SECTION 22 01 00

GENERAL PLUMBING PROVISIONS

PART 1 GENERAL

1.1 WORK INCLUDED

A. The work covered by Division 22 sections consist of furnishing all labor, equipment, appliances and material for the heating, air conditioning, piping and plumbing systems in strict accordance with Codes, Specifications and the applicable drawings and subject to the terms and conditions of the contract. Include all appurtenances necessary to the proper operation of the systems and equipment specified.

B. General Contractor shall install all concrete pads and bases required for installing mechanical equipment. Mechanical Contractor is responsible for the exact sizes required, location of anchor bolts, etc.

C. Some equipment may be furnished by other divisions. Mechanical Contractor is responsible to check the drawings and specifications for equipment that will be furnished by others. Furnish the supplies (hot and cold water cut-offs), traps, drains, controls, gas piping, backflow preventers, pressure reducing valves, etc., on all equipment furnished by other divisions.

D. General Contractor shall furnish and install all ceiling access panels required to service mechanical equipment, valves and controls above gyp board or hidden spline ceilings.

E. General Contractor shall provide all site drive, sidewalk and other surfaced areas saw cutting and repairs back to preexisting conditions for the required mechanical piping. Mechanical Contractor shall provide the trenching, bedding and backfill required for the pipe installation.

1.2 RELATED SECTIONS

A. The General Conditions and Division 1, General Requirements, as bound in the specification preamble, apply to all work under Division 22. Carefully note its contents in performance of the work.

B. The Architectural, Mechanical, Electrical, and Structural plans and Specifications, including Information to Bidders and other pertinent documents issued by the Engineer are a part of this Specifications and the accompanying mechanical plans. Comply with them in every respect. Examine all the above carefully. Failure to comply does not relieve the Contractor of responsibility nor may it be used as a basis for additional compensation due to omission of architectural, electrical and structural

details from the mechanical drawings.

C. All electrical power wiring is specified under Division 26 of the Specifications. Mechanical Contractor shall furnish all motor starters required for the control and protection of all motors furnished for the Division 22.

D. All concrete pads and bases required for installing mechanical equipment are specified in another section of the Specifications. Advise the General Contractor as to the exact sizes required, location of anchor bolts, etc.

E. Paint all mechanical equipment piping, supports and other exposed material. Do not paint equipment supplied with painted finish, such as the main mechanical equipment unless damaged during handling and installation. In such cases, use touch-up paint of the same type and color as original paint. Conform to requirements in other sections of the Specifications and match wall finish to the room in which installed.

1.3 CODES, FEES AND LATERAL COSTS

A. Comply with all applicable codes, specifications, local ordinances, industry standards, utility company regulations, and the applicable requirements of the following latest nationally accepted codes and standards:

1. Fayetteville , Arkansas City Building Code.
2. Arkansas State Mechanical Code.
3. Arkansas State Plumbing Code.
4. Arkansas Energy Code.
5. IBC - International Building Code.
6. IFC - International Fire Code; latest accepted edition.
7. IGC - International Gas Code; latest accepted edition.
8. IPC - International Plumbing Code; latest accepted edition.
9. IMC - International Mechanical Code; latest accepted edition.
10. IECC - International Energy Conservation Code; latest accepted edition.
11. AMCA - Air Moving & Conditioning Association.
12. ASA - American Standards Association.
13. ASHRAE - American Society of Heating, Refrigerating and Air Conditioning Engineers.

14. ASME - American Society of Mechanical Engineers.
15. ASTM - American Society of Testing Materials.
16. AWWA - American Water Works Association.
17. NBS - National Bureau of Standards.
18. NEMA - National Electrical Manufacturers Association.
19. NFPA - National Fire Protection Association.
20. SMACNA - Sheet Metal & Air Conditioning Contractors' National Association.
21. UL - Underwriters' Laboratories, Inc.
22. AGA - American Gas Association.
23. OSHA - Occupational Safety and Hazard Association.
24. AABC - Associated Air Balance Councils.
25. NEBB - National Environmental Balancing Bureau.

B. Comply with State of Arkansas adopted ADA Accessible Guidelines in regard to accessible or handicapped features.

C. In case of difference between building codes, Specifications, state Laws, local ordinances, industry standards and utility company regulations and the Contract Documents, the most stringent governs. Promptly notify the Engineer in writing of any such difference.

D. Remove any work installed that does not comply with the requirements of the applicable building codes, state laws, local ordinances, industry standards, or utility company regulations, correct the deficiencies, and reinstall all work at no cost to the Owner.

E. The mechanical drawings show the general arrangement of all piping, equipment and appurtenances. Follow as closely as actual building construction and the work of other trades will permit. Final layout will be governed by actual field conditions with all measurements verified at the site. Conform to the requirements shown on all of the drawings. General and structural drawings take precedence over mechanical drawings. Because of the small scale of the mechanical drawings, it is not possible to indicate all offsets, fittings and accessories which may be required. Investigate the existing and finish conditions affecting the work and arrange the work accordingly, providing such fittings, valves and accessories as may be required to meet such conditions. Contractor shall verify that all equipment, ducts, pipes and all other

components will fit in the space provided before fabrication or ordering.

F. Obtain any and all required permits in connection with this work under the Contract and pay any and all fees in connection therewith. Arrange with the serving utility companies for the connections to all utilities and pay all charges for same including inspection fees and meters if required. Refundable deposits will be paid by the Owner.

G. Mechanical Contractor shall provide and install, where applicable, seismic restraints for all piping and duct systems per the latest accepted Building Code.

1.4 GUARANTEE

A. Furnish a written certificate guaranteeing all materials, equipment and labor furnished to be free of all defects for a period of one (1) year from and after the date of final acceptance of the work by the Owner and further guarantee to replace such work without charges if any defects appear within the stipulated guaranty period.

1.5 SOIL CONDITIONS

A. The Specifications and the drawings in no way imply the conditions of the soil to be encountered. When excavating may be required in execution of the work, this Contractor agrees that he has informed himself regarding conditions affecting the work.

1.6 INSPECTION OF PREMISES

A. Before submitting a bid, visit the site of the proposed job and determine the conditions relating to this work.

1.7 UTILITIES, LOCATIONS AND ELEVATIONS

A. Locations and elevations of the various utilities included within the scope of this work have been obtained from substantially reliable sources and are offered as a general guide only, without guarantee as to accuracy. Verify the location and elevation of all utilities and their relation to the work before entering into a contract.

B. Identify outdoor underground lines with continuous strip of plastic utility marker tape at regular intervals (maximum of 10 feet) "Caution (state utility) pipe below". Install one foot directly above pipe before backfilling to grade.

1.8 EXISTING BUILDING AND EXISTING MECHANICAL EQUIPMENT

A. Visit the existing building and become thoroughly acquainted with the existing mechanical systems and utilities in order to determine all of the work that will be necessary to carry out the intent of the plans and specifications.

B. If it is necessary, in any way, to interfere with normal operations of the existing utilities in order to carry out the work, give notice and obtain written approval from the Owner before the work is started.

C. The work involved in this project requires the Contractor to work inside of an existing building. Interruption of the regular routine of the building by the Contractor must be kept to a minimum.

1.9 EQUIPMENT NOT SPECIFIED UNDER DIVISION 22

A. Equipment which requires plumbing and other mechanical connections may be specified in another division of this Specification. Under these conditions, provide necessary utilities including waste, water and natural gas.

B. Rough-in work from approved shop drawings only.

PART 2 PRODUCTS

2.1 EQUIPMENT AND MATERIALS

A. Provide new materials bearing the manufacturer's name, trade name and the UL label in every case where a standard has been established for the particular material. Furnish the standard product of a manufacturer regularly engaged in the production of the required type of equipment. Provide the manufacturer's latest approved design.

B. Deliver equipment and materials to the site and store in original containers, suitably sheltered from the elements, but readily accessible for inspection by the Engineer until installed. Store all items subject to moisture damage (such as controls) in dry, heated spaces.

C. Provide equipment and materials of the same general type and of the same make throughout the work to provide uniform appearance, operation and maintenance.

D. Tightly cover equipment and protect against dirt, water and chemical or mechanical injury and theft. At the completion of the work, clean fixtures, equipment and materials and polish thoroughly. Turn over to the Owner in a condition satisfactory to the Engineer. Repair damage or defects developing before acceptance of the work at no expense to the Owner.

E. Insure that items to be furnished fit the space available. Make necessary field measurements to ascertain space requirements, including those for connections. Furnish and install such sizes and shapes of equipment that the final installation suits the true intent and meaning of the drawings and Specifications.

F. Follow manufacturer's directions completely in the delivery, storage, protection and installation of all equipment and materials. Promptly notify the Engineer in writing of

any conflicts between any requirements of the Contract Documents and the manufacturers' directions. Obtain the Engineer's written instruction before proceeding with the work. Replace any work that does not comply with the manufacturers' directions or such written instructions from the Engineer, at no cost to the Owner.

G. Support all products by service organizations with adequate spare parts inventory and personnel located reasonably close to the site.

H. Where multiple units of the same type or class of products are required, provide all units of the same manufacturer.

2.2 EQUIPMENT ACCESSORIES

A. Furnish and install all equipment, accessories, connections and incidental items necessary to fully complete all work, ready for use, occupancy and operation by the Owner.

B. Where equipment requiring different arrangement or connections from those shown is provided, install the equipment to operate properly and in harmony with the intent of the drawings and Specifications.

C. Support, plumb, rigid and true to line, all work and equipment furnished. Study thoroughly all general, structural, electrical and mechanical drawings, shop drawings and catalog data to determine how equipment, fixtures, piping, ductwork, etc., are to be supported, mounted or suspended and provide extra steel bolts, inserts, pipe stands, brackets and accessories for proper supports whether or not shown on the drawings. When directed, submit drawings showing supports.

D. If accessories are required to complete the work and meet the intent of the specification, it is the responsibility of the Contractor to provide such accessories.

2.3 MATERIAL AND EQUIPMENT SCHEDULE

A. Submit to the Engineer as soon as practical, six (6) complete sets of the schedule of materials and equipment proposed for the installation, or electronic submittals as detailed below. Include manufacturers' names, catalog data, diagrams, drawings and other descriptive data and submit under one cover with an index sheet in front.

1. If Electronic files are submitted, a complete set of the schedule of materials and equipment proposed for the installation shall be included. Include manufacturers' names, catalog data, diagrams, drawings and other descriptive data. All information shall be submitted electronically in "pdf" format, and shall be separated into electronic "pdf" files according to the corresponding specification section (i.e. "22 10 06 - Plumbing Specialties.pdf"). Unless incomplete submittals are authorized by the project engineer, all Division 22 submittals shall be

electronically sent at one time. Without authorization, incomplete submittals shall be rejected.

B. Provide written certification that shop drawings are in accordance with the specifications and are dimensionally correct with reference to available space.

C. All submittals will be reviewed a maximum of two (2) times. The cost of additional submittal reviews beyond those two specified will be charged to the Contractor.

D. Shop drawings for the Engineer's files are required on the following items:

1. Commercial water heaters.
2. Plumbing fixtures and floor drains.
3. Domestic water heater.
4. Valves/Circulation pumps/flex connectors and other specialties.
5. Water balance certification.
6. Piping materials including valves.
7. Piping insulation materials.
8. Complete mechanical equipment electrical data and wiring details.
9. Seismic restraints.

2.4 EQUIPMENT AND MATERIAL SUBSTITUTIONS

A. It is the responsibility of the Contractor to investigate any desired substitutions for specified equipment prior to submission of his bid. The Mechanical Contractor shall be responsible for any changes required in mechanical, electrical, structural or vibration isolation systems and shall bear all cost for those changes whether the substitute equipment is named by manufacturer in the specifications or is submitted to the Architect for "or equal" consideration. All changes shall be accomplished in a manner acceptable to the Architect per Section 01 60 00 at no additional cost to the Owner.

B. In order to obtain prior approval on equipment or material not specified in Division 22 Specifications or Equipment Schedules, Mechanical Contractor MUST submit to the Engineer any proposed equipment or material ten (10) working days prior to the bid date.

C. If ANY substitute equipment is submitted to Engineer for approval, without said equipment having been pre-approved, the entire submittal will be rejected for

resubmittal.

D. Any equipment manufacturers which are a subsidiary to the listed acceptable manufacturers are not considered equal. Therefore, it is the responsibility of the Contractor and equipment supplier to obtain prior approval as described in paragraph 2.4, this Section.

2.5 ELECTRICAL MOTORS

A. Provide motors of a recognized manufacturer, wound for the voltage specified, and in conformance to latest standards of the manufacturer and performance of the National Electrical Manufacturers Association and the Institute of Electrical and Electronic Engineers. Provide motors as manufactured by General Electric, Westinghouse, Century or Siemens-Allis, Baldor or approved equal.

B. Provide motors rated for continuous duty at 100% of rated capacity and temperature raise of 40 degrees Centigrade open type; 50 degrees Centigrade drip and splash proof; 55 degrees Centigrade explosion proof and totally enclosed above an ambient of 40 degrees Centigrade.

C. Unless otherwise required, provide integral horsepower, polyphase motors, Class B, general purpose, squirrel cage, open type induction motors, T-frame.

D. Provide single phase fractional horsepower motors of the open capacitor type. Generally, motors under 1/2 horsepower may be split phase type unless otherwise specified. Provide motors rated 1/2 horsepower or less with integral overcurrent protection.

E. Insure the insulation resistance between stator conductor and frames of motors is not less than 1/2 megohm. Provide shop test of motors including temperature rise, insulation resistance, motor terminal voltage, normal operating line current, RPMs, breaker or switch size with fusing and overload relay sizes.

PART 3 EXECUTION

3.1 COORDINATION OF WORK

A. Compare the mechanical drawings and Specifications with the drawings and Specifications for other trades and report any discrepancies between them to the Engineer and obtain from him written instruction for changes necessary in the mechanical work. Install the mechanical work in cooperation with other trades installing inter-related work. Before installation, make proper provisions to avoid interferences in a manner approved by the Engineer. Make all changes required in the work caused either by neglect or existing field conditions at no cost to the Owner.

B. It is the responsibility of the General Contractor, Mechanical Contractor, Sprinkler and Electrical Contractor to coordinate installation of all equipment. Equipment installed prior to proper coordination, which interferes with the harmony and intent of the specifications and drawings, will be removed and reinstalled at the cost of the responsible Contractor.

C. Furnish anchor bolts, sleeves, inserts and supports required for the mechanical work. Locate anchor bolts, sleeves, inserts and supports as directed by the trade requiring them and insure that they are properly installed.

D. Adjust locations of pipes, ducts, equipment fixtures, etc., to accommodate the work and for interferences anticipated and encountered. Determine the exact route and location of each pipe and duct prior to fabrication.

1. New work and remodeled areas are to interface with existing facility services. Contractor to familiarize himself with the extent of the work prior to submitting his bid. Failure to gain familiarity will not be grounds for additional compensation.

2. Provide right-of-way to lines that pitch over those that do not pitch. For example, Plumbing drains normally have right-of-way. Lines whose elevations cannot be changed have the right-of-way over lines whose elevations can be changed.

3. Make offsets, transitions and changes in direction in pipes and ducts as required to maintain proper head room and pitch.

E. Install all mechanical work to permit removal without damage to other parts, to coils, fan shafts and wheels, filters, belt guards, sheaves and drives and all other parts requiring periodic replacement or maintenance. Arrange pipes, ducts and equipment to permit ready access to valves, cocks, traps, starters, motors, control components and to clear the openings of swinging and overhead doors and of access panels.

3.2 CHLORINATION OF DOMESTIC WATER LINES

A. After the hot and cold water systems are complete, all fixtures connected, the system flushed out completely and the shut-off valve to the water main closed, fill the system with a solution containing 50 parts per million of available chlorine. Allow the solution to stand six (6) hours before flushing and returning to service.

B. Then fill the system with a solution containing 100 parts per million of available chlorine. Allow this solution to stand two (2) hours before flushing and returning to service.

C. Notify the Owner twenty-four hours prior to test so his representative can witness test. Obtain chemical analysis of the domestic water lines after chlorination from a

Certified Chemist and submit the results of these tests to the Engineer and Owner.

3.3 RECORD DRAWINGS

A. Maintain record drawings showing exact locations and sizes, as actually installed, of piping, drains, cleanouts, ductwork, controls and equipment as specified herein. Deliver to the Owner/Architect upon completion and acceptance of the work, one (1) complete set of contract drawings marked to indicate all deviations from intended installation.

3.4 CUTTING AND PATCHING

A. The General Contractor shall be responsible for all required Building cutting, patching, etc., incidental to this work and shall make all required repairs thereafter to the satisfaction of the Engineer. Do not cut into any major structural element, beam or column without the written approval of the Engineer.

B. The General Contractor shall cut, patch, repair and/or replace pavements, sidewalks, roads and curbs as required to permit the installation of the plumbing work and pay all expenses incurred for this work.

C. Openings in fire or smoke barriers for air handling ductwork or air movement shall be protected in accordance with NFPA 90A and 90B and the Standard Mechanical Code.

D. Pipes, conduits, cables, wires, air ducts, pneumatic tubes and ducts and similar handling service equipment that pass through fire or smoke barriers shall be protected in accordance with NFPA 101 by the plumbing contractor.

E. All fire stopping assemblies must be UL approved assemblies.

3.5 EXCAVATION AND TRENCHING FOR PIPING

A. Excavate to the depths indicated on the Drawings or as required to provide adequate slope and burial depth. Excavated materials not required or suitable for backfill or fill shall be removed from the site. Do such grading as is necessary to prevent surface water from flowing into trenches or other excavations. Water accumulating therein shall be removed by pumping or by other method. Sheeting and shoring shall be installed as may be necessary for protection of the work and for safety of personnel. Excavation shall be by open cut except that short sections of a trench may be tunneled if the pipe can be safely and properly installed and backfill can be properly tamped in such tunnel sections.

B. Trench Excavation: Grade bottom of trenches to provide uniform bearing and support for each section of pipe on undisturbed soil. Where rock is encountered excavate to a minimum overdepth of 4" below trench depths indicated on the Drawings or specified. Overdepth in rock excavation and unauthorized overdepths shall be backfilled.

Whenever wet or otherwise unstable soil incapable of properly supporting the pipe is encountered such soil shall be removed and the trench backfilled to proper grade as hereinafter specified.

C. Depth of Cover: Trenches shall be of depth that will provide three feet (3') minimum cover for domestic water, fire lines, sanitary and storm sewers from existing grade or from indicated finish grade, whichever is lower, unless otherwise specifically shown.

