

DIVISION 15 - MECHANICALSECTION 15000 - GENERAL MECHANICAL REQUIREMENTSPART 1 - GENERAL1.01 SUMMARY

- A. This section shall apply to all phases of work indicated in contract drawings or required to provide for a complete installation of mechanical systems included in this project.

1.02 GENERAL DESCRIPTION

- A. This section applies to all Sections of DIVISION 15 - MECHANICAL, of this project specification, unless specified otherwise in the individual sections.
- B. The building shall be occupied during construction and all outages shall be coordinated with HCDA. Work area shall be kept clean on a daily basis.
- C. Install all new hot water recirculating piping from parking level P2 up to Heater room on rooftop to the maximum extent possible prior to any outage. Pressure test the new piping prior to connection to the existing hot water system. Once the new 1 1/4" hot water return line is tied into the existing hot water system, cut and cap the existing 1 1/4" hot water return piping on rooftop.

1.03 GENERAL REQUIREMENTS

- A. Provide all work described by the drawings and specifications, including work specified and not indicated, and work indicated and not specified.
- B. Completely examine the drawings and specifications and report to the HCDA (Hawaii Community Development Authority) Engineer any error, inconsistency, omission, or error in the work of others affecting the mechanical work. If the Contractor proceeds with the work affected without instructions from the HCDA Engineer, he shall correct or pay for any resultant damage or defect.
- C. Provide all supplementary or miscellaneous items, details, appurtenances and devices incidental to or necessary for a complete operating system where work required is not specifically indicated or specified.
- D. Maintain at the job site one copy of all drawings, specifications, addenda, approved shop drawings, change orders, and other modification, in good order and marked to record all changes made during construction. These documents shall be made available to the HCDA Engineer.
- E. The Contractor shall schedule a date and time with the HCDA, a minimum

of 7 days in advance, for all testing.

- F. Reference to standards and publications are intended to be the latest revision of the standard or publication. In each of the publications referred to herein, consider the advisory provisions to be mandatory, as though the word, "shall" had been substituted for "should" wherever it appears.
- G. The words "or approved equal", or other words of similar intent or meaning, means that the equipment or material to be substituted is subject to review by the HCDA Engineer and must be acceptable to the HCDA.

1.04 QUALITY ASSURANCE

- A. City, State, Federal and Industry Regulations: Comply with the City and County of Honolulu building, fire and plumbing codes; State of Hawaii Department of Health and Department of Labor and Industrial Relations Regulations; U.S. Occupational Safety and Health Act; U.S. Environmental Protection Agency Regulations; National Fire Protection Association Codes; and other laws, codes and regulations, and ordinances and manufacturer's recommendations and requirements, when applicable and as referenced in these specifications. The Contractor shall schedule and pay for all inspections required by any government agency.
- B. Permits: Obtain all permits and pay all fees required by the applicable government agencies. Schedule all inspections with City inspector as required upon completion of work.
- C. Warranty: Warrant all equipment and material furnished, and workmanship of the mechanical systems for a period of one year starting only after 30 consecutive days of trouble free operation after system acceptance. Submit the manufacturer's warranty documents for all equipment furnished to the HCDA. The warranty shall cover all labor and material required to correct, replace, or repair any defective item at no cost to the HCDA.
- D. Material Qualifications: Provide materials and equipment that are standard products of manufacturers regularly engaged in the manufacture of such products, which are of a similar material, design and workmanship. Preference should be given to products made or manufactured in the United States of America.

1.05 SUBMITTALS

Submit in accordance with - SUBMITTALS.

- A. Submit five (5) copies of each required submittal to the HCDA Engineer. Photographs of existing installations and data submitted in lieu of catalog data are not acceptable and will be returned without review. Partial submittals are not acceptable and will be returned without review.

