The General Provisions of the Contract including the General and Supplemental Conditions and General Requirements apply to the work in this section. Before submitting a bid, examine documents of all other trades, visit the site and get acquainted with all conditions that may in any way affect the execution of this contract. Contractor shall obtain and pay for all permits, certificates of inspection and approvals required. Submittal of a bid indicates that the contractor has examined the drawings, specifications, and had an opportunity to visit the site to be able to provide a comprehensive complete bid to include providing all materials, labor, tools, and equipment required to provide

Clearly state all full load amps (FLA), voltages and model numbers on all submittals. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories. Provide wiring diagrams: For power, signal, and control wiring.

APPLICABLE STANDARDS

complete plumbing systems as outlined in Division-22.

the following, but not limited, applicable local and municipal utility standards, rules and regulations, plumbing codes and statutes having jurisdiction. All plumbing fixtures, equipment, accessories, and appurtenances shall be NSF/ANSI 61-372 compliant. New York Building Code; New York Plumbing Code; American Society for Test Materials (ASTM); National Sanitation Foundation (NSF); American Standards Association (ASA); Underwriters Laboratories (UL); National Fire Protection Association (NFPA);

The installation of all plumbing work shall conform to all

National Electric Code (NEC); PLANS AND SPECIFICATIONS Obtain the latest owner design and construction standards document(s). Comply with all owner-specific requirements in addition to requirements set forth in these specifications and accompanying drawings. Should there be a conflict, the owner's standards shall take precedence, unless prevailing codes and regulations

mandate otherwise. The drawings that accompany these specifications are diagrammatic. Wherever possible make use of submittal data and verify all dimensions on site. Provide additional fittings as required by site conditions and codes at no additional cost to conform to the structure, avoid obstructions, provide required service clearances and preserve headroom. Do not scale from drawings, all measurements should be taken in the field. **EXISTING CONDITIONS**

Where new plumbing systems are required to be connected to existing plumbing systems, provide all camera scoping and dye testing necessary to verify the exact location, size, invert elevation, pressure, pipe integrity, and system type to ensure a proper connection is executed. The contractor shall notify the engineer immediately if it is found a proper connection cannot be

CUTTING, PATCHING AND DEMOLITION The contractor shall be responsible for damages to the grounds, walks, road, building, piping systems, electrical systems, and their equipment and contents, caused by leaks in the piping systems being installed or having been installed by him. The contractor shall repair at his expense all damaged so caused. All repair work shall be done as directed by and in such manner as satisfactory to the

Owner reserves the right to make emergency repairs as required to keep equipment in operation without voiding the contractor's guarantee bond nor relieving the contractor of his responsibilities during the bonding period. Cut and drill all openings in roofs, walls, and floors required for the installation. Neatly patch all openings cut. Hold cutting and patching to a minimum by arranging with other contractors for all sleeves and openings before construction is started. When drilling/cutting concrete slabs, utilize ground penetrating radar (GPR) and/or X-ray scanning equipment to verify the location is free from obstructions, including but not limited to: structural rebar/strands/tendons, electrical conduit/wiring, and/or

piping/ductwork.

EXCAVATION AND BACKFILL Perform all excavation and backfilling required for this work. Contractor shall consult with utility company prior to beginning excavation. At a minimum, all piping shall be laid on a bed of sand, 6" deep, well tamped into place and properly graded to permit the pipe to have an even bearing throughout its entire length. Sand shall be installed around the piping in 6" lifts to a point 6" above the WARRANTY

This contractor shall warrant that all work under this section shall be free of defective work, materials and parts for a period of one year after acceptance of the work and shall repair, revise, and replace, at no cost to the owner, any such defects occurring within the warranty period. Use of Electronic Drawings from the Owner's Design

If expressly permitted by the Owner and the terms of the Contract, editable electronic drawings may be made available for the creation of shop and as-built drawings upon request. Drawings will be made available at the discretion of the Engineer. "Request Drawings" form can be accessed, filled out and submitted at http://www.klhengrs.com (right hand side of page -Contractor Resources). Direct access to this form can be found here: http://files.klhengrs.com/requestdrawings.html