D. Utilities Locating: Locate existing utility lines prior to beginning any excavation

E. Protection of Existing Utilities: Existing utility lines to be retained that are shown on the Drawings or the locations of which are made known to the Contractor prior to excavation, as well as all utility lines uncovered during excavation operations, shall be protected from damage during excavation and backfilling, and if damaged, shall be repaired by the Contractor, at his expense.

F. Trenches shall not be backfilled until required pressure and other tests have been performed and until the utilities systems as installed conform to requirements of Drawings and Specifications.

G. Backfill trenches with excavated materials consisting of earth, sandy clay, sand, gravel, soft shale or other approved materials, free from clods of earth or stones 2-1/2" maximum dimension, deposited in 6" layers and compacted to 95% Standard Proctor Compaction Test of the maximum laboratory density determined in accordance with ASTM D698, Moisture-Density Relation of Soils. If fills fail to meet the specified densities, the Contractor shall remove and re-compact the fill until specified densities are achieved. Compaction test shall be performed for each fifty linear feet of trench.

H. Provide a 4-inch thick (minimum) layer of 3/4-inch No. 4 gravel aggregate bedding beneath all buried piping. Bedding shall be compacted and leveled to provide sloping required.

I. Tests for displacement of sewers: After the trench has been backfilled to 2 feet or more above the pipe, if the pipe shows poor alignment, displaced pipe, or any other defects, such defects shall be remedied by the Contractor at his expense.

3.6 EQUIPMENT START-UP AND TESTING

A. Instruct the Owner's operating personnel during start-up and separate operating tests of each major item of equipment. During the operating tests, prove the operation of each item of equipment to the satisfaction of the Engineer. Give at least seven (7) days notice to the Engineer of equipment start-up and operating tests.

3.7 CATALOG DATA FOR OWNER

A. Provide, in looseleaf binders, two (2) sets of a compilation of catalog data of each manufactured item of equipment used in the mechanical work and present this compilation to the Owner/Architect for transmittal to the Owner before final payment is made. Include descriptive data and printed installation, operating and maintenance instructions for each item of equipment. Provide a complete double index as follows:

1. Listing of products alphabetically by name.

2. Listing the names of manufacturers whose products have been incorporated in the work alphabetically together with their addresses and the names and addresses of the local sales representatives.

3. Certificates of Final Inspections.

4. Complete spare parts data with current prices and supply sources.

5. Extended warranties.

B. Deliver to the Owner all special tools, lubricants, extra materials and any other products necessary for the proper operation and maintenance of the mechanical and plumbing systems.

C. Provide project record documents indicating all changes from contract documents made during construction.

D. Submit all Certificates of Final Inspections from the Administrative Authorities.

E. Submit TAB reports on approved forms. Final TAB report submittals shall include all required rebalances if any are required.

F. Submit to the Engineer as soon as practical, electronic closeout documents as detailed below.

1. Include manufacturers' names, catalog data, diagrams, drawings and other descriptive data and submit under one cover with an index sheet in front.All information shall be submitted electronically in "pdf" format, and shall be separated into electronic "pdf" files.

3.8 INSTRUCTION OF OWNER'S REPRESENTATIVE

A. Instruct the representative of the Owner in the proper operation and maintenance of all elements of the mechanical system.

3.9 PROTECTIVE COATINGS

A. Paint exterior surfaces of steel piping run in or through concrete floor fill, under tile floors or underground, and aluminum surfaces in contact with masonry, with one coat of acid resisting bituminous base paint.

3.10 TEST AND ACCEPTANCE

A. Water Piping System: Test with water at 100 psi for one (1) hour or with available city water pressure for twenty-four (24) hours to prove tight and free from leaks.

B. Plumbing and Drainage System: Test the new system humidity and drain piping with water and prove tight. Test system with 10 feet of water for 24 hour period. Air test is not permitted.

3.11 NOISE CONTROL

A. It is intended that the mechanical systems as installed under this contract be free from objectionable noise when the system is operating. The system shall operate at noise levels below criteria recommended for the application by ASHRAE. Provide vibration isolation accessories and isolate equipment, pipeline, ductwork, etc., as required so as to insure an acceptable noise level in all of the mechanical systems.

3.12 CLEANING AND ADJUSTING

A. Do not allow waste material and rubbish to accumulate in or above the premises. After completion of this work, remove rubbish, tools, scaffolding and surplus materials from and about the building and leave all work clean and ready for use. Clean all equipment, pipes, valves and fittings of grease, metal cuttings and sludge. Repair any stoppage, discoloration or other damage to parts of the building, its finish or furnishings due to failure to properly clean the mechanical systems, without additional cost to the Owner. Adjust all automatic control devices for proper operation.

3.13 SYSTEM OPERATING TESTS

A. After the successful completion of all equipment start-up and test requirements, perform the following tests on the complete mechanical systems:

1. First Operating Test by Contractor: Prove the operation of the mechanical systems and of each individual item in the systems. Give at least 10 days prior notice to the Engineer of such tests. Adjust and set proper quantities to all items and equipment. Should any item of the systems fail to perform in an approved manner, repeat this test until approved by the Engineer. During this test, balance circulation of heating and cooling water to balancing cocks, valves, thermostats and similar Items to insure that the mechanical systems perform as intended.

2. Checking by Owner and Engineer: Following the successful completion of first operating tests by the Contractor, the Owner and the Engineer have the privilege of making such tests as they may desire during a period of three weeks to ascertain in detail if any corrections are to be made to the system. At the end of the testing by the Owner and the Engineer, the Engineer may direct the Contractor in writing to make such corrections to the systems as are within the scope of the contract.

3. Contractor's Corrections to Systems: Make all required corrections to the systems and notify the Engineer in wiring that the corrections outlined have been completed. Give at least seven (7) days notice of a final three-day operating test.

4. Three-Day Operating Test: Perform an operating test to the satisfaction of the Engineer for a period of three (3) days. Should any element of the systems not perform properly, make all required corrections and repeat the test until successfully performed.

    a. Submit the Form of Record proposed by the Contractor for the recording of all measurements to the Engineer for approval at least two weeks before the approved form will be required by the Contractor.

    b. Measurements: Make the following measurements at two-hour intervals (5 measurements per 8-hour day) during the three-day operating test.

        1) Electrical: Running amperes and voltage of each motor 3/4 horsepower or larger.

        2) Air temperatures in each heated or air conditioned space and outdoor temperatures.

    c. Instruments: Provide all instruments, materials and labor to perform the tests and to obtain and record the measurements specified herein, including the furnishing of all required record forms as approved by the Engineer. Submit for the Engineer's approval, complete shop drawings or catalog data for all instruments to be used for the three day operating test and obtain approval at least two weeks before the instruments will be required for test measurements.

    d. Report: Submit four (4) copies of a written report of the three-day operating test on the approved Form of Record to the Engineer for approval and subsequent transmittal to the Owner.

3.14 MOTOR CONTROL

A. General: Provide each motor 1/8 horsepower or larger with a suitable controller and devices that will perform the functions as specified for the respective motors, together with manual reset thermal overload, protection in each undergrounded conductor. Provide the controller either integral with circuit protective device or mounted in separate enclosure. Starters shall be Allen-Bradley, G.E., Westinghouse, Square D or approved equal.

B. Control: Automatic control devices such as thermostats, float or pressure switches may control the starting and stopping of motor directly, provided the device used is designated for that purpose and has an adequate horsepower rating. When automatic control device does not have such a rating, use a magnetic starter with the automatic control device actuating the pilot control circuit. When combination manual and automatic control is specified and the control device operates the motor directly, provide a manual motor starter and selector switch. When combination manual and automatic control is specified and the automatic control device actuates the pilot control circuit, a magnetic control device actuates the pilot control provided. Provide all magnetic starters with push buttons or selector switches in the covers. Provide connections to the selector switch such that only the normal automatic regulating control devices will be bypassed when the switch is in the manual position. Connect all safety control devices, such as low or high pressure cutouts, high temperature cutouts and motor overload protective devices in the motor control circuit in both the manual and automatic positions of the selector switch control circuit. Make connections to any selector switch or to more than one (1) automatic regulatory control device in accordance with wiring diagrams recommended by the manufacturer and approved by the Engineer. Where required for manual control, provide push-button stations consisting of two (2) momentary contact operators, 600 volts, 10 amperes installed and wired for three wire control to provide under-voltage relays, auxiliary contacts or other devices required for a complete system.

C. Location: Where the controller is located within sight of the motor driven equipment (fifty feet or less), the controller and circuit protective device shall be capable of being locked in the open position. Where the controller is located out of sight of the motor driven equipment (more than fifty feet) provide a non-fused safety disconnect, suitable for the service, and which opens all ungrounded conductors simultaneously, at or on the motor driven equipment.

D. Enclosure: Enclosure to be general purpose, NEMA Type 1 unless noted otherwise (NEMA Type 1 gasketed). The circuit breaker shall be operable by hand from outside the enclosure and shall be so interlocked with the door or doors that it must be returned to the "OFF" position before the door can be opened.

E. Push-buttons: Provide maintained contact, standard duty type in a general purpose, NEMA Type 1 enclosure for surface mounting rated for 10 amperes continuous at 600 volts or less.

3.15 ACCESS PANELS

A. Provide access panels as required in all walls, ceilings and ductwork to service and have access to all valves, and other operating parts. For all ceiling and wall access doors that are required in gypsum board and plaster, provide minimum 24" x 24", unless due to structural restraints the access door can be reduced to a minimum of 18" x18", Milcor type appropriate for the construction involved.

3.16 DEMOLITION

A. There are areas in the existing building in which demolition will have to be performed due to the requirements for remodeling. The demolition work involved is not fully described herein; however, the information given on the electrical and mechanical drawings and the information set out in the specifications will substantially serve to inform the mechanical Contractor as to the full extent of the demolition required.

B. Contractor should visit job site to verify extent of demolition required to complete project.

C. It is the intent of this Specification that all required demolition work be fully and completely performed and all work be accomplished in a neat and workmanlike manner.

D. Remove all existing piping, fittings, heating, cooling, ventilation equipment that is required to accomplish the remodel work. All existing utilities that are disconnected shall be capped recessed in walls and floors. Contractor shall be responsible for visiting building and determining the extent of the demolition work. Contractor shall provide any necessary temporary piping required to keep existing building utilities (water, gas and sewer) in operation until new construction is completed to the extent that the new utilities can be reconnected.

E. All rubbish, debris and expendable items resulting from demolition work shall be removed from the premises as it accumulates and disposed of at an off-site location by the Contractor.

3.17 SALVAGE

A. Except as otherwise specified herein, or noted on drawings, the Contractor shall receive title to all building materials indicated to be demolished or removed which are not specifically designated as being retained by the Owner, said title to vest in the Contractor immediately upon receipt of Work Order. All salvage materials removed

shall be taken from the premises promptly, as the storage of salvage materials on the site will not be permitted. Bidders shall take into account the salvage value to them of materials removed and such value shall be reflected in the bids.

B. All items of usable equipment shall remain the property of the Owner. All such items of equipment which are to be removed and which are not to be reused shall be stored on the premises by the Contractor as directed by the Owner.

C. Usable items shall be determined by the Owner and shall include existing heating and cooling pumps and other equipment so designated as "usable" by the Owner.

3.18 FINALLY

A. It is the intention that this specification shall provide a complete installation except as herein before specifically accepted. All accessory construction and apparatus necessary or advantageous in the operation and testing of the work shall be included. The omission of specific reference to any part of the work necessary for such complete installation shall not be interpreted as relieving this Contractor from furnishing and installing such parts.

END OF SECTION

SECTION 22 05 48

VIBRATION AND SEISMIC CONTROLS FOR PLUMBING PIPING AND EQUIPMENT

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Vibration isolation requirements.

B. Seismic control requirements.

1. Includes requirements for seismic qualification of equipment not specified in this section.

C. Equipment support bases.

D. Vibration isolators.

E. Seismic snubber assemblies.

F. Seismic restraints for suspended components and equipment.

1.2 RELATED REQUIREMENTS

A. Section 03 30 00 - Cast-in-Place Concrete.

B. Section 21 05 48 - Vibration and Seismic Controls for Fire Suppression Piping and Equipment.

C. Section 23 05 48 - Vibration and Seismic Controls for HVAC Piping and Equipment.

1.3 DEFINITIONS

A. Plumbing Component: Where referenced in this section in regards to seismic controls, applies to any portion of the plumbing system subject to seismic evaluation in accordance with applicable codes, including distributed systems (e.g. piping).

B. Seismic Restraint: Structural members or assemblies of members or manufactured elements specifically designed and applied for transmitting seismic forces between components and the seismic force-resisting system of the structure.

1.4 REFERENCE STANDARDS

A. ASCE 7 - Minimum Design Loads for Buildings and Other Structures; 2010, with 2013 Supplements and Errata.

B. ASCE 19 - Structural Applications of Steel Cables for Buildings; 2016.

C. ASHRAE (HVACA) - ASHRAE Handbook - HVAC Applications; 2015.

D. FEMA 412 - Installing Seismic Restraints for Mechanical Equipment; 2002.

E. FEMA 413 - Installing Seismic Restraints for Electrical Equipment; 2004.

F. FEMA 414 - Installing Seismic Restraints for Duct and Pipe; 2004.

G. FEMA E-74 - Reducing the Risks of Nonstructural Earthquake Damage; 2011.

H. ICC (IBC) - International Building Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

I. ICC-ES AC156 - Acceptance Criteria for Seismic Certification by Shake-Table Testing of Nonstructural Components; 2010, with Editorial Revision (2015).

J. MFMA-4 - Metal Framing Standards Publication; 2004.

K. SMACNA (SRM) - Seismic Restraint Manual Guidelines for Mechanical Systems; Sheet Metal and Air Conditioning Contractors' National Association; 2008.

1.5 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. Coordinate selection and arrangement of vibration isolation and/or seismic control components with the actual equipment to be installed.

2. Coordinate the work with other trades to provide additional framing and materials required for installation.

3. Coordinate compatibility of support and attachment components with mounting surfaces at the installed locations.

4. Seismic Controls:

a. Coordinate the arrangement of seismic restraints with piping, conduit, equipment, and other potential conflicts installed under other sections or by others.

b. Coordinate the work with other trades to accommodate relative positioning of essential and non-essential components in consideration of seismic interaction.

B. Sequencing:

1. Do not install products on or provide attachment to concrete surfaces until concrete has fully cured in accordance with Section 03 30 00.

1.6 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Design Documents: Prepare and submit all information required for plan review and permitting by authorities having jurisdiction, including but not limited to floor plans, details, and calculations.

C. All seismic / wind / vibration/seismic restraint systems shall be by a single manufacturer.

D. Product Data: Provide manufacturer's standard catalog pages and data sheets for products, including materials, fabrication details, dimensions, and finishes.

1. Vibration Isolators: Include rated load capacities and deflections; include information on color coding or other identification method for spring element load capacities.

2. Seismic Controls: Include seismic load capacities.

E. Shop Drawings - Vibration Isolation Systems:

1. Include dimensioned plan views and sections indicating proposed arrangement of vibration isolators; indicate equipment weights and static deflections.

2. Vibration-Isolated Equipment Support Bases: Include base weights, including concrete fill where applicable; indicate equipment mounting provisions.

F. Shop Drawings - Seismic Controls:

1. Include dimensioned plan views and sections indicating proposed plumbing component locations and distributed system routing, with locations and details of gravity supports and seismic restraints and associated attachments.

2. Identify mounting conditions required for equipment seismic qualification.

3. Identify anchor manufacturer, type, minimum embedment, minimum spacing, minimum member thickness, and minimum edge distance requirements.

4. Indicate proposed arrangement of distributed system trapeze support groupings.

5. Indicate proposed locations for distributed system flexible fittings and/or connections.

6. Indicate locations of seismic separations where applicable.

G. Seismic Design Data:

1. Compile information on project-specific characteristics of actual installed plumbing components necessary for determining seismic design forces required to design appropriate seismic controls.

   a. Component operating weight and center of gravity.

   b. Component elevation in the building in relation to the roof elevation (z/h).

   c. Component importance factor (Ip).

   d. For distributed systems, component materials and connection methods.

   e. Component amplification factor (ap) and component response modification factor (Rp), determined in accordance with ASCE 7 tables.

   f. Applicability of overstrength factor (for certain anchorage in concrete and masonry).

2. Include structural calculations, stamped or sealed by seismic controls designer, demonstrating suitability of seismic controls for seismic design forces.

H. Evaluation Reports: For products specified as requiring evaluation and recognition by a qualified evaluation service, provide current evaluation reports.

I. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.

J. Manufacturer’s detailed field testing and inspection procedures.

K. Field quality control test reports.

L. Shop Drawings:

1. Provide schedule of vibration isolator type with location and load on each.

2. Fully dimensioned fabrication drawings and installation details for vibration isolation bases, member sizes, attachments to isolators, and supported equipment.

3. Include the seal of the Professional Engineer registered in the State of Arkansas in which the Project is located, on drawings and calculations which at a minimum include the following:

   a. Seismic Restraint Details: Detailed drawings of seismic restraints and snubbers including anchorage details that indicate quantity, diameter, and depth of penetration, edge distance, and spacing of anchors.

b. Dimensioned outline drawings of equipment identifying center of gravity, locations, and provisions for mounting and anchorage.

c. Detailed description of the equipment anchorage devices on which the certifications are based.

1.7 QUALITY ASSURANCE

A. Comply with applicable building code.

B. Maintain at the project site a copy of each referenced document that prescribes execution requirements.

C. Seismic Controls Designer Qualifications: Registered professional engineer licensed in Arkansas and with minimum five years experience designing seismic restraints for nonstructural components.

1. Designer may be employed by the manufacturer of the seismic restraint products.

D. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

E. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than three years of documented experience.

1. Member of Vibration Isolation and Seismic Control Manufacturers Association (VISCMA).

1.8 DELIVERY, STORAGE, AND HANDLING

A. Receive, inspect, handle, and store products in accordance with manufacturer's instructions.

PART 2 PRODUCTS

2.1 VIBRATION ISOLATION REQUIREMENTS

A. Design and provide vibration isolation systems to reduce vibration transmission to supporting structure from vibration-producing plumbing equipment and/or plumbing connections to vibration-isolated equipment.

B. Comply with applicable general recommendations of ASHRAE (HVACA), where not in conflict with other specified requirements:

C. General Requirements:

1. Select vibration isolators to provide required static deflection.

2. Select vibration isolators for uniform deflection based on distributed operating weight of actual installed equipment.