- B. At the time the submittals are submitted, the Contractor shall inform the HCDA Engineer, in writing, of any deviation in the shop drawings and other submittals from the requirements of the contract documents.
- C. Manufacturer's Catalog Data: Submittals for each manufactured item shall be current manufacturer's descriptive literature of cataloged products, equipment drawings, diagrams, performance and characteristic curves and catalog cuts.
- D. Shop Drawings
 - 1. Submit drawings a minimum 22 by 34 inches in size, using a minimum scale of 1/8 inch per foot. Include floor plans and installation details of piping indicating proposed location, layout and arrangement of items of accessories, piping and other items that must be shown to ensure a coordinated installation. Indicate locations of items requiring maintenance or inspection. Drawings shall indicate adequate clearance for operation, maintenance, and replacement of equipment devices.
 - 2. Provide a written certification with the shop drawing submittal stating that the Contractor has determined and verified all field measurements, sizes and obstructions, and that he has coordinated the shop drawings with the field conditions and the work of other trades.
- F. Certificates of Compliance: Submit a certificate of compliance from the manufacturer for approval for products, finishes, and equipment as specified in the technical sections whose compliance with organizational standards or specifications is not regulated by an organization using its own listing or label as proof of compliance. The certificate shall identify the manufacturer, the products, equipment, or materials and the referenced standard and shall simply state that the manufacturer certifies that the product conforms to the requirements specified.
- G. Reference Standards Compliance: Where equipment or materials are specified to conform to industry and technical society reference standards of organizations such as the American National Standards Institute (ANSI), American Society for Testing and Materials (ASTM), National Electrical Manufacturers Association (NEMA), American Society of Mechanical Engineers (ASME), American Gas Association (AGA), American Refrigeration Institute (ARI), and Underwriters Laboratories (UL), submit proof of such conformance. If an organization uses a label or listing to indicate compliance with a particular reference standard, the label or listing will be acceptable evidence, unless otherwise specified in the individual sections.
- H. Independent Testing Organization Certificate: In lieu of the label or listing, submit a certificate from an independent testing organization, competent to

perform testing and approved by the HCDA. The certificate shall state that the item has been tested in accordance with the specified organization's test methods and that the item complies with the specified organization's reference standard.

- K. As-Built Drawings: Submit four (4) sets of as-built drawings in CD format to the Engineer prior to final inspection.

1.06 DELIVERY, STORAGE AND HANDLING

Handle, store, and protect equipment and materials to prevent damage before and during installation in accordance with the manufacturer's recommendations, and as approved by the HCDA. Replace damaged or defective items.

1.07 POSTED OPERATING INSTRUCTIONS

- A. Provide for each system and principal item of equipment as specified in the technical sections for the use of the operation and maintenance personnel. Include the following in the operating instructions.
- B. System Descriptive Information: Wiring diagrams, control diagrams, piping diagrams, control sequence and operating points for each principal system and item of equipment. Post instructions where indicated.
- C. Start up, proper adjustment, operating, lubrication and shutdown procedures.
- D. Safety precautions, procedure in the event of equipment failure.
- E. Other areas as recommended by the manufacturer of each system of item of equipment.

PART 2 - PRODUCTS

2.01 MATERIALS AND EQUIPMENT

All materials and equipment shall be new and free from defects.

PART 3 - EXECUTION

3.01 FIELD PAINTING

- A. Conform to Section 09900 - PAINTING. Provide labels/signs for all piping including isolation valves, hot water return piping, and drain lines.
- B. The following items furnished under this section are to be painted and

identified under Section 09900 - PAINTING. Do not paint over name plates or other identifying labels.

1. Paint exposed black iron work including pipe, fittings, iron body valves, pipe hangers, etc., with two coats of zinc rich paint.
2. Stencil all exposed piping with painted black letters indicating the service and with an arrow indicating the direction of flow. Stencil where pipes enter and leave each area and at not over 30 ft. intervals within an area. Paint color band at stencils; green for water systems. Width of color band, size of legend letters, and position of legend shall conform to the requirements of ANSI A13.1, Scheme for the Identification of Piping Systems.

3.02 OPENINGS, CUTTING AND PATCHING

- A. The Contractor shall be responsible for the cutting, drilling and patching of walls, partitions, floors, roofs, ceilings and other building structures, required for the installation of piping, conduits and other material equipment. This work may be subcontracted to other Contractors, or arranged to be performed by the General Contractor.
- B. Holes through existing concrete and existing masonry shall be sawcut or core drilled. Holes through new concrete and masonry shall be provided with sleeves. Holes through other building materials shall be sawcut or core drilled and provided with sleeves.

3.03 PIPING INSTALLATION

Conform to the requirements of the Uniform Plumbing Code and all manufacturer's recommendations. Inspect all pipes inside and outside. Remove interior obstructions and ream out pipe ends. Tool markings on polished fittings are not acceptable. Cut pipe accurately so that it can be worked into place without springing or forcing. Install pipes parallel to the wall of the structure and plumb. Make changes in direction with fittings. Bushings are not permitted. Pull-tees are not permitted. Install valves with stems above horizontal. Provide proper support and adequate provisions for expansion, contraction, slope and anchorage. Provide dielectric unions or separation at all dissimilar metals. Wrap pipe or tubing with 1/4-inch thick felt, secured with tape, where they contact other materials. Have piping treated, inspected and approved before it is furred in, buried or otherwise hidden. Provide standard weight galvanized steel pipe sleeves for all pipes passing through structure, sufficiently large to provide 1/4-inch clearance around pipe. Caulk watertight around pipes passing through sleeves. Wrap pipe with polyethylene tape where it passes through sleeve and when it contacts concrete or masonry. Grout with fire proof material around all pipe penetrations through slabs and walls full length of penetrations. Provide chrome plated brass escutcheons, set tight on the pipe and to the wall where pipes are exposed in finished areas. Provide clamping collar or membrane flange where pipe or drains penetrate waterproof membrane. Perform all welding

