the longitudinal joint to outside surface of insulation under insulation jacket. Factory apply a white, polymer, vapor-retarder jacket with self-sealing adhesive tape seam and evaporation holes running continuously along the longitudinal seam, exposing the absorbent cloth. Insulate all hot and cold water piping with 1" thick pipe insulation. All water or roof drain piping installed in exterior walls or in attic spaces shall be installed to the heated side of the wall or attic insulation. All water piping subject to freezing temperatures shall be:

1. Insulated sufficiently to prevent freezing of piping; or
 2. Wrapped with heat tape, thermostatically controlled, of sufficient wattage to prevent freezing of piping, pipe insulation thickness as recommended by the heat tape manufacturer with fiberglass insulation with universal jacket.
- B. Condensate drainage pipe insulation inside the building and roof drain piping inside building used for condensate drainage: 1/2" thick flexible elastomeric thermal insulation, closed-cell, sponge- or expanded-rubber materials. Comply with ASTM C 534.

C. Roof drain piping inside building: Minimum of 1 1/2" insulation on first 10-feet of horizontal run starting at the roof drain body or elbow. This requirement applies to primary and overflow piping. Refer to condensate drainage piping where primary roof drain (horizontal or vertical) is used for condensate disposal.

2.3.1 EXECUTION OF PLUMBING SYSTEMS

A. Water and sewer lines shall be laid in separate trenches with a minimum horizontal spacing as required by code. Trenches for all underground pipe shall be excavated to the required depths. The bottoms of trenches shall be graded to produce the required fall.

B. At all underground pipes, provide not less than 8" minimum protection at different services. Domestic water shall be at least 12" above the top of the sanitary sewer at crossing. Provide 6" minimum clearance between pipes of different services above ground.

C. The contractor shall furnish all pipe supports required for their equipment and materials.

D. All horizontal runs of piping shall be supported by pipe straps, spaced as follows:

- 2" dia. and larger copper piping: 10 feet
- 1-1/2" dia. and smaller copper piping: 6 feet
- PV piping: 4 feet
- Cast iron: 5 feet

10-foot lengths of pipe are installed.

Soil and waste piping: At each joint.

Additional supports shall be provided where required to prevent sagging, hangers for copper pipe shall have nylon insulated bushings or pipe shall be wrapped with 15# felt.

E. Provide air chambers on water supplies at each fixture battery. Air chamber shall consist of a 12" length of tubing of the same diameter as the branch supply and fitted with a cap.

F. All connections to risers or fixtures shall be from top of mains, and all piping shall be pitched at least 1" in 25', so that it can be drained completely at the low points. Piping shall be pitched up toward risers and fixtures for proper air relief.

G. Horizontal soil and waste pipes shall be given a grade of 1/4" per foot where possible, but in no case less than 1/8" per foot. Horizontal waste lines receiving the discharge from 2 or more fixtures shall be provided with and vents unless separate venting of fixtures is provided. Changes in pipe size on waste, soil and drain lines shall be made with reducing fitting or recessed reducers. Changes in direction shall be made by the use of 45 degree wyes, halfwyes, except that sanitary tees may be used on vertical stacks and short 1/4 bends may be used in soil and waste lines where the change in direction of flow is from the horizontal to the vertical.

H. Each plumbing vent and/or soil stack projecting above the roof shall be flashed with standard manufactured flashing. Flashing shall be sheet metal with rubber gaskets. Flashing shall extend into roofing a minimum of 12" or distance specified by local code.

I. Cleanouts shall be provided where indicated on the drawings, or where required, to provide access to all lines and at each change in direction greater than 45 degrees and in each horizontal run at intervals not exceeding 50' in 4" or smaller and 100' in larger than 4" soil, waste and drain lines. Cleanouts shall be same size as pipe except cleanouts larger than 4" will not be required. Where cleanouts occur in walls of finished areas, they shall be concealed behind chrome-plated access covers.

J. STERILIZATION: The entire hot and cold domestic water systems shall be thoroughly sterilized after fabrication per the requirements of the local health and building codes.

K. CROSS CONNECTION AND INTERCONNECTIONS: No plumbing fixture, device or piping shall be installed which will provide a cross connection or interconnection between a distributing supply for drinking or domestic purposes and a polluted supply such as drainage system or a soil or waste pipe which will permit or make possible the backflow of sewage, polluted water or waste into the water supply system.

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PLUMBING SPECIFICATIONS

Project No.

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Date:

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Sheet No.

PO.2



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