3. Select seismic type vibration isolators to comply with seismic design requirements, including conditions of equipment seismic certification where applicable.

4. Select vibration isolators for outdoor equipment to comply with wind design requirements.

5. Select vibration-isolated equipment support bases and associated vibration isolators to provide minimum 2 inch operating clearance beneath base unless otherwise indicated.

D. Equipment Isolation: As indicated on drawings.

E. Piping Isolation:

1. Minimum Static Deflection:

a. First Three Supports Closest to Isolated Equipment: Same as static deflection of equipment; maximum of 2 inch deflection required.

b. Remainder of Supports: 0.75 inch deflection unless otherwise indicated.

2. Suspended Piping, Non-Seismic Applications: Use resilient material isolator hangers, spring isolator hangers, or combination resilient material/spring isolator hangers.

3. Suspended Piping, Seismic Applications: Use seismic type resilient material isolator hangers, seismic type spring isolator hangers, or seismic type combination resilient material/spring isolator hangers.

4. Floor-Mounted Piping, Non-Seismic Applications: Use open (unhoused) spring isolators.

5. Floor-Mounted Piping, Seismic Applications: Use seismic type restrained spring isolators.

6. Use modular seal or approved resilient material where vibration-isolated piping penetrates building elements (e.g. walls, floors) arranged to prevent vibration transmission to structure.

2.2 SEISMIC CONTROL REQUIREMENTS

A. Design and provide plumbing component restraints, supports, and attachments suitable for seismic loads determined in accordance with applicable codes, as well as gravity

and operating loads and other structural design considerations of the installed location. Consider wind loads for outdoor plumbing components.

B. Seismic Design Criteria: As indicated on drawings.

C. Component Importance Factor (Ip): Plumbing components to be assigned a component importance factor (Ip) of 1.5 unless otherwise indicated.

D. Seismic Restraints:

1. Provide seismic restraints for plumbing components except where exempt according to applicable codes and specified seismic design criteria, as approved by authorities having jurisdiction.

2. Seismic Restraint Exemptions:

a. Exemptions for Seismic Design Category C:

1) Plumbing components with component importance factor (Ip) of 1.0.

2) Plumbing piping with component importance factor (Ip) of 1.5 and nominal pipe size of 2 inch or less; exemption does not apply to piping constructed of low-deformability materials (e.g. cast iron, glass, nonductile plastics).

b. Exemptions for Seismic Design Category D, E, and F:

1) Plumbing components with component importance factor (Ip) of 1.0 where all of the following apply:

(a) The component is positively attached to the structure.

(b) Flexible connections are provided between the component and associated ductwork, piping, and conduit.

(c) Either:

(1) The component weighs 400 pounds or less and has a center of mass located 4 feet or less above the adjacent floor level.

(2) The component weighs 20 pounds or less or, in the case of a distributed system, 5 pounds per foot or less.

2) Plumbing piping with component importance factor (Ip) of 1.0 and nominal pipe size of 3 inch or less, or with component importance factor (Ip) of 1.5 and nominal pipe size of 1 inch or less; exemption does not apply to piping constructed of low-deformability materials (e.g. cast

iron, glass, nonductile plastics).

c. Plumbing Piping Exemptions, All Seismic Design Categories:

1) Trapeze supported piping weighing less than 10 pounds per foot, where all pipes supported meet requirements for exemption as single pipes described under specific seismic design category exemptions above.

2) Hanger supported piping where each hanger in the piping run is 12 inches or less in length from the pipe support to the supporting structure; rod hangers, where used, to be equipped with swivels.

3. Comply with applicable general recommendations of the following, where not in conflict with applicable codes, seismic design criteria, or other specified requirements:

a. ASHRAE (HVACA).

b. FEMA 412.

c. FEMA 413.

d. FEMA 414.

e. FEMA E-74.

f. SMACNA (SRM).

4. Seismic restraint capacities to be verified by a Nationally Recognized Testing Laboratory (NRTL) or certified by an independent third party registered professional engineer acceptable to authorities having jurisdiction.

5. Seismic Type Vibration Isolators:

a. Comply with seismic design requirements, including conditions of equipment seismic certification where applicable.

6. External Seismic Snubber Assemblies:

a. Provide quantity and arrangement of external seismic snubber assemblies as required to restrain equipment in all directions (both lateral and vertical).

b. Do not use external seismic snubber assemblies that restrain equipment only in one or more lateral directions (but not vertical) except where uplift forces are zero or are addressed by other restraints.

7. Seismic Restraint Systems:

a. Except where otherwise restricted, use of either cable or rigid restraints is permitted.

b. Use only cable restraints to restrain vibration-isolated plumbing components, including distributed systems.

c. Use only one restraint system type for a given plumbing component or distributed system (e.g. piping) run; mixing of cable and rigid restraints on a given component/run is not permitted.

d. Size restraint elements, including anchorage, to resist seismic loads as necessary to restrain plumbing component in all lateral directions; consider bracket geometry in anchor load calculations.

e. Use rod stiffener clips to attach bracing to hanger rods as required to prevent rod buckling from vertical (upward) compressive load introduced by cable or rigid restraints loaded in tension, in excess of downward tensile load due to supported plumbing component weight.

f. Select hanger rods and associated anchorage as required to accommodate vertical (downward) tensile load introduced by rigid restraints loaded in compression, in addition to downward tensile load due to supported plumbing component weight.

g. Clevis hangers may only be used for attachment of transverse restraints; do not use for attachment of longitudinal restraints.

h. Where seismic restraints are attached to clevis hangers, provide clevis bolt reinforcement accessory to prevent clevis hanger deformation.

i. Do not introduce lateral loads on open bar joist chords or the weak axis of beams, or loads in any direction at other than panel points unless approved by project Structural Engineer of Record.

E. Seismic Attachments:

1. Attachments to be bolted, welded, or otherwise positively fastened without consideration of frictional resistance produced by the effects of gravity.

2. Post-Installed Concrete and Masonry Anchors: Evaluated and recognized by ICC Evaluation Service, LLC (ICC-ES) or qualified evaluation service acceptable to authorities having jurisdiction for compliance with applicable building code, and qualified for seismic applications; concrete anchors to be qualified for installation in both cracked and uncracked concrete.

3. Do not use power-actuated fasteners.

4. Do not use friction clips (devices that rely on mechanically applied friction to resist loads). Beam clamps may be used for supporting sustained loads where provided with restraining straps.

5. Comply with anchor minimum embedment, minimum spacing, minimum member thickness, and minimum edge distance requirements.

6. Concrete Housekeeping Pads:

    a. Increase size of pad as required to comply with anchor requirements.

    b. Provide pad reinforcement and doweling to ensure integrity of pad and connection and to provide adequate load path from pad to supporting structure.

F. Seismic Interactions:

1. Include provisions to prevent seismic impact between plumbing components and other structural or nonstructural components.

2. Include provisions such that failure of a component, either essential or nonessential, does not cause the failure of an essential component.

G. Seismic Relative Displacement Provisions:

1. Use suitable fittings or flexible connections to accommodate:

    a. Relative displacements at connections between components, including distributed systems (e.g. piping); do not exceed load limits for equipment utility connections.

    b. Relative displacements between component supports attached to dissimilar parts of structure that may move differently during an earthquake.

    c. Design displacements at seismic separations.

    d. Anticipated drifts between floors.

2.3 MANUFACTURERS

A. Kinetics Noise Control, Inc; _____: www.kineticsnoise.com/#sle.

B. Mason Industries; _____: www.mason-ind.com/#sle.

C. Substitutions: See Section 22 01 00.

2.4 EQUIPMENT SUPPORT BASES

A. Vibration-Isolated Structural Steel Bases:

1. Description: Engineered structural steel frames with integral mounting provisions for vibration isolators, sized and configured for mounting of equipment.

B. Vibration-Isolated Concrete Inertia Bases:

1. Description: Concrete-filled engineered steel forms with integral mounting provisions for vibration isolators, sized and configured for mounting of equipment.

2. Minimum Base Depth: 6 inches.

3. Minimum Base Mass (Including Concrete): 1.5 times weight of supported equipment.

4. Concrete Reinforcement: Welded or tied reinforcing bars running both ways in a single layer.

5. Concrete: Filled on site with minimum 3000 psi concrete in accordance with Section 03 30 00.

2.5 VIBRATION ISOLATORS

A. General Requirements:

1. Resilient Materials for Vibration Isolators: Oil, ozone, and oxidant resistant.

2. Spring Elements for Spring Isolators:

a. Color code or otherwise identify springs to indicate load capacity.

b. Lateral Stability: Minimum lateral stiffness to vertical stiffness ratio of 0.8.

c. Designed to operate in the linear portion of their load versus deflection curve over deflection range of not less than 50 percent above specified deflection.

d. Designed to provide additional travel to solid of not less than 50 percent of rated deflection at rated load.

e. Selected to provide designed deflection of not less than 75 percent of specified deflection.

f. Selected to function without undue stress or overloading.

3. Seismic Snubbing Elements for Seismic Isolators:

a. Air Gap: Between 0.125 inches and 0.25 inches unless otherwise indicated.

b. Points of Contact: Cushioned with resilient material, minimum 0.25 inch thick; capable of being visually inspected for damage and replaced.

B. Vibration Isolators for Non-Seismic Applications:

1. Resilient Material Isolator Pads:

a. Description: Single or multiple layer pads utilizing elastomeric (e.g. neoprene, rubber) or fiberglass isolator material.

b. Pad Thickness: As required for specified minimum static deflection; minimum 0.25 inch thickness.

c. Multiple Layer Pads: Provide bonded, galvanized sheet metal separation plate between each layer.

2. Resilient Material Isolator Mounts, Non-Seismic:

a. Description: Mounting assemblies for bolting equipment to supporting structure utilizing elastomeric (e.g. neoprene, rubber) or fiberglass isolator material; fail-safe type.

3. Open (Unhoused) Spring Isolators:

a. Description: Isolator assembly consisting of single or multiple free-standing, laterally stable steel spring(s) without a housing.

b. Bottom Load Plate: Non-skid molded elastomeric isolator material or steel with non-skid elastomeric isolator pad with provisions for bolting to supporting structure as required.

c. Furnished with integral leveling device for positioning and securing supported equipment.

4. Housed Spring Isolators:

a. Description: Isolator assembly consisting of single or multiple free-standing, laterally stable steel spring(s) within a metal housing.

b. Furnished with integral elastomeric snubbing elements, non-adjustable type, for limiting equipment movement and preventing metal-to-metal contact between housing elements.

c. Bottom Load Plate: Steel with non-skid elastomeric isolator pad with provisions for bolting to supporting structure as required.

d. Furnished with integral leveling device for positioning and securing supported equipment.

5. Restrained Spring Isolators, Non-Seismic:

a. Description: Isolator assembly consisting of single or multiple free-standing, laterally stable steel spring(s) within a metal housing designed to prevent movement of supported equipment above an adjustable vertical limit stop.

b. Bottom Load Plate: Steel with non-skid elastomeric isolator pad with provisions for bolting to supporting structure as required.

c. Furnished with integral leveling device for positioning and securing supported equipment.

d. Provides constant free and operating height.

6. Resilient Material Isolator Hangers, Non-Seismic:

a. Description: Isolator assembly designed for installation in hanger rod suspension system utilizing elastomeric (e.g. neoprene, rubber) or fiberglass isolator material for the lower hanger rod connection.

7. Spring Isolator Hangers, Non-Seismic:

a. Description: Isolator assembly designed for installation in hanger rod suspension system utilizing single or multiple free-standing, laterally stable steel spring(s) in series with an elastomeric element for the lower hanger rod connection.

b. Designed to accommodate misalignment of bottom hanger rod up to 30 degrees (plus/minus 15 degrees) without short circuiting of isolation.

8. Combination Resilient Material/Spring Isolator Hangers, Non-Seismic:

a. Description: Isolator assembly designed for installation in hanger rod suspension system utilizing single or multiple free-standing, laterally stable steel spring(s) for the lower hanger rod connection and elastomeric (e.g. neoprene, rubber) or fiberglass isolator material for the upper hanger rod connection.

b. Designed to accommodate misalignment of bottom hanger rod up to 30 degrees (plus/minus 15 degrees) without short circuiting of isolation.

C. Vibration Isolators for Seismic Applications:

1. Resilient Material Isolator Mounts, Seismic:

a. Description: Mounting assemblies for bolting equipment to supporting structure utilizing elastomeric (e.g. neoprene, rubber) isolator material; specifically designed and rated for seismic applications with integral snubbing in all directions.

2. Restrained Spring Isolators, Seismic:

   a. Description: Isolator assembly consisting of single or multiple free-standing, laterally stable steel spring(s) in series with elastomeric (e.g. neoprene, rubber) isolator material within a metal housing designed to prevent movement of supported equipment above an adjustable vertical limit stop; specifically designed and rated for seismic applications with integral snubbing in all directions.

   b. Bottom Load Plate: Steel with provisions for bolting to supporting structure as required.

   c. Furnished with integral leveling device for positioning and securing supported equipment.

   d. Provides constant free and operating height.

3. Resilient Material Isolator Hangers, Seismic:

   a. Description: Isolator assembly designed for installation in hanger rod suspension system utilizing elastomeric (e.g. neoprene, rubber) isolator material for the lower hanger rod connection; specifically designed and rated for seismic applications with vertical limit stop to prevent upward travel of hanger rod and cushion impact.

4. Spring Isolator Hangers, Seismic:

   a. Description: Isolator assembly designed for installation in hanger rod suspension system utilizing single or multiple free-standing, laterally stable steel spring(s) in series with an elastomeric element for the lower hanger rod connection; specifically designed and rated for seismic applications with vertical limit stop to prevent upward travel of hanger rod and cushion impact.

   b. Designed to accommodate misalignment of bottom hanger rod up to 30 degrees (plus/minus 15 degrees) without short circuiting of isolation.

5. Combination Resilient Material/Spring Isolator Hangers, Seismic:

   a. Description: Isolator assembly designed for installation in hanger rod suspension system utilizing single or multiple free-standing, laterally stable steel spring(s) for the lower hanger rod connection and elastomeric (e.g.

neoprene, rubber) isolator material for the upper hanger rod connection; specifically designed and rated for seismic applications with vertical limit stop to prevent upward travel of hanger rod and cushion impact.

b. Designed to accommodate misalignment of bottom hanger rod up to 30 degrees (plus/minus 15 degrees) without short circuiting of isolation.

2.6 SEISMIC SNUBBER ASSEMBLIES

A. Description: Steel snubbing assemblies designed for external attachment to both equipment and supporting structure that, as part of a complete system, restrain equipment motion in all directions during a seismic event while maintaining vibration isolation during normal operation.

B. Seismic Snubbing Elements:

1. Air Gap: Between 0.125 inches and 0.25 inches unless otherwise indicated.

2. Points of Contact: Cushioned with resilient material, minimum 0.25 inch thick; capable of being visually inspected for damage and replaced.

2.7 SEISMIC RESTRAINTS FOR SUSPENDED COMPONENTS AND EQUIPMENT

A. Description: System components and accessories specifically designed for field assembly and attachment of seismic restraints.

B. Cable Restraints:

1. Comply with ASCE 19.

2. Cables: Pre-stretched, galvanized steel wire rope with certified break strength.

3. Cable Connections: Use only swaged end fittings. Cable clips and wedge type end fittings are not permitted in accordance with ASCE 19.

4. Use protective thimbles for cable loops where potential for cable damage exists.

C. Rigid Restraints: Use MFMA-4 steel channel (strut), steel angle, or steel pipe for structural element; suitable for both compressive and tensile design loads.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that field measurements are as shown on the drawings.

B. Verify that mounting surfaces are ready to receive vibration isolation and/or seismic control components and associated attachments.

C. Verify that conditions are satisfactory for installation prior to starting work.

3.2 CODE-REQUIRED SPECIAL INSPECTIONS

A. Frequency of Special Inspections: Where special inspections are designated as continuous or periodic, arrange work accordingly.

1. Periodic Special Inspections: Special Inspection Agency to be present in the area where work is being performed and observe the work part-time or intermittently and at the completion of the work.

B. Seismic special inspections include, but are not limited to:

1. Installation and anchorage of piping systems designed to carry hazardous materials and their associated mechanical units for Seismic Design Categories C, D, E, and F; periodic inspection.

2. Installation and anchorage of vibration isolation systems for Seismic Design Categories C, D, E, and F where the approved contract documents require a nominal clearance of 1/4 inch or less between equipment support frame and seismic restraint; periodic inspection.

C. Special Inspection Agency services do not relieve Contractor from performing inspections and testing specified elsewhere.

3.3 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Install anchors and fasteners in accordance with ICC Evaluation Services, LLC (ICC-ES) evaluation report conditions of use where applicable.

C. Secure fasteners according to manufacturer's recommended torque settings.

D. Install flexible piping connections to provide sufficient slack for vibration isolation and/or seismic relative displacements as indicated or as required.

E. Vibration Isolation Systems:

1. Spring Isolators:

a. Position equipment at operating height; provide temporary blocking as required.

b. Lift equipment free of isolators prior to lateral repositioning to avoid damage to isolators.

c. Level equipment by adjusting isolators gradually in sequence to raise equipment uniformly such that excessive weight or stress is not placed on any single isolator.

2. Isolator Hangers:

a. Use precompressed isolator hangers where required to facilitate installation and prevent damage to equipment utility connection provisions.

b. Locate isolator hangers at top of hanger rods in accordance with manufacturer's instructions.

3. Clean debris from beneath vibration-isolated equipment that could cause short circuiting of isolation.

4. Use elastomeric grommets for attachments where required to prevent short circuiting of isolation.

5. Adjust isolators to be free of isolation short circuits during normal operation.

6. Do not overtighten fasteners such that resilient material isolator pads are compressed beyond manufacturer's maximum recommended deflection.

F. Seismic Controls:

1. Provide specified snubbing element air gap; remove any factory-installed spacers, debris, or other obstructions.

2. Use only specified components, anchorage, and hardware evaluated by seismic design. Comply with conditions of seismic certification where applicable.

3. Where mounting hole diameter exceeds bolt diameter by more than 0.125 inch, use epoxy grout, elastomeric grommet, or welded washer to reduce clearance to 0.125 inch or less.

4. Equipment with Sheet Metal Housings:

a. Use Belleville washers to distribute stress over a larger surface area of the sheet metal connection interface as approved by manufacturer.

b. Attach additional steel as approved by manufacturer where required to transfer loads to structure.

c. Where mounting surface is irregular, do not shim housing; reinforce housing with additional steel as approved by manufacturer.