22 05 03.00 - SUBMITTALS FOR PLUMBING Provide submittals in accordance with the Contract Documents. In addition to Division 01, the Contractor is

advised to review and comply with the requirements articulated within each Division and within each section of that Division. Some Divisions may include a division-specific "Submittal Requirements for" section. Where this section exists, it articulates additional requirements for submittals that apply to the work of that Division. The following requirements help to identify, track and keep the project organized for all parties involved. They are necessary to ensure a timely turnaround and an appropriate technical review. Submittals that do not

conform to the administrative requirements are rejected and returned, without technical review. Supply submittals for each section: Submittals shall be supplied on a section-by-section and type-by-type basis. For example, independent product data submittals shall be furnished for each section that requires product data submittals. Independent shop drawing submittals shall be furnished for each section that requires shop drawings. Separate PDF file packages shall be supplied for each section, for each submittal type. Each PDF shall represent a single standalone submittal. Include a transmittal: Transmittals shall enumerate each submittal for each section of each type and iteration. Include cover sheet / title page: The cover sheet shall

include the information identified in the contract documents. It shall be included as the first page of each electronic and/or hardcopy document-based submittal. An editable and printable PDF form created with editable fields and specification compliant appearance is available from KLH upon request. It is also downloadable from the KLH website at www.klhengrs.com. Include an index: The index shall enumerate the contents

of the submittal. Include checklists: Where checklists are included with the specifications, complete and include them within the appropriate submittal. Supply complete submittals: Complete submittals of each type are required. Partial submittals will be rejected. Where a section requires a product data submittal, all product data for that section shall be supplied together, at one time, as one complete submittal. When resubmittal is required (e.g. Revise and Resubmit) the revised submittal shall be more complete, more accurate and more contract-compliant than its rejected predecessor. The submittal number (for each section and type) shall increment for each subsequent submittal (00 – Original submission, 01 – First Resubmission, 02 – Second Resubmission, etc...).

Resubmittals shall include a copy of the reviewers comments supplied with the prior submittal rejection and shall be amended with a description of the specific action taken to comply with the reviewer's comments. The absence of this on resubmittal is cause for rejection. Name electronic files to match the submittal ID and cover sheet: The electronic file name of submittals shall match the submittal ID included on the submittals cover page. For example: The original/first product data submittal for Section 220523 would be labeled as "220523.00-PD-00"; the first resubmittal of same shall be labeled "220523.00-PD-01". The original/first shop drawings submittal file for the same section would be labeled "220523.00-SD-00"; the first resubmittal of same shall be labeled "220523.00-

If expressly permitted by the Owner and the terms of the Contract, editable electronic drawings may be made available for the creation of shop and as-built drawings upon request. Drawings will be made available at the discretion of the Engineer. 'Request Drawings" form can be accessed, filled out and submitted at http://www.klhengrs.com (right hand side of page - Contractor Resources). Direct access to this form can be found here: http://files.klhengrs.com/requestdrawings.html

22 05 23.00 - GENERAL DUTY VALVES Submittal Requirements Product Data: For each type of product indicated.

Provide stops or isolation valves on domestic water supplies to isolate hot and cold water to each fixture, including all equipment and equipment provided by others. Access shall be provided to all valves. Provide fire-rated access panel(s) to maintain full access to concealed

Ball valves - 2 inch and smaller: Lead-Free, 150 psi @ 250°F minimum pressure rating, cast bronze body, blowout-proof stem Butterfly Valves - 3" and up: Ductile Iron Butterfly Valve, 200 WOG, Lug Body, Lever Operator. Approved Manufacturers: Milwaukee Valve, NIBCO, and Watts Water Technologies Co. Valves to conform to: MSS-SP-110 Type I/ MSS-SP-67 Type I. NSF/ANSI -61/372. Check valves - to be same size as system piping it accompanies. Lead-free, bronze body, 250 WOG, nonshock, spring check valve. Conforms to the following