5. Concrete Housekeeping Pads:

a. Size in accordance with seismic design to meet anchor requirements.

b. Install pad reinforcement and doweling in accordance with seismic design to ensure integrity of pad and associated connection to slab.

6. Seismic Restraint Systems:

a. Do not attach seismic restraints and gravity supports to dissimilar parts of structure that may move differently during an earthquake.

b. Install restraints within permissible angles in accordance with seismic design.

c. Install cable restraints straight between component/run and structural attachment; do not bend around other nonstructural components or structural elements.

d. Install cable restraints for vibration-isolated components slightly slack to prevent short circuiting of isolation.

e. Install hanger rod stiffeners where indicated using only specified clamps; do not weld stiffeners to hanger rod.

3.4 FIELD QUALITY CONTROL

A. Inspect vibration isolation and/or seismic control components for damage and defects.

B. Provide services of a manufacturer's authorized representative for vibration isolation systems and seismic controls to perform inspection and testing. Include manufacturer's detailed testing and inspection procedures and field reports with submittals.

C. Vibration Isolation Systems:

1. Verify isolator static deflections.

2. Verify vibration isolation performance during normal operation; investigate sources of isolation short circuits.

D. Seismic Controls:

1. Verify snubbing element air gaps.

E. Correct deficiencies and replace damaged or defective vibration isolation and/or seismic control components.

F. Inspect isolated equipment after installation and submit report. Include static deflections.

END OF SECTION

SECTION 22 05 53

IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Nameplates.

B. Tags.

C. Pipe Markers.

D. Underground warning tape.

E. Ceiling tacks.

1.2 REFERENCE STANDARDS

A. ASME A13.1 - Scheme for the Identification of Piping Systems; 2007.

B. ASME A13.1 - Scheme for the Identification of Piping Systems; The American Society of Mechanical Engineers; 2007.

C. ASTM D709 - Standard Specification for Laminated Thermosetting Materials; 2013.

1.3 SUBMITTALS

A. See Section 22 01 00 - General Plumbing Provisions for submittal procedures.

B. List: Submit list of wording, symbols, letter size, and color coding for mechanical identification.

C. Chart and Schedule: Submit valve chart and schedule, including valve tag number, location, function, and valve manufacturer's name and model number. Valve locations with tag numbers shall also be indicated on "as-built" drawings.

D. Product Data: Provide manufacturers catalog literature for each product required.

E. Manufacturer's Installation Instructions: Indicate special procedures, and installation.

F. Project Record Documents: Record actual locations of tagged valves.

PART 2 PRODUCTS

2.1 PLUMBING COMPONENT IDENTIFICATION GUIDELINE

A. Pipe Markers: 3/4 inch diameter and higher.

2.2 IDENTIFICATION APPLICATIONS

A. Instrumentation: Tags.

B. Piping: Pipe markers.

C. Pumps: Nameplates.

D. Small-sized Equipment: Tags.

E. Valves: Tags and ceiling tacks where located above lay-in ceiling.

2.3 NAMEPLATES

A. Manufacturers:

1. Kolbi Pipe Marker Co.

2. Seton Identification Products.

3. Substitutions: See Section 22 01 00 - General Plumbing Provisions.

B. Description: Laminated three-layer plastic with engraved letters.

1. Letter Color: White.

2. Letter Height: 1/4 inch.

3. Background Color: Black.

4. Plastic: Conform to ASTM D709.

2.4 TAGS

A. Manufacturers:

1. Advanced Graphic Engraving.

2. Brady Corporation.

3. Kolbi Pipe Marker Co.

4. Seton Identification Products.

5. Substitutions: See Section 22 01 00 - General Plumbing Provisions.

B. Plastic Tags: Laminated three-layer plastic with engraved black letters on light contrasting background color. Tag size minimum 1-1/2 inch diameter.

C. Metal Tags: Brass with stamped letters; tag size minimum 1-1/2 inch diameter with smooth edges.

D. Valve Tag Chart: Typewritten letter size list in anodized aluminum frame. Valve tag chart should should indicate valve size, valve model and valve location. Valve locations with tag numbers shall also be indicated on "as-built" drawings.

2.5 PIPE MARKERS

A. Manufacturers:

1. Brady Corporation.
2. Kolbi Pipe Marker Co.
3. MIFAB, Inc.
4. Seton Identification Products.
5. Substitutions: See Section 22 01 00 - General Plumbing Provisions.

B. Comply with ASME A13.1.

C. Plastic Pipe Markers: Factory fabricated, flexible, semi- rigid plastic, preformed to fit around pipe or pipe covering; minimum information indicating flow direction arrow and identification of fluid being conveyed.

D. Plastic Tape Pipe Markers: Flexible, vinyl film tape with pressure sensitive adhesive backing and printed markings.

E. Underground Plastic Pipe Markers: Bright colored continuously printed plastic ribbon tape, minimum 6 inches wide by 4 mil thick, manufactured for direct burial service.

F. Color code as follows:

1. Potable, Cooling, Boiler, Feed, Other Water: Green with white letters.
2. Fire Quenching Fluids: Red with white letters.
3. Combustible Fluids: Brown with white letters.

2.6 UNDERGROUND WARNING TAPE

A. Materials: Use foil-backed detectable type polyethylene tape suitable for direct burial, unless otherwise indicated.

B. Foil-backed Detectable Type Tape: 3 inches wide, with minimum thickness of 5 mil, 0.005 inch, unless otherwise required for proper detection.

C. Legend: Type of service, continuously repeated over full length of tape.

2.7 CEILING TACKS

A. Manufacturers:

1. Craftmark.

2. Substitutions: See Section 22 01 00 - General Plumbing Provisions.

B. Description: Steel with 3/4 inch diameter color coded head.

C. Color code as follows:

1. Plumbing Valves: Green.

PART 3 EXECUTION

3.1 PREPARATION

A. Degrease and clean surfaces to receive adhesive for identification materials.

3.2 INSTALLATION

A. Install plastic nameplates with corrosive-resistant mechanical fasteners, or adhesive. Apply with sufficient adhesive to ensure permanent adhesion and seal with clear lacquer.

B. Install tags with corrosion resistant chain.

C. Install plastic pipe markers in accordance with manufacturer's instructions.

D. Install plastic tape pipe markers complete around pipe in accordance with manufacturer's instructions.

E. Install underground plastic pipe markers 6 to 8 inches below finished grade, directly above buried pipe.

F. Apply ASME A13.1 Pipe Marking Rules:

1. Place pipe marker adjacent to changes in direction.

2. Place pipe marker adjacent each valve port and flange end.

3. Place pipe marker at both sides of floor and wall penetrations.

4. Place pipe marker every 25 to 50 feet interval of straight run.

G. Install metallic detection tape located approximately 12 inches above pipe, where in ground utility lines are buried outside building footprint. Tape shall be continuous and be marked, indicating utility type (ie. water, sewer, gas, electric, etc).

H. Use tags on piping 3/4 inch diameter and smaller.

1. Identify service, flow direction, and pressure.

2. Install in clear view and align with axis of piping.

3. Locate identification not to exceed 20 feet on straight runs including risers and drops, adjacent to each valve and Tee, at each side of penetration of structure or enclosure, and at each obstruction.

I. Locate ceiling tacks to locate valves above lay-in panel ceilings. Locate in corner of panel closest to equipment.

J. Identify all piping on this project as described, except piping which is concealed and/or not accessible. Identify piping concealed by ceiling tiles, floor tiles and, crawl spaces. Piping outside, on roof, above grade, and within parking structures shall also be identified. Only piping located within walls or inaccessible areas need not be identified. Install pipe markers on long straight runs every 20 feet. Install pipe markers above and below every floor penetration and on either side of every wall penetration and, insure there is at least one marker per pipe in every room. Install pipe markers at every valve, branch and, any change in piping direction. Install pipe markers so they are visible for a normal standing position.

END OF SECTION

SECTION 22 07 19

PIPING INSULATION

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Flexible elastomeric cellular insulation.

B. Piping insulation.

C. Jackets and accessories.

1.2 RELATED REQUIREMENTS

A. Section 22 10 05 - Plumbing Piping: Placement of hangers and hanger inserts.

1.3 REFERENCE STANDARDS

A. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2014.

B. ASTM C177 - Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus; 2019, with Editorial Revision (2023).

C. ASTM C195 - Standard Specification for Mineral Fiber Thermal Insulating Cement; 2007 (Reapproved 2019).

D. ASTM C449 - Standard Specification for Mineral Fiber Hydraulic-Setting Thermal Insulating and Finishing Cement; 2007 (Reapproved 2019).

E. ASTM C518 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus; 2021.

F. ASTM C533 - Standard Specification for Calcium Silicate Block and Pipe Thermal Insulation; 2017 (Reapproved 2023).

G. ASTM C534/C534M - Standard Specification for Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form; 2023.

H. ASTM C795 - Standard Specification for Thermal Insulation for Use in Contact with Austenitic Stainless Steel; 2008 (Reapproved 2013).

I. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2015a.

J. ASTM E96/E96M - Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials; 2023.

K. NFPA 255 - Standard Method of Test of Surface Burning Characteristics of Building Materials; National Fire Protection Association; 2006.

1.4 SUBMITTALS

A. See Section 22 01 00 - General Plumbing Provisions, for submittal procedures.

B. Product Data: Provide product description, thermal characteristics, list of materials and thickness for each service, and locations.

C. Manufacturer's Instructions: Indicate installation procedures that ensure acceptable workmanship and installation standards will be achieved.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with not less than five years of documented experience.

B. Applicator Qualifications: Company specializing in performing the type of work specified in this section with minimum five years of documented experience.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Accept materials on site, labeled with manufacturer's identification, product density, and thickness.

B. Deliver material to job site in original non-broken factory packaging, labeled with manufacturer's density and thickness.

1.7 FIELD CONDITIONS

A. Maintain ambient conditions required by manufacturers of each product.

B. Maintain temperature before, during, and after installation for minimum of 24 hours.

C. Perform work at ambient and equipment temperature as recommended by the adhesive manufacturer.

PART 2 PRODUCTS

2.1 REQUIREMENTS FOR ALL PRODUCTS OF THIS SECTION

A. Surface Burning Characteristics: Flame spread/Smoke developed index of 25/50, maximum, when tested in accordance with ASTM E84, NFPA 255, or UL 723.

2.2 GLASS FIBER

A. Manufacturers:

1. Knauf Insulation.
2. Johns Manville Corporation.
3. Owens Corning Corp.
4. CertainTeed Corporation.
5. Armstrong World Industries, Inc.
6. Rubatex Corp.
7. Substitutions: See Section 22 01 00 - General Plumbing Provisions.

B. Insulation: ASTM C547 ; semi-rigid, noncombustible, end grain adhered to jacket.

1. 'K' value: ASTM C177, 0.24 at 75 degrees F.
2. Maximum service temperature: 650 degrees F.
3. Maximum moisture absorption: 0.2 percent by volume.

C. Vapor Barrier Jacket: White Kraft paper with glass fiber yarn, bonded to aluminized film; moisture vapor transmission when tested in accordance with ASTM E96/E96M of 0.02 perm-inches.

D. Tie Wire: 0.048 inch stainless steel with twisted ends on maximum 12 inch centers.

E. Vapor Barrier Lap Adhesive:

1. Compatible with insulation.

F. Insulating Cement/Mastic:

1. ASTM C195; hydraulic setting on mineral wool.

G. Fibrous Glass Fabric:

1. Cloth: Untreated; 9 oz/sq yd weight.
2. Blanket: 1.0 lb/cu ft density.
3. Weave: 5x5.

H. Indoor Vapor Barrier Finish:

1. Cloth: Untreated; 9 oz/sq yd weight.

2. Vinyl emulsion type acrylic, compatible with insulation, white color.

I. Outdoor Vapor Barrier Mastic:

1. Vinyl emulsion type acrylic or mastic, compatible with insulation, black color.

J. Outdoor Breather Mastic:

1. Vinyl emulsion type acrylic or mastic, compatible with insulation, black color.

K. Insulating Cement:

1. ASTM C449/C449M.

2.3 CELLULAR GLASS

A. Manufacturers:

1. Pittsburgh Corning Corporation.

2. Substitutions: See Section 22 01 00 - General Plumbing Provisions.

B. Insulation: ASTM C 552.

1. 'K' value: 0.37 at 100 degrees F.

2. Service Temperature: Up to 900 degrees F.

3. Water Vapor Permeability: 0.005 perm inch.

4. Water Absorption: 0.2 percent by volume, maximum.

2.4 HYDROUS CALCIUM SILICATE

A. Manufacturers:

1. Johns Manville Corporation.

2. PABCO.

3. Substitutions: See Section 22 01 00 - General Plumbing Provisions.

B. Insulation: ASTM C533 and ASTM C795; rigid molded, asbestos free, gold color.

1. 'K' value: 2 and C518; 0.40 at 300 degrees F, when tested in accordance with 2 or 1.

C. Tie Wire: 0.048 inch stainless steel with twisted ends on maximum 12 inch centers.

D. Insulating Cement:

1. ASTM C449/C449M.

2.5 FLEXIBLE ELASTOMERIC CELLULAR INSULATION

A. Manufacturer:

1. Armacell International.

2. Substitutions: See Section 22 01 00 - General Plumbing Provisions.

B. Insulation: Preformed flexible elastomeric cellular rubber insulation complying with ASTM C534 Grade 2; use molded tubular material wherever possible.

1. 'K' value: ASTM C 177; 0.27 at 75 degrees F.

2. Maximum Moisture Absorption - Pipe Insulation: 3.5 percent, by weight, when tested in accordance with ASTM D 1056.

3. Maximum Moisture Absorption - Sheets: 6.0 percent, by weight, when tested in accordance with ASTM D 1056.

4. Water Vapor Permeability: 0.20 perm-inches, when tested in accordance with ASTM E 96.

C. Elastomeric Foam Adhesive: Air dried, contact adhesive, compatible with insulation.

1. Air dried, contact adhesive, compatible with insulation.

2.6 JACKETS

A. PVC Plastic.

1. Manufacturers:

a. Johns Manville Corporation.

b. Substitutions: See Section 22 01 00 - General Plumbing Provisions.

2. Jacket: One piece molded type fitting covers and sheet material, off-white color.

a. Minimum Service Temperature: 0 degrees F.

b. Maximum Service Temperature: 150 degrees F.

c. Moisture Vapor Permeability: 0.002 perm inch, maximum, when tested in accordance with ASTM E96/E96M.

d. Thickness: 15 mil.

e. Connections: Pressure sensitive color matching vinyl tape.

3. Covering Adhesive Mastic:

a. Compatible with insulation.

B. Canvas Jacket: UL listed 6 oz/sq yd plain weave cotton fabric treated with dilute fire retardant lagging adhesive.

1. Lagging Adhesive:

a. Compatible with insulation.

C. Aluminum Jacket: ASTM B209 (ASTM B209M) formed aluminum sheet.

1. Thickness: 0.016 inch sheet.

2. Finish: Embossed.

3. Joining: Longitudinal slip joints and 2 inch laps.

4. Fittings: 0.016 inch thick die shaped fitting covers with factory attached protective liner.

5. Metal Jacket Bands: 3/8 inch wide; 0.015 inch thick aluminum.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that piping has been tested before applying insulation materials.

B. Verify that surfaces are clean and dry, with foreign material removed.

C. Repair all insulation that is damaged during construction using the same materials.

3.2 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install in accordance with NAIMA National Insulation Standards.

C. Exposed Piping: Locate insulation and cover seams in least visible locations.

D. Insulated pipes conveying fluids below ambient temperature: Insulate entire system including fittings, valves, unions, flanges, strainers, flexible connections, pump bodies, and expansion joints.

E. Glass fiber insulated pipes conveying fluids below ambient temperature:

1. Provide vapor barrier jackets, factory-applied or field-applied. Secure with self-sealing longitudinal laps and butt strips with pressure sensitive adhesive. Secure with outward clinch expanding staples and vapor barrier mastic.

2. Insulate fittings, joints, and valves with molded insulation of like material and thickness as adjacent pipe. Finish with glass cloth and vapor barrier adhesive or PVC fitting covers.

F. For hot piping conveying fluids 140 degrees F or less, do not insulate flanges and unions at equipment, but bevel and seal ends of insulation.

G. Inserts and Shields:

1. Application: Piping 1 inch diameter or larger.

2. Shields: Galvanized steel between pipe hangers or pipe hanger rolls and inserts.

3. Insert location: Between support shield and piping and under the finish jacket.

4. Insert configuration: Minimum 6 inches long, of same thickness and contour as adjoining insulation; may be factory fabricated.

5. Insert material: Hydrous calcium silicate insulation or other heavy density insulating material suitable for the planned temperature range.

H. Continue insulation through walls, sleeves, pipe hangers, and other pipe penetrations. Finish at supports, protrusions, and interruptions.

I. Pipe Exposed in Mechanical Equipment Rooms or Finished Spaces: Finish with PVC jacket and fitting covers.

J. Pipe Exposed in Mechanical Equipment Rooms or Finished Spaces (less than 10 feet above finished floor): Finish with PVC jacket and fitting covers.

K. Exterior Applications: Provide vapor barrier jacket. Insulate fittings, joints, and valves with insulation of like material and thickness as adjoining pipe, and finish with glass mesh reinforced vapor barrier cement. Cover with aluminum jacket with seams located on bottom side of horizontal piping.

L. Buried Piping: Provide factory fabricated assembly with inner all-purpose service jacket with self-sealing lap, and asphalt impregnated open mesh glass fabric, with one mil thick aluminum foil sandwiched between three layers of bituminous compound; outer surface faced with a polyester film.

3.3 SCHEDULES

A. Plumbing Systems:

1. Domestic Hot Water Supply:

a. Glass Fiber Insulation:

1) Pipe Size Range: 2 inch and under: 1 inch thickness.

2) Pipe Size Range: 2-1/2 inch and larger: 1-1/2 inch thickness.

3) Thickness: 1/2 inch (in interior walls).

2. Domestic Cold Water Supply:

a. Glass Fiber Insulation:

1) Pipe Size Range: 2 inch and under: 1 inch thickness.

2) Pipe Size Range: 2-1/2 inch and larger: 1 inch thickness.

3) Thickness: 1/2 inch (in interior walls).

3. Domestic Hot Water Recirculation:

a. Glass Fiber Insulation:

1) Pipe Size Range: All sizes.

2) Thickness: 1 inch.

B. Cooling Systems:

1. Condensate Drains from Cooling Coils: 1/2 inch thickness; cellular insulation.

2. Refrigerant Suction: 3/4 inch thickness; cellular insulation.

3. Refrigerant Hot Gas: 3/4 inch thickness; cellular insulation.

END OF SECTION

SECTION 22 10 05

PLUMBING PIPING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Pipe, pipe fittings, valves, and connections for piping systems.

1. Sanitary sewer.
2. Domestic water.
3. Flanges, unions, and couplings.
4. Valves.
5. Flow controls.
6. Strainers.

1.2 RELATED REQUIREMENTS

A. Section 22 01 00 - General Plumbing Provisions.

B. Section 22 05 53 - Identification for Plumbing Piping and Equipment.

C. Section 22 07 19 - Piping Insulation.

1.3 REFERENCE STANDARDS

A. ANSI Z21.22 - American National Standard for Relief Valves for Hot Water Supply Systems; 2015 (Reaffirmed 2020).

B. ASME B16.3 - Malleable Iron Threaded Fittings: Classes 150 and 300; 2021.

C. ASME B16.4 - Gray Iron Threaded Fittings: Classes 125 and 250; 2021.

D. ASME B16.22 - Wrought Copper and Copper Alloy Solder-Joint Pressure Fittings; 2021.

E. ASME B16.26 - Cast Copper Alloy Fittings for Flared Copper Tubes; 2018.

F. ASME B31.9 - Building Services Piping; 2020.

G. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 2022.

H. ASTM A74 - Standard Specification for Cast Iron Soil Pipe and Fittings; 2021.

I. ASTM A234/A234M - Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service; 2023a.

J. ASTM B32 - Standard Specification for Solder Metal; 2020.

K. ASTM B42 - Standard Specification for Seamless Copper Pipe, Standard Sizes; 2020.

L. ASTM B68/B68M - Standard Specification for Seamless Copper Tube, Bright Annealed; 2019.

M. ASTM C4 - Standard Specification for Clay Drain Tile and Perforated Clay Drain Tile; 2004 (Reapproved 2014).

N. ASTM C14 - Standard Specification for Nonreinforced Concrete Sewer, Storm Drain, and Culvert Pipe; 2015.

O. ASTM C564 - Standard Specification for Rubber Gaskets for Cast Iron Soil Pipe and Fittings; 2020a.

P. ASTM D2239 - Standard Specification for Polyethylene (PE) Plastic Pipe (SIDR-PR) Based on Controlled Inside Diameter; 2022.

Q. ASTM D2241 - Standard Specification for Poly(Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR Series); 2020.

R. ASTM D2321 - Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications; latest accepted edition.

S. ASTM D2513 - Standard Specification for Polyethylene (PE) Gas Pressure Pipe, Tubing, and Fittings; 2020.

T. ASTM D2564 - Standard Specification for Solvent Cements for Poly(Vinyl Chloride) (PVC) Plastic Piping Systems; 2020.

U. ASTM D2665 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Drain, Waste, and Vent Pipe and Fittings; 2020.

V. ASTM D2680 - Standard Specification for Acrylonitrile-Butadiene-Styrene (ABS) and Poly(Vinyl Chloride) (PVC) Composite Sewer Piping; 2020.

W. ASTM D2683 - Standard Specification for Socket-Type Polyethylene Fittings for Outside Diameter-Controlled Polyethylene Pipe and Tubing; 2020.

X. ASTM D2846/D2846M - Standard Specification for Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Hot- and Cold-Water Distribution Systems; 2019a.

Y. ASTM D2855 - Standard Practice for the Two-Step (Primer and Solvent Cement) Method of Joining Poly (Vinyl Chloride) (PVC) or Chlorinated Poly (Vinyl Chloride) (CPVC) Pipe and Piping Components with Tapered Sockets; 2020.

Z. ASTM D3034 - Standard Specification for Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings; 2023.

AA. ASTM D3517 - Standard Specification for "Fiberglass" (Glass-Fiber-Reinforced Thermosetting-Resin) Pressure Pipe; 2019.

BB. ASTM F437 - Standard Specification for Threaded Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Pipe Fittings, Schedule 80; 2021.

CC. ASTM F876 - Standard Specification for Crosslinked Polyethylene (PEX) Tubing; 2024.

DD. ASTM F708 - Standard Practice for Design and Installation of Rigid Pipe Hangers; 1992 (Reapproved 2008).

EE. AWWA C105/A21.5 - Polyethylene Encasement for Ductile-Iron Pipe Systems; 2018.

FF. AWWA C110/A21.10 - Ductile-Iron and Gray-Iron Fittings; 2021.

GG. AWWA C151/A21.51 - Ductile-Iron Pipe, Centrifugally Cast; 2023.

HH. AWWA C901 - Polyethylene (PE) Pressure Pipe and Tubing, 3/4 In. (19 mm) Through 3 In. (76 mm), for Water Service; 2020.

II. CISPI 301 - Standard Specification for Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste, and Vent Piping Applications; 2021.

JJ. CISPI 310 - Specification for Coupling for Use in Connection with Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste, and Vent Piping Applications; 2020.

KK. MSS SP-67 - Butterfly Valves; 2022.

LL. MSS SP-71 - Gray Iron Swing Check Valves, Flanged and Threaded Ends; 2018.

MM. MSS SP-78 - Gray Iron Plug Valves, Flanged and Threaded Ends; 2011.

NN. MSS SP-80 - Bronze Gate, Globe, Angle, and Check Valves; 2019.

OO. MSS SP-110 - Ball Valves Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends; 2010, with Errata .

PP. NFPA 54 - National Fuel Gas Code; National Fire Protection Association; 2012.

QQ. NSF 61 - Drinking Water System Components - Health Effects; 2023, with Errata.

RR. NSF 372 - Drinking Water System Components - Lead Content; 2022.

1.4 SUBMITTALS

A. See Section 22 01 00 - General Plumbing Provisions, for submittal procedures.

B. Product Data: Provide data on pipe materials, pipe fittings, valves, and accessories. Provide manufacturers catalog information. Indicate valve data and ratings.

C. Welders' Certificates: Submit certification of welders' compliance with ASME BPVC-IX.

D. Shop Drawings: For non-penetrating rooftop supports, submit detailed layout developed for this project, with design calculations for loadings and spacings.

E. Sustainable Design Documentation: For soldered copper joints, submit installer's certification that the specified installation method and materials were used.

F. Project Record Documents: Record actual locations of valves.

1.5 QUALITY ASSURANCE

A. Perform work in accordance with applicable codes.

B. Perform Work in accordance with Arkansas, city of Fayetteville standards.

C. Valves: Manufacturer's name and pressure rating marked on valve body.

D. Welding Materials and Procedures: Conform to ASME (BPV IX) and applicable state labor regulations.

E. Welder Qualifications: Certified in accordance with ASME (BPV IX).

F. Identify pipe with marking including size, ASTM material classification, ASTM specification, potable water certification, water pressure rating.

1.6 REGULATORY REQUIREMENTS

A. Perform Work in accordance with State of Arkansas, and city of Fayetteville plumbing code.

B. Conform to city of Fayetteville , Arkansas code for installation of backflow prevention devices.

C. Provide certificate of compliance from authority having jurisdiction indicating approval of installation of backflow prevention devices.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Accept valves on site in shipping containers with labeling in place. Inspect for damage.

B. Provide temporary protective coating on cast iron and steel valves.

C. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.

D. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system.

1.8 FIELD CONDITIONS

A. Do not install underground piping when bedding is wet or frozen.

PART 2 PRODUCTS

2.1 SANITARY SEWER PIPING, BURIED BEYOND 5 FEET OF BUILDING

A. Cast Iron Pipe: ASTM A74 service weight.

1. Fittings: Cast iron.

2. Joint Seals: ASTM C 564 neoprene gaskets.

B. PVC Pipe: ASTM D2665 or ASTM D3034.

1. Fittings: PVC.

2. Joints: Pipe sizes 4 inches or less: Solvent welded, with ASTM D 2564 solvent cement.

3. Joints: Pipe sizes greater than 4 inch: Push-on, using ASTM F477 elastomeric gaskets.

2.2 SANITARY SEWER PIPING, BURIED WITHIN 5 FEET OF BUILDING

A. Cast Iron Pipe: ASTM A74 service weight.

1. Fittings: Cast iron.

2. Joints: Hub-and-spigot, CISPI HSN compression type with ASTM C 564 neoprene gaskets.

B. Cast Iron Pipe: CISPI 301, hubless.

1. Fittings: Cast iron.

2. Joints: CISPI 310, neoprene gasket and stainless steel clamp and shield assemblies.

C. PVC Pipe: ASTM D2665 or ASTM D3034.

1. Fittings: PVC.

2. Joints: Pipe sizes 4 inch and smaller: Solvent welded, with ASTM D 2564 solvent cement.

3. Joints: Pipe sizes greater than 4 inch: Push-on, using ASTM F477 elastomeric gaskets.

2.3 SANITARY SEWER PIPING, ABOVE GRADE

A. Cast Iron Pipe: ASTM A74, service weight.

1. Fittings: Cast iron.

2. Joint Seals: ASTM C 564 neoprene gaskets.

B. Cast Iron Pipe: CISPI 301, hubless, service weight.

1. Fittings: Cast iron.

2. Joints: CISPI 310, neoprene gaskets and stainless steel clamp-and-shield assemblies.

C. PVC Pipe: ASTM D2665.

1. Fittings: PVC.

2. Joints: Solvent welded, with ASTM D2564 solvent cement.

D. In Fire-rated Walls:

1. Cast iron.

a. Fittings: Cast iron.

E. In Plenum-rated Areas:

1. Cast iron.

a. Fittings: Cast iron.

2.4 WATER PIPING, ABOVE GRADE

A. Copper Tube: ASTM B88 (ASTM B88M), Type L (B), Drawn (H).

1. Fittings: ASME B16.18, cast copper alloy or ASME B16.22, wrought copper and bronze.

2. Joints: ASTM B32, alloy Sn95 solder or mechanical press-fit couplings.

2.5 STORM WATER PIPING, ABOVE GRADE

A. Cast Iron Pipe Where Noted: ASTM A 74 service weight.

1. Fittings: Cast iron.

2. Joint Seals: ASTM C 564 neoprene gaskets.

B. Cast Iron Pipe Where Noted: CISPI 301, hubless, service weight.

1. Fittings: Cast iron.

2. Joints: Neoprene gaskets and stainless steel clamp-and-shield assemblies.

C. PVC Pipe: ASTM D2665 or ASTM D3034.

1. Fittings: PVC.

2. Joints: Solvent welded, with ASTM D2564 solvent cement.

2.6 NATURAL GAS PIPING, BURIED BEYOND 5 FEET OF BUILDING

A. Steel Pipe: ASTM A53/A53M Schedule 40 black.

1. Fittings: ASTM A234/A234M, wrought steel welding type, with AWWA C105/A21.5 polyethylene jacket or double layer, half-lapped 10 mil polyethylene tape.

2. Joints: ASME B31.1, welded.

B. Polyethylene Pipe: ASTM D2513, SDR 11.

1. Fittings: ASTM D2683 or ASTM D2513 socket type.

2. Joints: Fusion welded.

2.7 NATURAL GAS PIPING, BURIED WITHIN 5 FEET OF BUILDING

A. Steel Pipe: ASTM A53/A53M Schedule 40 black.

1. Fittings: ASTM A 234/A 234M, forged steel welding type.

2. Joints: ASME B31.1, welded.

3. Jacket: AWWA C105/A21.5 polyethylene jacket or double layer, half-lapped 10 mil polyethylene tape.

2.8 NATURAL GAS PIPING, ABOVE GRADE

A. Steel Pipe: ASTM A53/A53M Schedule 40 black.

1. Fittings: ASME B16.3, malleable iron, or ASTM A234/A234M, wrought steel welding type.

2. Fittings: ASME B16.3, malleable iron, or ASTM A 234/A 234M, forged steel welding type.

3. Joints: NFPA 54, threaded or welded to ASME B31.1.

2.9 FLANGES, UNIONS, AND COUPLINGS

A. Unions for Pipe Sizes 3 Inches and Under:

1. Ferrous pipe: Class 150 malleable iron threaded unions.

2. Copper tube and pipe: Class 150 bronze unions with soldered joints.

B. Flanges for Pipe Size Over 1 Inch:

1. Ferrous pipe: Class 150 malleable iron threaded or forged steel slip-on flanges; preformed neoprene gaskets.

2. Copper tube and pipe: Class 150 slip-on bronze flanges; preformed neoprene gaskets.

C. Dielectric Connections: Union with galvanized or plated steel threaded end, copper solder end, water impervious isolation barrier.

D. Victaulic Devices:

1. Couplings shall consist of a one or more piece ductile or malleable iron cast housing, a synthetic rubber gasket of a central cavity pressure-responsive design, with nuts, bolts, locking toggle or luggs to secure unit together.

a. Coupling housings shall be cast of ductile iron conforming to ASTM A-536 (Grade 65-45-12) or malleable iron conforming to ASTM A-47 (Grade 32510), hot dip galvanized to ASTM A-153, or zinc electroplated to ASTM B-633, as manufactured by Victaulic Company of America. Refer to Victaulic product specifications for other materials.

b. Coatings shall consist of an alkyd enamel paint, or hot-dip galvanizing to ASTM A-153, or zinc electroplating to ASTM B-633, as specified.

2. Couplings for grooved end steel pipe shall be Victaulic couplings for grooved end steel pipe.

    a. Line, fittings and valve joints shall be Victaulic flexible (styles 75, 77, 78, or 791) or rigid (styles 005, 07 or HP-70).

    b. Rigid joints shall be Victaulic style 07 "Zero-Flex", style HP-70 or style 005 "FireLock" couplings.

    c. Pin assembled joints shall be Victaulic style 791 "Vic-Boltless" couplings.

    d. Reducing joints shall be Victaulic style 750 Reducing Couplings for pipe to pipe joints or to create reducing fittings using straight fitting configurations.

    e. Outlets: All joints designated Outlet Couplings, or where feasible to replace reducing outlet tees, shall be Victaulic style 72 Outlet Couplings (specify grooved, female or male threaded outlet).

    f. Flanged Connections shall be Victaulic style 741 (2-24") "Vic-Flange" adapters, engaging directly into grooved pipe and bolting directly to ANSI Class 125 cast iron and Class 150 steel flanged components or style 743 (2-12") for ANSI Class 300 flanged components; installer to supply standard flange bolts.

    g. Quick disconnects shall be Victaulic style 78 "Snap-Joint" Couplings or style 780/781 for double grooved pipe.

3. Gasket shall be molded of synthetic rubber in a central cavity, pressure-responsive configuration conforming to the pipe outside diameter and coupling housing, of elastomers having properties as designated in ASTM D-2000. Reference shall always be made to the latest published Selection Guide for Victaulic Gaskets for proper gasket selection for the intended service.

    a. Water service: Gasket supplied for water services from -30 degrees F to +230 degrees F, shall be a Grade "E" EPDM compound, with green color code, molded of materials conforming to ASTM D-2000, designation 2CA615A25B24F17Z, recommended for hot water service within the specified temperature range, plus a variety of dilute acids, oil-free air, and many chemical services. Not recommended for petroleum services.

4. Bolts and nuts shall be heat treated carbon steel, track head, conforming to physical properties of ASTM A-183 minimum tensile 110,000 psi, black, or zinc electroplated to ASTM B-633, as supplied or specified.

5. Fittings shall be Victaulic full flow cast fittings, steel fittings or segmentally welded fittings with grooves or shoulders designed to accept Victaulic grooved

end couplings.

a. Standard fittings shall be cast of ductile iron conforming to ASTM A-536 (Grade 65-45-12), or malleable iron conforming to ASTM A-47, Grade 32510, painted with alkyd enamel or hot-dip galvanized to ASTM A-153 or zinc electroplated to ASTM B-633 or cadmium plated to ASTM A-165 as required.

b. Standard steel fittings including large size elbows (16-24") shall be forged steel conforming to ASTM A-234 Grade WPB (0.375" wall), painted with alkyd enamel or hot-dip galvanized to ASTM A-153.

6. Branch outlets for hole cut steel pipe shall be Victaulic hole cut products.

7. Branch outlets shall be made with Victaulic style 920, 921 or 929 "Mechanical-T" branch connections with locating collar or foot engaging into hole. (Specify outlet/branch connection type - grooved, female threaded or FIT, as available.)

8. Sprinkler head connections: Branch connections, direct sprinkler head connections, drop nipples and sprigs shall be made with Victaulic style 922 "Hooker" outlet connections with locating collar engaging into hole, assembled with standard plated breakaway head bolt (specify 1/2, 3/4 or 1" female threaded outlet).

9. Gauge, meter outlets for hole cut steel pipe shall be Victaulic strapless mechanical outlet products style 923 "Vic-Let" or 924 "Vic-O-Well" and shall provide a pipe outlet without a need for a strap or lower housing to wrap around the pipe.

10. Flow indicators for hole cut steel pipe shall be Victaulic style 736 Waterflow Indicators for wet sprinkler systems, to sense water flow to 10 GPM or greater.

11. Fittings for plain end steel pipe shall be Victaulic FIT fittings (sizes 1", 1 1/4", 1 1/2" and 2") with internal pipe stop for uniform takeout dimensions, 1/4-turn positive locking lugs of heat treated carbon steel conforming to AISI C-1022, cadmium plated, with externally locked-position indicator for inspection or connection of plain end steel pipe. FIT fittings shall have self-contained, pressure responsive gaskets: for water service (-30 degrees to +230 degrees F) Grade "E"; FIT silicone Grade "L" (-30 degrees to +160 degrees F) are recommended for fire protection dry systems, all systems operating below 0 degrees F, plus dry heat, air without hydrocarbons, certain chemical services and water to +160 degrees F. FIT Nitrile gaskets Grade "T" (0 degrees to +180 degrees F) are recommended for petroleum products, hydrocarbons, air without hydrocarbons, except hot dry air over +140 degrees F, vegetable and mineral oils within the specified temperature range. Not recommended for hot water services.

12. Reducing outlet tees shall be Victaulic FIT style 96 with female threaded outlet (specify 1/2, 3/4 or 1" outlet) for direct sprinkler head, sprig or drop nipple connections.

13. 90 degree elbows shall be Victaulic FIT style 969.

14. FIT Outlet/Mechanical-T shall be Victaulic FIT style 929 with FIT locking lug branch outlet (specify 1 1/4, 1 1/2 or 2" outlet) for direct branch connections.