22 05 29.00 – HANGERS AND SUPPORTS FOR PLUMBING PIPING AND EQUIPMENT

standard(s): MSS-SP-80 I, NSF/ANSI -61/372

GENERAL Provide hangers, supports, clamps, attachments, and structural steel members where required to support piping and equipment from building structure. Support of piping from the decking or equipment is Arrange for grouping of parallel runs of horizontal piping supported together on field-fabricated, heavy-duty trapeze hangers where possible. Trapeze hangers shall conform to: MSS SP-69, Type 59. Horizontal-Piping Clamps:

Provide Carbon- or Alloy-Steel, Double-Bolt Pipe Clamps (MSS Type 3) for suspension of pipes requiring clamp flexibility and up to 4 inches of insulation. Vertical-Piping Clamps: Provide extension pipe or Riser Clamps (MSS Type 8) for support of pipe risers. Hangers shall be sized to allow insulation to pass through unobstructed. Hanger and support types:

Hangers: Provide adjustable, Steel Clevis Hangers (MSS Type 1) for suspension of noninsulated or insulated, stationary pipes. Horizontal-Piping Clamps: Provide Carbon- or Alloy-Steel, Double-Bolt Pipe Clamps (MSS Type 3) for suspension of pipes requiring clamp flexibility and up to 4 inches of insulation. Vertical-Piping Clamps: Provide extension pipe or Riser Clamps (MSS Type 8) for support of pipe

Hangers: Provide adjustable, Steel Clevis Hangers (MSS Type 1) for suspension of noninsulated or insulated, stationary pipes. Horizontal-Piping Clamps: Provide Carbon- or Alloy-Steel, Double-Bolt Pipe Clamps (MSS Type 3) for suspension of pipes requiring clamp flexibility and up to 4 inches of insulation. Vertical-Piping Clamps: Provide extension pipe or Riser Clamps (MSS Type 8) for support of pipe

Hanger and support types:

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Riser Clamps (MSS Type 8) for support of pipe

Hangers and supports shall be placed at all changes in direction, valves and equipment. The maximum horizontal spacing of cast-iron pipe hangers can be 10' where 10-foot lengths of pipe are Piping shall also be supported at each change in direction,

valves and equipment. Clevis-type hangers shall and supports shall conform to: MSS SP-58, Type 1-58.

22 05 53.00 - IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT Provide self-adhesive pipe labels with white background

and black lettering, contact type with permanent adhesive backing. Include identification of piping service using same designations or abbreviations as used on the drawings and an arrow indicating flow direction. **EQUIPMENT** Provide self-adhesive plastic equipment labels with white background and black lettering, contact type with permanent adhesive backing, 160 degree F temperature. Include equipment's drawing designation and specification section number where equipment is specified.

22 07 19.00 – PLUMBING SYSTEM INSULATION

Insulation shall be listed and labeled per ASTM E 84 for plenum installations employing slip on techniques. Provide insulation materials, accessories, and finishes with smooth, straight, and even surfaces; free of voids throughout the length of piping including fittings, valves, and specialties. Surface Preparation: Clean and dry surfaces to receive insulation. Remove materials that will adversely affect

insulation application. PIPING SYSTEMS REQUIRING INSULATION Insulate domestic cold water piping, associated fittings and valves with flexible elastomeric 1/2" wall thickness Insulate domestic hot water piping, associated fittings and

fiberglass insulation or per local energy code, whichever Insulate domestic hot water return piping, associated fittings and valves with 1" wall thickness insulation or per local energy code, whichever greater. Insulate waste piping above ceilings that receive condensate with 1/2" wall thickness insulation.

valves with 1" thick flexible elastomeric, 1-1/2" thick

Insulate exposed sanitary drains, domestic water, domestic hot water, and stops for plumbing fixtures for people with disabilities. FLEXIBLE ELASTOMERIC INSULATION Closed-cell, sponge- or expanded-rubber materials. Comply with ASTM C 534, Type I for tubular materials and Type II for sheet materials. Adhesives, Sealers, and Protective Finishes: As recommended by insulation manufacturer for applications