15. Straight tees shall be Victaulic FIT style 963.

16. Straight couplings shall be Victaulic FIT style 960.

17. Reducing elbows shall be Victaulic FIT style 966 with female threaded outlet (specify 1/2, 3/4, or 1" outlet) for direct sprinkler head, sprig or drop nipple connections.

2.10 MECHANICALLY FORMED TEE FITTINGS

A. Mechanically extracted outlets shall have a height not less than three times the thickness of the branch tube wall.

B. Branch tubes shall not restrict the flow in the main tube. Mechanical Contractor shall insure the branch tube penetration into the collar is of the correct depth.

C. Mechanically formed tee fittings shall be cleaned and brazed with filler material conforming to AWS A5.8.

2.11 PRESS FITTINGS

A. Fittings shall comply with NSF 61, CSA, UPC and be approved by the local jurisdiction. Wrot copper press fittings shall be made from commercially pure copper mill products per ASTM B 75 Alloy C12200. Cast copper alloy press fittings shall be made from materials with a minimum of 78% copper and a maximum of 15% zinc. The press fittings connections shall be compatible with seamless K, L or M copper tube made to ASTM B 88. Fittings shall have a maximum non-shock working pressure of 200 PSI between the temperatures of -20°F and +250°F. Elastomeric seals shall be made of EPDM material, and the fittings shall be manufactured with an inboard bead design. All fittings shall be installed in accordance with the manufacturer's installation instructions and according to local plumbing and mechanical codes. The press-to-connect joint shall be made with pressing tools and jaw sets recommended and authorized by press fitting manufacturer.

2.12 PIPE HANGERS AND SUPPORTS

A. Provide hangers and supports that comply with MSS SP-58.

B. Plumbing Piping - Drain, Waste, and Vent:

1. Conform to ASME B31.9.

2. Hangers for Pipe Sizes 1/2 Inch to 1-1/2 Inches: Carbon steel, adjustable swivel, split ring.

3. Hangers for Pipe Sizes 2 Inches and Over: Carbon steel, adjustable, clevis.

4. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.

5. Wall Support for Pipe Sizes to 3 Inches: Cast iron hook.

6. Wall Support for Pipe Sizes 4 Inches and Over: Welded steel bracket and wrought steel clamp.

7. Vertical Support: Steel riser clamp.

8. Floor Support: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.

9. Copper Pipe Support: Carbon steel ring, adjustable, copper plated.

C. Plumbing Piping - Water:

1. Conform to ASME B31.9.

2. Hangers for Pipe Sizes 1/2 Inch to 1-1/2 Inches: Carbon steel, adjustable swivel, split ring.

3. Hangers for Cold Pipe Sizes 2 Inches and Over: Carbon steel, adjustable, clevis.

4. Hangers for Hot Pipe Sizes 2 Inches to 4 Inches: Carbon steel, adjustable, clevis.

5. Hangers for Hot Pipe Sizes 6 Inches and Over: Adjustable steel yoke, cast iron pipe roll, double hanger.

6. Multiple or Trapeze Hangers: Steel channels with welded supports or spacers and hanger rods.

7. Multiple or Trapeze Hangers for Hot Pipe Sizes 6 Inches and Over: Steel channels with welded supports or spacers and hanger rods, cast iron roll.

8. Wall Support for Pipe Sizes to 3 Inches: Cast iron hook.

9. Wall Support for Pipe Sizes 4 Inches and Over: Welded steel bracket and wrought steel clamp.

10. Vertical Support: Steel riser clamp.

11. Floor Support for Cold Pipe: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.

12. Floor Support for Hot Pipe Sizes to 4 Inches: Cast iron adjustable pipe saddle, locknut, nipple, floor flange, and concrete pier or steel support.

13. Copper Pipe Support: Carbon steel ring, adjustable, copper plated.

2.13 GATE VALVES

A. Manufacturers:

1. Conbraco Industries.

2. Nibco, Inc.

3. Milwaukee Valve Company.

4. Crane Co.

5. Substitutions: See Section 22 01 00 - General Plumbing Provisions.

B. Up To and Including 2 1/2 Inches:

1. MSS SP-80, Class 125, bronze body, bronze trim, rising stem, handwheel, inside screw, solid wedge disc, solder or threaded ends.

C. 3 Inches and Larger:

1. MSS SP-70, Class 125, iron body, bronze trim, outside screw and yoke, handwheel, solid wedge disc, flanged ends. Provide chain wheel operators for valves 6 inches and larger mounted over 8 feet above floor.

2.14 GLOBE VALVES

A. Manufacturers:

1. Conbraco Industries.

2. Nibco, Inc.

3. Milwaukee Valve Company.

4. Crane Co.

5. Substitutions: See Section 22 01 00 - General Plumbing Provisions.

B. Up To and Including 2 1/2 Inches:

1. MSS SP-80, Class 125, bronze body, bronze trim, handwheel, bronze disc, solder or threaded ends.

C. 3 Inches and Larger:

1. MSS SP-85, Class 125, iron body, bronze trim, handwheel, outside screw and yoke, renewable bronze plug-type disc, renewable seat, flanged ends. Provide chain-wheel operators for valves 6 inches and larger mounted over 8 feet above floor.

2.15 BALL VALVES

A. Manufacturers:

1. Conbraco Industries.

2. Nibco, Inc.

3. Milwaukee Valve Company.

4. Crane Co.

B. Construction, 4 Inches and Smaller: MSS SP-110, Class 150, 400 psi CWP, bronze, ductile iron, or _____ body, 304 stainless steel, chrome plated brass, or _____ ball, regular port, teflon seats and stuffing box ring, blow-out proof stem, lever handle with balancing stops, solder, threaded, grooved, or _____ ends with union.

1. Substitutions: See Section 22 01 00 - General Plumbing Provisions.

C. Construction, 4 Inches and Smaller: MSS SP-110, Class 150, 400 psi CWP, bronze, two piece body, chrome plated brass ball, regular port, teflon seats and stuffing box ring, blow-out proof stem, lever handle, threaded ends with union.

2.16 PLUG VALVES

A. Manufacturers:

1. Conbraco Industries.

2. Nibco, Inc.

3. Milwaukee Valve Company.

4. Substitutions: See Section 22 01 00 - General Plumbing Provisions.

B. Construction 2-1/2 Inches and Larger: 1, 250 psi CWP, cast iron body and plug, pressure lubricated, teflon or Buna N packing, flanged or grooved ends. Provide lever operator with set screw.

2.17 BUTTERFLY VALVES

A. Manufacturers:

1. Hammond Valve.
2. Crane Co.
3. Milwaukee Valve Company.
4. Stockham.
5. Substitutions: See Section 22 01 00 - General Plumbing Provisions.

B. Construction 1-1/2 Inches and Larger: MSS SP-67, 200 psi CWP, cast or ductile iron body, elastomer coated ductile iron disc, resilient replaceable EPDM seat, wafer ends, extended neck, 10 position lever handle.

C. Provide gear operators for valves 6 inches and larger, and chain-wheel operators for valves mounted over 8 feet above floor.

2.18 FLOW CONTROLS

A. Manufacturers:

1. ITT Bell & Gossett.
2. Griswold Controls.
3. Taco, Inc.
4. Substitutions: See Section 22 01 00 - General Plumbing Provisions.

B. Construction: Class 125, Brass or bronze body with union on inlet and outlet, temperature and pressure test plug on inlet and outlet , blowdown/backflush drain.

C. Calibration: Control flow within 5 percent of selected rating, over operating pressure range of 10 times minimum pressure required for control, maximum minimum pressure 3.5 psi psi.

2.19 SWING CHECK VALVES

A. Manufacturers:

1. Hammond Valve.

2. Nibco, Inc.

3. Milwaukee Valve Company.

4. Crane Co.

5. Substitutions: See Section 22 01 00 - General Plumbing Provisions.

B. Up to 2 Inches:

1. 1, Class 125, bronze body and cap, bronze swing disc with rubber seat, solder or threaded ends.

C. Over 2 Inches:

1. 1, Class 125, iron body, bronze swing disc, renewable disc seal and seat, flanged or grooved ends.

2.20 SPRING LOADED CHECK VALVES

A. Manufacturers:

1. Hammond Valve.

2. Crane Co.

3. Milwaukee Valve Company.

4. Stockham.

5. Substitutions: See Section 22 01 00 - General Plumbing Provisions.

B. Class 125, iron body, bronze trim, stainless steel springs, bronze disc, Buna N seals, wafer style ends.

2.21 WATER PRESSURE REDUCING VALVES

A. Manufacturers:

1. Amtrol Inc.

2. Cla-Val Co.

3. Watts Regulator Company.

4. Spence Engineering Co.

5. Substitutions: See Section 22 01 00 - General Plumbing Provisions.

B. Up to 2 Inches:

1. MSS SP-80, bronze body, stainless steel and thermoplastic internal parts, fabric reinforced diaphragm, strainer, threaded single union ends.

C. Over 2 Inches:

1. MSS SP-85, cast iron body, bronze fitted, elastomeric diaphragm and seat disc, flanged.

2.22 RELIEF VALVES

A. Pressure Relief:

1. Manufacturers:

a. Cla-Val Co.

b. Henry Technologies.

c. Watts Regulator Company.

d. Spence Engineering Co.

e. Substitutions: See Section 22 01 00 - General Plumbing Provisions.

2. AGA Z21.22 certified, bronze body, teflon seat, stainless steel stem and springs, automatic, direct pressure actuated, temperature relief maximum 210 degrees F, capacity ASME (BPV IV) certified and labelled.

B. Temperature and Pressure Relief:

1. Manufacturers:

a. Cla-Val Co.

b. Henry Technologies.

c. Watts Regulator Company.

d. Spence Engineering Co.

e. Substitutions: See Section 22 01 00 - General Plumbing Provisions.

2. AGA Z21.22 certified, bronze body, teflon seat, stainless steel stem and springs, automatic, direct pressure actuated, temperature relief maximum 210 degrees F, capacity ASME (BPV IV) certified and labelled.

2.23 STRAINERS

A. Manufacturers:

1. Armstrong International, Inc.
2. Green Country Filtration.
3. WEAMCO.
4. Substitutions: See Section 22 01 00 - General Plumbing Provisions.

B. Size 1-1/2 inch to 4 inch:

1. Class 125, flanged iron body, Y pattern with 1/16 inch stainless steel perforated screen.

C. Size 5 inch and Larger:

1. Class 125, flanged iron body, basket pattern with 1/8 inch stainless steel perforated screen.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that excavations are to required grade, dry, and not over-excavated.

3.2 PREPARATION

A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.

B. Remove scale and dirt, on inside and outside, before assembly.

C. Prepare piping connections to equipment with flanges or unions.

3.3 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Provide non-conducting dielectric connections wherever jointing dissimilar metals.

C. Route piping in orderly manner and maintain gradient. Route parallel and perpendicular to walls.

D. Install piping to maintain headroom, conserve space, and not interfere with use of space.

E. Group piping whenever practical at common elevations.

F. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.

G. Provide clearance in hangers and from structure and other equipment for installation of insulation and access to valves and fittings. Refer to Section 22 07 19.

H. Provide access where valves and fittings are not exposed. Coordinate size and location of access doors.

I. Establish elevations of buried piping outside the building to ensure not less than 3 ft of cover.

J. Install vent piping penetrating roofed areas to maintain integrity of roof assembly.

K. Where pipe support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc rich primer to welding.

L. Provide support for utility meters in accordance with requirements of utility companies.

M. Prepare exposed, unfinished pipe, fittings, supports, and accessories ready for finish painting.

N. Install bell and spigot pipe with bell end upstream.

O. Install valves with stems upright or horizontal, not inverted.

P. Pipe vents from propane pressure reducing valves to outdoors and terminate in weather proof hood.

Q. Install water piping to ASME B31.9.

R. PVC Pipe: Make solvent-welded joints in accordance with ASTM D2855.

S. Sleeve pipes passing through partitions, walls and floors.

T. Inserts:

1. Provide inserts for placement in concrete formwork.

2. Provide inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams.

3. Provide hooked rod to concrete reinforcement section for inserts carrying pipe over 4 inches.

4. Where concrete slabs form finished ceiling, locate inserts flush with slab surface.

5. Where inserts are omitted, drill through concrete slab from below and provide through-bolt with recessed square steel plate and nut recessed into and grouted flush with slab.

U. Pipe Hangers and Supports:

1. Install in accordance with ASME B31.9.

2. Support horizontal piping as scheduled.

3. Install hangers to provide minimum 1/2 inch space between finished covering and adjacent work.

4. Place hangers within 12 inches of each horizontal elbow.

5. Use hangers with 1-1/2 inch minimum vertical adjustment. Design hangers for pipe movement without disengagement of supported pipe.

6. Support vertical piping at every other floor. Support riser piping independently of connected horizontal piping.

7. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.

8. Provide copper plated hangers and supports for copper piping.

9. Provide hangers adjacent to motor driven equipment with vibration isolation.

10. Support cast iron drainage piping at every joint.

V. Where water pressure within the building exceeds 75 psi static, install an approved water-pressure reducing valve conforming to ASSE 1003 with strainer to reduce the building pressure to 75 psi static or less.

3.4 APPLICATION

A. Use grooved mechanical couplings and fasteners only in accessible locations.

B. Install unions downstream of valves and at equipment or apparatus connections.

C. Install brass male adapters each side of valves in copper piped system. Solder adapters to pipe.

D. Install gate valves for shut-off and to isolate equipment, part of systems, or vertical risers.

E. Install globe valves for throttling, bypass, or manual flow control services.

F. Provide lug end butterfly valves adjacent to equipment when provided to isolate equipment.

G. Provide spring loaded check valves on discharge of water pumps.

H. Provide ball valves propane systems for shut-off service.

I. Provide flow controls in water recirculating systems where indicated.

J. All sanitary waste and vent pipe installed above grade in fire-rated walls, fire-rated plenum spaces or return air plenums shall be cast iron.

3.5 TOLERANCES

A. Drainage Piping: Maintain invert elevations within 1/4 inch vertically of location indicated on drawings. Slope to drain at minimum of 1/4 inch per foot slope for pipes 2 inch and smaller and 1/8 inch per foot slope for pipes larger than 2 inch.

B. Contractor must maintain inverts as indicated on the drawings. The contractor shall employ the latest precision technology available to insure the accuracy of the installation. If the contractor is unable to maintain, the contractor should notify the engineer IMMEDIATELY to obtain direction.

C. Water Piping: Slope at minimum of 1/32 inch per foot and arrange to drain at low points.

3.6 DISINFECTION OF DOMESTIC WATER PIPING SYSTEM

A. Disinfect water distribution system in accordance with Arkansas state and local codes.

B. Prior to starting work, verify system is complete, flushed and clean.

C. Ensure Ph of water to be treated is between 7.4 and 7.6 by adding alkali (caustic soda or soda ash) or acid (hydrochloric).

D. Inject disinfectant, free chlorine in liquid, powder, tablet or gas form, throughout system to obtain 50 to 80 mg/L residual.

E. Bleed water from outlets to ensure distribution and test for disinfectant residual at minimum 15 percent of outlets.

F. Maintain disinfectant in system for 24 hours.

G. If final disinfectant residual tests less than 25 mg/L, repeat treatment.

H. Flush disinfectant from system until residual equal to that of incoming water or 1.0 mg/L.

I. Take samples no sooner than 24 hours after flushing, from 10 percent of outlets and from water entry, and analyze in accordance with AWWA C651.

3.7 SERVICE CONNECTIONS

A. Provide new sanitary sewer services. Before commencing work check invert elevations required for sewer connections, confirm inverts and ensure that these can be properly connected with slope for drainage and cover to avoid freezing.

B. Provide new water service complete with approved reduced pressure backflow preventer and water meter with by-pass valves, pressure reducing valve, and sand strainer.

1. Provide sleeve in wall for service main and support at wall with reinforced concrete bridge. Calk enlarged sleeve and make watertight with pliable material. Anchor service main inside to concrete wall.

2. Provide 18 gage galvanized sheet metal sleeve around service main to 6 inch above floor and 6 feet minimum below grade. Size for minimum of 2 inches of loose batt insulation stuffing.

C. Connections to existing manholes shall be made at the locations shown on the plans. An opening shall be cut in the wall of the manhole and shall be of sufficient size to permit installation of the pipe at the designated elevation. The invert of the existing manhole shall be removed and a new invert constructed. The end of the pipe shall be flush with the inside wall of the manhole and shall be sealed in the wall with mortar to provide a water tight joint.

D. Connection of dissimilar pipe materials shall be made with the specified adapter couplings.

E. Sewers shall be encased or cradled in concrete where shown on the plans or as directed by the Engineer. Unless otherwise noted on the plans, concrete encasement shall encircle the pipe and shall be a minimum thickness of four inches.

F. Provide new gas service complete with gas meter and regulators. Gas service distribution piping to have initial minimum pressure of 11 inch wg.

G. This Contractor shall extend the system of gas piping, to the various outlets as indicated on plans, complete with stop ball valves, drip pockets, valves and other accessories that may be required to give proper and adequate service.

H. Provide gas ball valves in final connection to all equipment. Unions will not be permitted, except in final connections to equipment. Proper reducing fittings shall be used. Bushings will not be accepted. Gas piping in building shall be standard weight schedule 40 black steel pipe with malleable fittings, unless contractor wishes to weld all joints. Welded rod shall be of same material as piping. No. 22 bronze welding will be permitted.

I. All underground gas service exterior to the building (5 psi or less) shall be a polyethylene plastic pipe manufactured in accordance with ASTM No. D-2517 or D-2513 and shall be indicated on the pipe. Gas and propane piping shall be laid at least 36" below grade at all points. Provide a #12 THN copper wire in trench with pipe and leave both ends exposed for future accessibility.

J. For corrosion protection, all underground and exposed exterior steel pipe and fittings must be coated and wrapped.

K. Test all gas piping operating at 6 oz. with air pump and mercury gauge to pressure that will maintain 25 psig for 20 minutes and inspected by gas and propane service official.

L. All gas piping operating at more than 1 psig shall be tested at 100 psig for steel and 50 psig for plastic, for a minimum of 15 minutes and inspected by gas service official.

M. The pressure regulator at the building shall be sized, and approved by gas service official.

N. All above gas ground piping shall be rigid steel pipe designated for natural gas use. Pipe shall be painted with a rust inhibiting primer and a final coat the color of which shall be determined by governing regulations or as directed by the Engineer if no governing regulations exist regarding finish color.

O. All gas piping systems within a building and other above ground gas piping shall be electrically continuous and bonded to a grounded electrode as defined in NFPA 70.

P. Medium and high pressure gas regulators installed in the medium and high pressure gas lines (2 psi or greater) shall comply with the following provisions:

1. Shall be suitable for the inlet and outlet gas pressure.
2. Shall comply with Code and gas official requirements.
3. Shall be accessible for servicing.
4. Shall be vented to outdoors when located indoors.
5. Shall be installed in the gas piping system so that it cannot be concealed by building construction.

Q. Provide a listed shut off valve immediately ahead of and immediately behind each medium pressure regulator.

R. Underground gas piping shall be installed in a separate ditch.

3.8 SCHEDULES

A. Pipe Hanger Spacing:

1. Metal Piping:

a. Pipe size: 1/2 inches to 1-1/4 inches:

1) Maximum hanger spacing: 8 ft.

2) Hanger rod diameter: 1/4 inch.

b. Pipe size: 1-1/2 inches to 2 inches:

1) Maximum hanger spacing: 8 ft.

2) Hanger rod diameter: 1/4 inch.

c. Pipe size: 2-1/2 inches to 3 inches:

1) Maximum hanger spacing: 8 ft.

2) Hanger rod diameter: 3/8 inch.

d. Pipe size: 4 inches to 6 inches:

1) Maximum hanger spacing: 8 ft.

2) Hanger rod diameter: 3/8 inch.

e. Pipe size: 8 inches to 12 inches:

1) Maximum hanger spacing: 10 ft.

2) Hanger rod diameter: 1/2 inch.

f. Pipe size: 14 inches and Over:

1) Maximum hanger spacing: 10 ft.

2) Hanger rod diameter: 7/8 inch..

2. Plastic Piping:

a. All sizes:

1) Maximum hanger spacing: 6 ft.

2) Hanger rod diameter: 3/8 inch.

END OF SECTION

SECTION 22 10 06

PLUMBING SPECIALTIES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Floor and Trench drains

B. Cleanouts.

C. Hydrants.

D. Backwater valves.

E. Backflow preventers.

F. Water hammer arrestors.

G. Interceptors.

H. Thermostatic mixing valves.

1.2 RELATED REQUIREMENTS

A. Section 22 10 05 - Plumbing Piping.

B. Section 22 40 00 - Plumbing Fixtures.

C. Section 22 30 00 - Plumbing Equipment.

1.3 REFERENCE STANDARDS

A. ASME A112.6.3 - Floor Drains; 2022.

B. ASSE 1011 - Performance Requirements for Hose Connection Vacuum Breakers; 2023.

C. ASSE 1012 - Performance Requirements for Backflow Preventers with an Intermediate Atmospheric Vent; 2021.

D. ASSE 1019 - Performance Requirements for Wall Hydrant with Backflow Protection and Freeze Resistance; 2023.

E. NSF 61 - Drinking Water System Components - Health Effects; 2023, with Errata.

F. NSF 372 - Drinking Water System Components - Lead Content; 2022.

G. PDI-WH 201 - Water Hammer Arresters; 2017.

1.4 SUBMITTALS

A. See Section 22 01 00 - General Plumbing Provisions, for submittal procedures.

B. Product Data: Provide component sizes, rough-in requirements, service sizes, and finishes.

C. Shop Drawings: Indicate dimensions, weights, and placement of openings and holes.

D. Certificates: Certify that grease interceptors meet or exceed City of Fayetteville, Arkansas requirements .

E. Manufacturer's Instructions: Indicate Manufacturer's Installation Instructions: Indicate assembly and support requirements.

F. Project Record Documents: Record actual locations of equipment, cleanouts, backflow preventers, water hammer arrestors ____.

G. Operation Data: Indicate frequency of treatment required for interceptors.

H. Maintenance Data: Include installation instructions, spare parts lists, exploded assembly views.

I. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.

1. Extra Loose Keys for Outside Hose Bibbs: Four.

J. Product Data: Manufacturer’s standard data sheets describing components including materials, dimensions, relationship to adjacent construction, and attachments.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with not less than five years documented experience.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Accept specialties on site in original factory packaging. Inspect for damage.

PART 2 PRODUCTS

2.1 DRAINS

A. Manufacturers:

1. Josam Company.

2. Jay R. Smith Manufacturing Company.

3. Zurn Industries, Inc.

4. Wade Tyler Pipe.

5. MIFAB, Inc.

6. Striem.

7. Watts Water Technologies.

8. Striem, Edwardsville, KS USA

9. Schier Products Company, Edwardsville, KS USA

10. Substitutions: See Section 22 10 00 - General Plumbing Provisions.

B. Washer Drain

1. Description: IAPMO/ANSI/CAN Z1167, UPC 3/4"Polyethelene trough made in the USA for above and below grade installation. Removable, corrosion-resistant primary filter screen and secondary filter basket. Furnished with a nested cover, internally sloped floor. Trought shall be equipped with a plain end outlet. Inlet connections are field installed.

2. Cover shall hav maximum 450 lbs. load capacity.

3. Maximum operating temperature 165 degrees fahrenheit intermittent.

4. Floor Drain:

a. ASME A112.6.3; lacquered cast iron two piece body with double drainage flange, weep holes, reversible clamping collar, and round, adjustable round nickel bronze strainer with removable perforated sediment bucket.

5. Floor Sink:

a. Square lacquered cast iron body with integral seepage pan, epoxy coated interior, aluminum dome strainer, clamp collar, sediment bucket; and nickel bronze frame; full grate.

2.2 CLEANOUTS

A. Manufacturers:

1. Jay R. Smith Manufacturing Company.

2. Josam Company.

3. Ward Manufacturing, Inc.

4. Zurn Industries, Inc.

5. Wade Tyler Pipe.

6. Watts Water Technologies.

7. Substitutions: See Section 22 01 00 - General Plumbing Provisions.

B. Cleanouts at Exterior Surfaced Areas:

1. Round cast nickel bronze access frame and non-skid cover.

C. Cleanouts at Exterior Unsurfaced Areas:

1. Line type with lacquered cast iron body and round epoxy coated gasketed tractor-type cover.

D. Cleanouts at Interior Finished Floor Areas:

1. Lacquered cast iron body with threaded, adjustable housing, flanged ferrule and round scoriated secured cover. Round gasket depressed cover to accept finish in finish floor areas. Coordinate cover with floor finish per architectural plans.

E. Cleanouts at Interior Finished Wall Areas:

1. Line type with lacquered cast iron body and round epoxy coated gasketed cover, and round stainless steel access cover secured with machine screw.

F. Cleanouts at Interior Unfinished Accessible Areas: Calked or threaded type. Provide bolted stack cleanouts on vertical rainwater leaders.

2.3 HYDRANTS

A. Manufacturers:

1. Arrowhead Brass Company.

2. Jay R. Smith Manufacturing Company.

3. Zurn Industries, Inc.

4. Wade Tyler Pipe.

5. Woodford.

6. Substitutions: See Section 22 01 00 - General Plumbing Provisions.

B. Wall Hydrants:

1. ASSE 1019; freeze resistant, self-draining type with chrome plated lockable recessed box hose thread spout, lockshield and removable key, and integral vacuum breaker.

C. Roof Hydrants:

1. Hydrant shall be freeze proof, backflow protected, Woodford Model SRH-MS, or equal.

2. Hydrant shall meet ASSE 1057

3. The hydrant shall not require a drain line. Venturi action shall draw water out of the internal reservoir and discharge out the backflow preventer.

4. Provide backflow preventer.

5. Provide mounting system.

2.4 BACK WATER VALVES

A. Manufacturers:

1. Jay R. Smith Manufacturing Company; Model _____: www.jayrsmith.com/#sle.

2. Savko Plastic Pipe & Fittings, Inc; Model _____: www.savko.com/#sle.

3. Zurn Industries, Inc; Model _____: www.zurn.com/#sle.

4. Substitutions: See Section 01 60 00 - Product Requirements.

B. Cast Iron Back Water Valves: ANSI A112.21.2M; lacquered cast iron body and cover, brass valve, extension sleeve, and access cover.

C. Plastic Back Water Valves: ABS body and valve, extension sleeve, and access cover.

2.5 BACKFLOW PREVENTERS

A. Manufacturers:

1. Conbraco Industries.

2. Valve Solutions, Inc.

3. Watts Regulator Company.

4. Zurn Industries, Inc.

5. FEBCO.

6. Substitutions: See Section 22 01 00 - General Plumbing Provisions.

B. Reduced Pressure Backflow Preventers:

1. ASSE 1013; bronze body with bronze internal parts and stainless steel springs; two independently operating, spring loaded check valves; diaphragm type differential pressure relief valve located between check valves; third check valve that opens under back pressure in case of diaphragm failure; non-threaded vent outlet; assembled with two gate valves, strainer, and four test cocks.

2.6 WATER HAMMER ARRESTORS

A. Manufacturers:

1. Jay R. Smith Manufacturing Company.
2. Watts Regulator Company.
3. Zurn Industries, Inc.
4. Wade Tyler Pipe.
5. Substitutions: See Section 22 01 00 - General Plumbing Provisions.

B. Water Hammer Arrestors:

1. Stainless steel construction, bellows type sized in accordance with PDI-WH 201, precharged suitable for operation in temperature range -100 to 300 degrees F and maximum 250 psi working pressure.

2.7 INTERCEPTORS

A. Manufacturers:

1. ACO International.
2. Jay R. Smith Manufacturing Company.
3. Zurn Industries, Inc.
4. Wade Tyler Pipe.
5. Peterson Concrete Tank Co.
6. Striem.
7. Schier.
8. Substitutions: See Section 22 01 00 - General Plumbing Provisions.

B. Indoor/Outdoor Hydromechanical Grease Interceptor

1. Description: ASME A112.14.3, Seamless, molded polyethylene with minimum 7/16"" uniform wall thickness grease interceptor made in USA. Interceptor shall be furnished for above or below grade installation with adjustable cover adapter.

2. Capacities:100 gpm or 200 gpm

a. Liquid: 1,500 gal.

b. Grease: 10,061 lbs. (1,379 gal.) @100 gpm.

c. Grease: 9,446 lbs. (1,294 gal) @ 200 gpm.

d. Solids: 318 gal.

3. Unit weight - w/cast iron covers: 1,290 lbs. (for wet weight add 12,525 lbs.).

2.8 MIXING VALVES

A. Thermostatic Mixing Valves:

1. Manufacturers:

a. ESBE.

b. Leonard Valve Company.

c. Honeywell Water Controls.

d. Powers Process Controls.

e. Substitutions: See Section 22 01 00 - General Plumbing Provisions.

2. Valve: Chrome plated cast brass body, stainless steel or copper alloy bellows, integral temperature adjustment.

3. Accessories:

a. Check valve on inlets.

b. Volume control shut-off valve on outlet.

c. Stem thermometer on outlet.

d. Strainer stop checks on inlets.

4. Cabinet: 16 gage stainless steel, for surface mounting with keyed lock.

B. Pressure Balanced Mixing Valves:

1. Manufacturers:

    a. Delta Faucet Company.

    b. H.G. Specialties.

    c. Powers Process Controls.

    d. Taconova.

    e. Substitutions: See Section 22 01 00 - General Plumbing Provisions.

2. Valve: Chrome plated cast brass body, stainless steel cylinder, integral temperature adjustment.

3. Accessories:

    a. Volume control shut-off valve on outlet.

    b. Stem thermometer on outlet.

    c. Strainer stop checks on inlets.

    d. Cabinet: 16 gage stainless steel, for surface mounting with keyed lock.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Extend cleanouts to finished wall or floor surface. Lubricate threaded cleanout plugs with mixture of graphite and linseed oil. Ensure clearance at cleanout for rodding of drainage system.

C. Encase exterior cleanouts in concrete flush with grade. Refer to plans for detail.

D. Install floor cleanouts at elevation to accommodate finished floor.

1. Provide optional tops to match floor finish. Refer to Architectural plans for floor finishes.

E. Install approved potable water protection devices on plumbing lines where contamination of domestic water may occur; on janitor rooms, fire sprinkler systems, premise isolation, irrigation systems, flush valves, exterior hose bibbs.

F. Pipe relief from backflow preventer to nearest floor drain or floor sink.

G. Install water hammer arrestors complete with accessible isolation valve on hot and cold water supply piping to lavatories,sinks, and water closets.

H. Install city approved backwater valve on all building sewers at the exterior of the building and prior to connection to the public sewer system.

I. Install components in accordance with manufacture's instructions and approved product data submittals.

END OF SECTION

SECTION 22 10 08

PLUMBING SOLDER

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Lead-free plumbing solder.

1.2 RELATED SECTIONS

A. Section 22 10 05 - Plumbing Piping.

B. Section 22 40 00 - Plumbing Fixtures.

C. Section 22 30 00 - Plumbing Equipment.

1.3 REFERENCES

A. ASTM B 32 - Standard Specification for Solder Metal; 1996.

B. NSF 61 - Drinking Water System Components - Health Effects; 2002 (ANSI/NSF 61).

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturer: The Harris Products Group

B. Substitutions: See Section 22 01 00 - General Plumbing Provisions for equipment and material substitutions.

C. Provide all plumbing solder from a single manufacturer.

2.2 MATERIALS

A. Plumbing Solder: Sterling® solder or equal, ASTM B 32, Alloy Grade TC; 95 percent tin, 4.85 percent copper, 0.15 percent selenium.

1. Certified to comply with NSF 61.

2. Melting Temperature: 410 degrees F.

3. Tensile Strength: 7,130 psi.

4. Shear Strength: 5,979 psi.

5. Elongation Percent: 19.1.

6. Brinell Hardness: 15.1.

7. Burst Strength: 5,800 psi.

8. Pressure/Temperature Test Data on Copper Tube Assemblies comprised of 3 inch, 2 inch, 1 inch, 3/4 inch, and 1/2 inch Tubing with a Reducing Tee:

    a. No leaks at 70 degrees F., 200 psi, held for 2 minutes.

    b. No leaks at 180 degrees F., 200 psi, held for 2 minutes.

    c. No leaks at 70 degrees F., 2,000 psi, held for 5 minutes.

B. No lead in plumbing solder.

PART 3 EXECUTION

3.1 INSTALLATION

A. Apply plumbing solder in accordance with manufacturer's recommendations.

END OF SECTION

SECTION 22 30 00

PLUMBING EQUIPMENT

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Water heaters.

B. Pumps.

1. Circulators.

1.2 RELATED REQUIREMENTS

A. Division 26 - Equipment wiring; electrical characteristics and wiring connections.

1.3 REFERENCE STANDARDS

A. ANSI Z21.10.1 - Gas Water Heaters, Volume I, Storage Water Heaters with Input Ratings of 75,000 Btu Per Hour or Less; 2019, with Errata (2020).

B. ANSI Z21.10.3 - Gas-Fired Water Heaters, Volume III, Storage Water Heaters with Input Ratings Above 75,000 Btu Per Hour, Circulating and Instantaneous; 2019.

C. NEMA MG 1 - Motors and Generators; 2014.

D. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

E. NSF 61 - Drinking Water System Components - Health Effects; 2023, with Errata.

F. UL 778 - Standard for Motor-Operated Water Pumps; Current Edition, Including All Revisions.

1.4 REFERENCE STANDARDS

A. Comply with State of Arkansas adopted ADA Accessible Guidelines in regard to accessible or handicapped features.

B. ANSI Z21.10.1 - Gas Water Heaters, Volume I, Storage Water Heaters with Input Ratings of 75,000 Btu Per Hour or Less; 2019, with Errata (2020).

C. ANSI Z21.10.3 - Gas-Fired Water Heaters, Volume III, Storage Water Heaters with Input Ratings Above 75,000 Btu Per Hour, Circulating and Instantaneous; 2019.

D. NFPA 54 - National Fuel Gas Code; National Fire Protection Association; 2006.

E. NFPA 70 - National Electrical Code; National Fire Protection Association; 2008.

1.5 SUBMITTALS

A. See Section 22 01 00 - General Plumbing Provisions, for submittals procedures.

B. Product Data:

1. Provide dimension drawings of water heaters indicating components and connections to other equipment and piping.

2. Indicate pump type, capacity, power requirements.

3. Provide certified pump curves showing pump performance characteristics with pump and system operating point plotted. Include NPSH curve when applicable.

4. Provide electrical characteristics and connection requirements.

C. Shop Drawings:

1. Indicate heat exchanger dimensions, size of tappings, and performance data.

2. Indicate dimensions of tanks, tank lining methods, anchors, attachments, lifting points, tappings, and drains.

D. Operation and Maintenance Data: Include operation, maintenance, and inspection data, replacement part numbers and availability, and service depot location and telephone number.

E. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum five years of documented experience.

B. Identification: Provide pumps with manufacturer's name, model number, and rating/capacity identified by permanently attached label.

C. Standards: Ensure products and installation of specified products are in conformance with recommendations and requirements of the following organizations:

1. American Gas Association (AGA).

2. National Sanitation Foundation (NSF).

3. American Society of Mechanical Engineers (ASME).

4. National Electrical Manufacturers' Association (NEMA).

5. Underwriters Laboratories (UL).

D. Performance: Ensure pumps operate at specified system fluid temperatures without vapor binding and cavitation, are non-overloading in parallel or individual operation, operate within 25 percent of midpoint of published maximum efficiency curve.

1.7 CERTIFICATIONS

A. Water Heaters: NSF approved.

B. Gas Water Heaters: Certified by CSA International to ANSI Z21.10.1 or ANSI Z21.10.3, as applicable.

C. Conform to AGA requirements for water heaters.

D. Pressure Vessels for Heat Exchangers: ASME labeled, to ASME (BPV VIII, 1).

E. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc., as suitable for the purpose specified and indicated.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Provide temporary inlet and outlet caps. Maintain caps in place until installation.

1.9 WARRANTY

A. Provide five year manufacturer warranty for domestic water heaters.

B. All warranties to begin at Date of Substantial Completion as accepted by the Owner.

PART 2 PRODUCTS

2.1 WATER HEATER MANUFACTURERS

A. Commercial Condensing Tankless Gas Fired Water Heater Manufacturers

1. Rinnai.

2. A.O. Smith Water Products Co.

3. State Industries.

4. Takagi.

5. Substitutions: See Section 22 01 00 - General Plumbing Provisions.

2.2 COMMERCIAL CONDENSING TANKLESS GAS FIRED WATER HEATERS

A. Type: Automatic, condensing natural gas-fired, tankless, temperature controlled, continuous flow, direct vent, forced combustion.