Manufacturers: Subject to compliance with requirements, available products that may be incorporated into the work include, and are limited to, the following: Aeroflex USA, Inc.; Aerocel., Armacell LLC; AP Armaflex.,K-Flex USA; FIBERGLASS INSULATION Fiberglass piping insulation: ASTM C 547, Class 1

Encase pipe fittings insulation with one-piece pre-molded PVC fitting covers. Vapor Barrier Material: Paper-backed aluminum foil, except as otherwise indicated, strength and permeability rating equivalent to adjoining pipe insulation jacketing. Staples, Bands, Wires, and Cement: As recommended by insulation manufacturer for applications indicated. Adhesives, Sealers, and Protective Finishes: As recommended by insulation manufacturer for applications

indicated. Manufacturers: Subject to compliance with requirements, available products that may be incorporated into the work include, and are limited to, the following: Armstrong World Industries, Inc., Owens-Corning Fiberglass Corp., Johns Manville.

ADHESIVES Materials shall be compatible with insulation materials. jackets, and substrates and for bonding insulation to itself and to surfaces to be insulated, unless otherwise indicated

Insulation for handicap accessible fixtures All handicap lavatory p-trap and angle stop assemblies shall be insulated with trap wrap protective kit manufactured by Proflo model PF202WH or equal. Abrasion resistant, anti-microbial vinyl exterior cover shall be smooth. For traps, the insulation shall have a cleanout nut cap to allow service to the trap without disassembly. For stops, the insulation shall have a lock lid that prevents tampering but allows access without removal of the insulation. Fasteners shall remain substantially out of Manufacturers: subject to compliance with requirements: Proflo, Truebro, Plumberex

22 11 16.00 – DOMESTIC WATER PIPING Submittal Requirements

Product Data: For each type of product indicated. GENERAL Install piping concealed from view unless noted otherwise, free of sags and bends. Do not enclose, cover, or put piping into operation until it has been inspected and approved by authorities having jurisdiction. Clean and disinfect potable domestic water piping using approved procedures by authorities having jurisdiction or AWWA C651, whichever is more rigorous. Install at right angles; diagonal runs are prohibited unless otherwise shown. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal. Coordinate all piping with all other trades. Provide water pressure regulators where necessary to limit the incoming water pressure to 80 psi inside the

DOMESTIC WATER PIPING ABOVE GROUND Hard copper tube, ASTM B 88, Type L; wrought-copper, solder-joint fittings; and soldered joints. Solder Filler Metals: ASTM B 32, lead-free alloys. Flux: ASTM B 813, water flushable. Type "L"; copper pressure-seal joint; and pressure-seal joint systems. CATHODIC PROTECTION Provide dielectric insulation at points where copper or brass pipe comes in contact with ferrous piping,

22 11 23.00 - RECIRCULATION DOMESTIC WATER

reinforcing steel or other dissimilar metal in structure

Submittal Requirements Product Data: For each type of product indicated. Hot-water circulating pump shall be constructed of the following: in-line wet-rotor, lead-free bronze body, plastic impeller, with ceramic bearings. Working pressure to be a minimum 125 psig with a maximum continuous operating temperature of 220° F. Pump shall be controlled with an aquastat and timer. Aguastat: Electric; surface mounted sensing element. Adjustable temperature control of hot-water circulation from 65 to 200 °F.