B. Performance:

1. As specified in drawing schedule.

C. Accessories: Provide:

1. Water Connections: Brass.

2. Water flow sensor with electronic water control.

3. Digital Controller.

4. Manufacturer's concentric vent kit.

D. Approval: By AGA.

2.3 IN-LINE CIRCULATOR PUMPS

A. Manufacturers:

1. Armstrong Pumps Inc.

2. ITT Bell & Gossett.

3. Sterling Fluid Systems.

4. Grundfos.

5. Substitutions: See Section 22 01 00 - General Plumbing Provisions.

B. Casing: Bronze, rated for 150 psig working pressure, with stainless steel rotor assembly.

C. Impeller: Bronze.

D. Shaft: Alloy steel with integral thrust collar and two oil lubricated bronze sleeve bearings.

E. Seal: Carbon rotating against a stationary ceramic seat.

F. Drive: Flexible coupling.

G. Performance:

1. As scheduled on drawings.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install plumbing equipment in accordance with manufacturer's instructions, as required by code, and complying with conditions of certification, if any.

B. Install water heaters in accordance with manufacturer's instructions and to AGA or UL requirements.

C. Coordinate with plumbing piping and related fuel piping, gas venting, and electrical work to achieve operating system.

D. Pumps:

1. Provide air cock and drain connection on horizontal pump casings.

2. Provide line sized isolating valve and strainer on suction and line sized soft seated check valve and balancing valve on discharge.

3. Decrease from line size with long radius reducing elbows or reducers. Support piping adjacent to pump such that no weight is carried on pump casings. Provide supports under elbows on pump suction and discharge line sizes 4 inches and over.

4. Ensure pumps operate at specified system fluid temperatures without vapor binding and cavitation, are non-overloading in parallel or individual operation, and operate within 25 percent of midpoint of published maximum efficiency curve.

5. Align and verify alignment of base mounted pumps prior to start-up.

3.2 SCHEDULES

A. Water Heaters:

1. Refer to plan schedule.

B. Recirculating Pumps:

1. Refer to plan schedule.

END OF SECTION

SECTION 22 40 00

PLUMBING FIXTURES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Water closets.

B. Urinals.

C. Lavatories.

D. Sinks.

E. Service sinks.

F. Institutional ligature-resistant showers.

G. Showers.

1.2 RELATED REQUIREMENTS

A. Section 22 10 05 - Plumbing Piping.

B. Section 22 10 06 - Plumbing Specialties.

C. Section 22 30 00 - Plumbing Equipment.

D. Division 26 - Equipment wiring, electrical characteristics and wiring connections.

1.3 REFERENCE STANDARDS

A. Comply with State of Arkansas adopted ADA Accessible Guidelines in regard to accessible or handicapped features.

B. ASME A112.6.1M - Floor-Affixed Supports for Off-the-Floor Plumbing Fixtures for Public Use; 1997 (Reaffirmed 2017).

C. ASME A112.18.1 - Plumbing Supply Fittings; 2018, with Errata.

D. ASME A112.19.2 - Ceramic Plumbing Fixtures; 2018, with Errata.

E. ASME A112.19.3 - Stainless Steel Plumbing Fixtures; 2022.

F. ASME A112.19.5 - Flush Valves and Spuds for Water Closets, Urinals, and Tanks; 2022.

G. NSF 61 - Drinking Water System Components - Health Effects; 2023, with Errata.

H. NSF 372 - Drinking Water System Components - Lead Content; 2022.

1.4 SUBMITTALS

A. Section 22 01 00 - General Plumbing Provisions: Procedures for submittals.

B. Product Data: Provide catalog illustrations of fixtures, sizes, rough-in dimensions, utility sizes, trim, and finishes.

C. Manufacturer's Instructions: Indicate installation methods and procedures.

D. Maintenance Data: Include fixture trim exploded view and replacement parts lists.

E. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum five years of documented experience.

1.6 REGULATORY REQUIREMENTS

A. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc., as suitable for the purpose specified and indicated.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Accept fixtures on site in factory packaging. Inspect for damage.

B. Protect installed fixtures from damage by securing areas and by leaving factory packaging in place to protect fixtures and prevent use.

1.8 WARRANTY

A. Provide five year manufacturer warranty for electric water cooler.

B. All warranties to begin at Date of Substantial Completion as accepted by the Owner.

PART 2 PRODUCTS

2.1 GENERAL REQUIREMENTS

A. Potable Water Systems: Provide plumbing fittings and faucets that comply with NSF 61 and NSF 372 for maximum lead content; label pipe and fittings.

2.2 FLUSH VALVE WATER CLOSETS

A. Water Closets: Vitreous china, ASME A112.19.2, floor mounted, siphon jet flush action, china bolt caps.

1. Bowl: Height as indicated on plans, with elongated rim.

2. Flush Volume: 1.6 gallon, maximum.

3. Flush Valve: Exposed (top spud).

a. Dual-Filtered Bypass.

4. Flush Operation: Sensor operated.

5. Manufacturers:

a. American Standard Inc.

b. Kohler Company.

c. Zurn Industries, Inc.

d. Wiloughby

e. Sloan.

f. Acorn

g. Bradley

h. Substitutions: See Section 22 01 00 - General Plumbing Provisions.

B. Flush Valves: ASME A112.18.1, diaphragm type, dual-filtered bypass, complete with vacuum breaker stops and accessories.

1. Sensor-Operated Type: Solenoid operator, low voltage hard-wired, infrared sensor and over-ride push button.

a. Valve shall be equal to Sloan Royal #111 ES-S.

2. Manufacturers:

a. Sloan Valve Company.

b. Substitutions: See Section 22 01 00 - General Plumbing Provisions.

3. Sensor-Operated:

a. Type: ASME A112.19.5; chloramine-resistant clog-resistant dual-seat diaphragm valve complete with vacuum breaker, stops and accessories.

b. Mechanism: Solenoid-operated piston or electronic motor-actuated operator with low-voltage powered infrared sensor, and mechanical override or override push button.

c. Supplied Volume Capacity: 1.6 gal per flush.

4. Concealed Type: Rough brass, exposed parts chrome-plated, wall escutcheon, wheel handle stop.

C. Seats:

1. Manufacturers:

a. Beneke Magnolia.

b. Bemis Manufacturing Company.

c. Church Seat Company.

d. Olsonite.

e. Substitutions: See Section 22 01 00 - General Plumbing Provisions.

f. Substitutions: See Section 01 60 00 - Product Requirements.

2. Solid white plastic, open front, self-sustaining hinge, brass bolts, without cover.

D. Water Closet Carriers:

1. Manufacturers:

a. JOSAM Company.

b. Sloan Valve Company.

c. Zurn Industries, Inc.

d. Wade Tyler Pipe.

e. Watts Water Technologies.

f. Substitutions: See Section 22 01 00 - General Plumbing Provisions.

2. ASME A112.6.1M; adjustable cast iron frame, integral drain hub and vent, adjustable spud, lugs for floor and wall attachment, threaded fixture studs with nuts and washers.

2.3 IINSTITUATIONAL WATER CLOSET

A. Manufacturer's:

1. Wiloughby Industries.

2. Substitutions: Not Permitted.

B. Description: ASME A112.19.3, rear discharge and floor mounted, blow series toilet. Provide with wall sleeve where required.

C. ADA Compliant.

D. Construction: 14 galvanized, type 304 stainless steel. Provide with wall sleeve as required.

E. Minimum Supply Pressure: 35 psi.

F. Water Closet:

1. Type: Elongated, with back inlet, integral trap and blowout.

2. Floor Outlet Connection: Water closet gasket waste.

3. Wall Outlet Connection: NPS 4 (DN 100) PVC suppliedx with no hub coupling sized to match.

4. Seat Surface: No. 4 satin finish.

5. Flushometer Valve:

a. Sloan model sloan with dual filter bypass.

6. Electronic Controls:

a. Electronic push button with electronic toilet overflow preventer.

b. Hard-wired transformer.

7. Consumption: 1.6 gpf.

8. Horizontal Cast Iron Cleanout Tee with Pin: NPS 4 (DN 100).

9. Cleanout Tee Plug: Brass

2.4 INSTITUTIONAL LAVATORIES

A. Lavatory:

1. Standard: ASME A112.18.

2. Description: 14 gauge, type 304 stainless steel oval-shape bowl lavatory. Provide with wall sleeve as required.

3. Recepter: Bowl with integral, self-draining, soap depression.

4. Pushbuttons and escutcheons: Machined type 303 stainless steel. No chrome-plated brass allowed.

5. Water supply valve:

   a. Standard: ASME A112.18.1.

   b. Valve type: Pneumatic adjustable 5 to 90 seconds with individual check stops.

   c. Temperatue: Single with ASSE 1070 rated thermostatic mixing valve.

6. Electronic Controls:

   a. Controls: EPBH electronic ligature-resistant push button.

   b. Electronic push button with electronic toilet overflow preventer.

   c. Hard-wired transformer.

2.5 INSTITUTIONAL COMBINATION LAVATORY/TOILETS:

A. Manufacturer's:

   1. Wiloughby Industries.

   2. Substitutions: Not Permitted.

B. Description: ASME A112.19.3, Left, RIght, or Center, floor mounted combination lavartory and toilet. Provide with wall sleeve as required.

C. ADA Compliant with intergal grab bar.

D. Construction: 14 galvanized, type 304 stainless steel. Provide with wall sleeves as required.

E. Minimum Supply Pressure: 35 psi.

F. Water Closet:

   1. Type: Elongated, with back inlet, integral trap and blowout and siphon-jet.

   2. Floor Outlet Connection: Water closet gasket waste.

3. Wall Outlet Connection: NPS 4 (DN 100) PVC suppliedx with no hub coupling sized to match.
4. Seat Surface: No. 4 satin finish.
5. Flushometer Valve:
    a. Sloan model sloan with dual filter bypass.
6. Electronic Controls:
    a. Electronic push button with electronic toilet overflow preventer.
    b. Hard-wired transformer.
7. Consumption: 1.6 gpf.
8. Horizontal Cast Iron Cleanout Tee with pin: NPS 4 (DN 100).
9. Cleanout Tee Plug: Brass
10. Acessories:
    a. Provide with recessed tissue holder.

G. Lavatory:

1. Standard: ASME A112.18.
2. Recepter: Bowl with integral, self-draining, soap depression.
3. Pushbuttons and escutcheons: Machined type 303 stainless steel. No chrome-plated brass allowed.
4. Water supply valve:
    a. Standard: ASME A112.18.1.
    b. Valve type: Pneumatic adjustable 5 to 90 seconds with individual check stops.
    c. Temperatue: Single with ASSE 1070 rated thermostatic mixing valve.
    d. Controls: EPBH electronic ligature-resistant push button.
    e. Drain: Fast integral punched grid.
    f. Trap Location: Integral

2.6 LAVATORIES

A. Lavatory Manufacturers:

1. American Standard Inc.
2. Zurn Industries, Inc.
3. Kohler Company.
4. Sloan.
5. Substitutions: See Section 22 01 00 - General Plumbing Provisions.

B. Vitreous China Wall Hung Basin:

1. ASME A112.19.2; vitreous china wall hung lavatory, with 4 inch high back, rectangular basin with front overflow.
    a. Drilling Centers: 4 inch.

C. Supply Faucet Manufacturers:

1. Sloan Valve Company.
2. Substitutions: See Section 22 01 00 - General Plumbing Provisions.

D. Sensor Operated Faucet: Cast brass, chrome plated, deck mounted with sensor located on neck of spout.

1. Spout Style: Standard.
2. Power Supply: 24 VAC.
    a. For 24V applications, provide transformer.
3. Mixing Valve: Thermostatic mixing valve.
4. Water Supply: 1/2 inch compression connections.
5. Aerator: Vandal resistant, 0.5 GPM, .
6. Automatic Shut-off: 30 seconds.
7. Sensor range: Automatically adjusts.
    a. Accessory: Optional remote reprogrammer module to adjust pre-set factory functions.
8. Finish: Polished chrome.

9. Accessory: 4 inch deck plate.

10. Sensor Operated Faucet Manufacturers:

    a. Sloan Valve Company.

    b. Substitutions: See Section 22 01 00 - General Plumbing Provisions.

E. Accessories:

1. Chrome plated 17 gage brass P-trap with clean-out plug and arm with escutcheon.

2. Offset waste with plug and strainer where required.

3. Wheel handle stops.

4. Rigid supplies.

5. Carrier:

    a. Manufacturers:

        1) JOSAM Company.

        2) Sloan Valve Company.

        3) Zurn Industries, Inc.

        4) Watts Water Technologies.

        5) Substitutions: See Section 22 01 00 - General Plumbing Provisions.

    b. ASME A112.6.1M; cast iron and steel frame with tubular legs, lugs for floor and wall attachment, concealed arm supports, bearing plate and studs.

F. All lavatory faucets shall be listed to ASSE 1070 for temperature and pressure protection with a maximum control flow of 0.5 gpm (2.2 lpm). Faucet shall feature a single cartridge design for ease of repair and maintenance and shall provide an approach temperature of no greater than 5ºF (3°C). Faucet shall include integral check valves to prevent cross flow and shall be in compliance with the American with Disabilities Act (ADA). Faucet shall feature ceramic disc mixing and shall be constructed using Lead Free material.

2.7 SINKS

A. Sink Manufacturers:

1. American Standard Inc.

2. Elkay.

3. Kohler Company.

4. Just.

5. Bradley.

6. Substitutions: See Section 22 01 00 - General Plumbing Provisions.

B. Single Compartment Bowl:

1. ASME A112.19.3; See schedule outside dimensions, 20 gauge thick, Type 304 stainless steel, self-rimming and undercoated, with ledge back drilled for trim.

2. Drain Size: 3-1/2"

3. Drain Location: Center.

C. Trim: ASME A112.18.1; chrome plated brass supply with high rise swing spout, water economy aerator with maximum 1.5 gpm flow, wrist blades .

D. Accessories: Chrome plated 17 gage brass P-trap with clean-out plug and arm with escutcheon, wheel handle stop, rigid supplies.

2.8 INSTITUTIONAL LIGATURE-RESISTANT SHOWERS

A. Manufacturers:

1. Willoughby.

2. Substitution: Not permitted.

B. Description: 14 gauge, Type 304 stainless steel recessed rear mounted shower panel. Provide with wall sleeves as requied.

C. Electronic Controls:

1. Hard-wired transformer, 110VA OR 24VAC.

D. Flow Rate: 2.0 GPM

E. Shower: Ligature-resistant shower head.

F. Acessories:

1. Recessed mounted soap dish.

G. Water supply valve:

1. Temperatue: Single with ASSE 1070 rated thermostatic mixing valve.

2. Controls: Ligature-resistant Piezo Electronic Push Buttons

2.9 SERVICE SINKS

A. Service Sink Manufacturers:

1. Elkay Manufacturing Company.

2. American Standard. Inc..

3. Williams.

4. Crane-Fiat.

5. Florestone.

6. Substitutions: See Section 22 01 00 - General Plumbing Provisions.

B. Bowl:

1. 24 x 24 x 12 inch high white terrazzo, floor mounted, shoulders not less 4" high inside and not less than 1-3/4" wide, vinyl bumper guard, stainless steel strainer.

C. Trim:

1. ASME A112.18.1 exposed wall type supply with cross handles, spout wall brace, vacuum breaker, hose end spout, strainers, eccentric adjustable inlets, integral screwdriver stops with covering caps, hot and cold water supply check valves, and adjustable threaded wall flanges.

D. Accessories:

1. 5 feet of 1/2 inch diameter plain end reinforced rubber hose.

2. Hose clamp hanger.

3. Mop hanger.

4. 20 ga. stainless steel splash catcher panels for all adjacent walls.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that walls and floor finishes are prepared and ready for installation of fixtures.

B. Verify that electric power is available and of the correct characteristics.

C. Confirm that millwork is constructed with adequate provision for the installation of counter top lavatories and sinks.

3.2 PREPARATION

A. Rough-in fixture piping connections in accordance with minimum sizes indicated in fixture rough-in schedule for particular fixtures.

3.3 INSTALLATION

A. Install each fixture with trap, easily removable for servicing and cleaning.

B. Provide chrome plated rigid supplies to fixtures with hand wheel stops, reducers, and escutcheons.

C. Install components level and plumb.

D. Install and secure fixtures in place with wall carriers and bolts.

E. Solidly attach water closets to floor with lag screws. Lead flashing is not intended hold fixture in place.

F. Install handicap valve handles to the accessible side.

G. Provide HandiLav or approved equal molded trap and supply insulation kit for all exposed drain and supply handicap lavatories.

H. Install a check valve in the hot and cold water supply lines at every service sink.

3.4 INTERFACE WITH WORK OF OTHER SECTIONS

A. Review millwork shop drawings. Confirm location and size of fixtures and openings before rough-in and installation.

3.5 ADJUSTING

A. Adjust stops or valves for intended water flow rate to fixtures without splashing, noise, or overflow.

3.6 CLEANING

A. Clean plumbing fixtures and equipment.

3.7 PROTECTION

A. Protect installed products from damage due to subsequent construction operations.

B. Repair or replace damaged products before Date of Substantial Completion.

3.8 SCHEDULES

A. Fixture Heights: Install fixtures to heights above finished floor as indicated.

1. Water Closet Flush Valves:

a. Standard: 11 inches min. above bowl rim.

2. Lavatory:

a. Standard: 31 inches to top of basin rim.

b. Accessible: 34 inches maximum to top of basin rim.

B. Minimum fixture rough-in sizes or as required for particular fixtures.

1. Water Closet (Flush Valve Type):

a. Cold Water: 1 Inch.

b. Waste: 4 Inch.

c. Vent: 2 Inch.

2. Lavatory:

a. Hot Water: 1/2 Inch.

b. Cold Water: 1/2 Inch.

c. Waste: 1-1/2 Inch.

d. Vent: 1-1/4 Inch.

3. Sink:

a. Hot Water: 1/2 Inch.

b. Cold Water: 1/2 Inch.

c. Waste: 1-1/2 Inch.

d. Vent: 1-1/4 Inch.

4. Service Sink:

a. Hot Water: 1/2 Inch.

b. Cold Water: 1/2 Inch.

c. Waste: 3 Inch.

d. Vent: 2 Inch.

5. Shower:

a. Hot Water: 1/2 Inch.

b. Cold Water: 1/2 Inch.

c. Waste: 2 Inch.

d. Vent: 2 Inch.

END OF SECTION