Timer: Electric; for control of hot-water circulation Programmable type, seven-day, twenty-four hour clock with manual override on-off switch. Programmable for preset times during the day for each day for seven days. Approved Manufacturers: Armstrong Pumps Inc, Bell & Gossett/Goulds Water Technology; Xylem Inc., Taco inc., Honeywell International inc. Pumps shall conform to: UL 778, NSF 61/372 CONNECTIONS On water heating systems with separate storage tanks, interlock pump between water heater(s) and hot-water storage tank(s) with water heater burner and time-delay

22 13 16.00 - SANITARY, WASTE AND VENT PIPING SYSTEM

Submittal Requirements Product Data: For each type of product indicated. **GENERAL** Provide a complete soil, waste and vent system in the building and on the site as indicated on the drawings and as specified herein. Above ground soil, waste and vent piping within buildings including soil stacks, vent stacks, horizontal branches, traps, and connections to fixtures and drains. Underground building drain piping including mains branches, traps, connections to fixtures and drains, and connections to stacks, terminating at connection to existing sanitary sewer. INTERIOR PIPING ABOVE GRADE No-Hub cast iron soil, waste, and vent piping and fittings

1-1/2" and larger shall conform to ASTM A-888. Pipe couplings shall conform to ASTM C 1277 and CISPI 310. Piping alignment shall be as indicated on the drawings using approved wye branches or eight bands for direction changes and shall be surely supported or secured to maintain such alignment. Soil, waste and vent piping smaller than 1-1/2" shall be Type "M" copper and conform to ASTM B-306. BELOW GRADE PIPING Solid wall schedule 40 PVC pipe and fittings 2" and larger shall conform to ASTM D 2665 / ASTM D 1785 DWV. Fittings shall conform to ASTM D 2665, made to ASTM D, DWV patterns and fit schedule 40 pipe. Piping alignment shall be as indicated on the drawings using approved wye branches or eight bands for direction changes and shall be surely set and buried to maintain such alignment. Soil, waste and vent piping smaller 1-1/2" and smaller

Protection shall be given to all footings and other structural elements during underground work adjacent to such items. Refer to architectural and/or structural drawings for locations. Vent all fixtures, connect branch vents to main vent risers at least six inches above flood rim of fixtures. Pitch vent lines back to soil or waste pipe, free of drops and sags. Cleanouts shall be full size of pipe up to 4", and 4" for larger sizes. For underground and concealed lines, provide cleanouts in accessible positions at each right angle turn and at intervals not to exceed fifty feet. In

floors, install flush with finish floor with extension pipe from

below grade shall not be permitted

cleanout wye.

Slope piping according to local codes.

22 30 01.00 - POINT OF USE THERMOSTATIC MIXING

Submittal Requirements Product Data: For each type of product indicated. Thermostatic mixing valves shall be provided for all public hand washing sinks and lavatories and shall be ASSE 1070 listed, lead free, sweat connections, 125 psi operating pressure. Mount under sink or lavatory. Set

outlet temperature of thermostatic mixing valve to 105 Point-of use thermostatic mixing valves shall be equal to Powers LFG480. Route tempered water to hot water side of sink and lavatories. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the work include, and are limited to, the Symmons, Acorn Engineering, Powers, Bradley

22 33 00.00 - COMMERCIAL ELECTRIC, DOMESTIC WATER HEATERS Submittal Requirements Product Data: For each type of product indicated. Provide commercial electric tank type water heater as scheduled. Comply with UL 1453 Standard. Provide corrosion resistant metal drain pan with raised edges at the base of the water heater and include drain Provide field fabricated piping heat trap arrangement according to ASHRAE/IESNA 90.1. Provide combination temperature and pressure relief valve, ASME rated and stamped with relieving capacity at least as great as heat input and pressure setting less than water heater's rated operating pressure. Provide water heater stands or mounting brackets with manufacturer's factory fabricated steel capable of supporting water heater. Provide steel pressure-rated thermal expansion tank constructed with welded joints and factory-installed butyl rubber diaphragm, pre-charged to minimum system operating pressure at tank. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the work include, and are limited to, the Bock Water Heaters, Bradford White Corp., Lochinvar Corp., State Industries.

22 40 00.00 - PLUMBING FIXTURES Submittal Requirements

Product Data: For each type of product indicated. Refer to plumbing fixture schedule and install per the manufacturer's installation and operation manual. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the work include, and are limited to, the American Standard, Kohler Co., Zurn Industries, LLC.

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