using qualified welders in accordance with American National Standards Institutes Code B31.1 and American Welding Society Standard B3.0. Soil for bedding and backfill shall be tested for soil resistivity. If soil resistivity is less than 20,000 ohms-cm, provide cathodic protection of underground steel (including gas) and copper lines. Coordinate all pipe openings in prestressed tri-tree concrete flooring.

3.04 FIELD TESTS

The Contractor shall provide all labor, material, equipment, and instruments needed for the tests. During pressure test, all items in the system to be tested, which are not designed for the test pressure shall be removed or isolated from the system, and shall be reconnected or unblocked after the tests are completed.

If operating tests require the supervision of the manufacturer's representative, the Contractor shall assist the representative by providing any labor, material, or equipment needed by the representative.

3.05 CLEANUP AND CLEANING

The Contractor shall keep the premises free from accumulation of waste materials or rubbish caused by his operations. At the completion of the work, he shall remove all his waste materials, and rubbish from the project site as well as his tools, construction equipment, and surplus materials. Clean all new equipment and materials prior to final inspection.

3.06 GUARANTEE AND CERTIFICATE

A. The Contractor shall guarantee and certify in writing the following items:

1. All equipment and material furnished for a period of one (1) year commencing after date of acceptance of the work as a whole by the Project Engineer, against all defects in material and workmanship. If any equipment, piping or material fails, does not operate satisfactorily or shows undue wear, the Contractor will be notified, and shall be required to correct the defect and damage to other work caused by such defect, immediately and at no additional cost to the HCDA.
2. All equipment, piping and materials to provide the results specified or shown.
3. All equipment and fixtures to be properly installed in strict accordance with manufacturer's recommendations.
4. All piping to be drip free and properly installed.

B. The above guarantee shall not be interpreted as voiding, limiting or reducing any equipment manufacturer's warranty of any guarantee permitted by law.

- C. The HCDA shall have the right to require a written certificate, dated and signed by a responsible employee of the Contractor, evidencing the performance of any portion of the work, or any testing; as a condition precedent to the acceptance of any work or the result of any test. Whenever a regulatory agency performs inspections or tests of any portion of the work, a certificate shall be furnished by the Contractor that the inspection or test was satisfactorily passed.
- D. The Contractor shall be held responsible for all damages to any part of the premises, building or contents caused by leaks or other defects in pipe, fixtures, equipment or materials provided under this specification for a period of one (1) year after date of acceptance of the work as a whole by the Project Engineer.
- E. Terms of this guarantee are in addition to other guarantee provisions of the specifications, and do not substitute for other more stringent terms, if any.
- F. Cleanup and Work Practices: The Contractor shall keep the job site free of debris, litter, discarded parts and materials, etc. and shall clean all oil drippings during the daily progress of work. The Contractor shall remove all tools, parts, and equipment from the service areas upon completion of the work.

The Contractor shall exercise caution during the progress of his maintenance and repair work to prevent damage to the ceilings, roofing and other building structure. The Contractor shall restore all damages, caused by his negligence, to its original condition, at his own expense.

END OF SECTION

DIVISION 15 - MECHANICALSECTION 15400 - PLUMBINGPART 1 - GENERAL1.01 SUMMARY

- A. Provide all labor and materials, service and equipment to complete the plumbing work as indicated on the drawings and/or specified herein.
- B. It shall be the responsibility of the Contractor to examine the project site and determine for himself the existing conditions.

1.02 CONTRACT DRAWINGS

- A. Contract drawings are diagrammatic, indicating general layout and approximate locations towards establishing the scope for uniform estimating basis for all bidders. Drawings are not intended to be detailed construction working drawings; they do not show every offset, bend, elbow, etc., required for installation in the space provided. All locations, dimensions and finish conditions for mechanical work shall be checked and coordinated with the shop drawings.
- B. Resolve all discrepancies between the plans and specifications of this Division, or between the plans and specifications of this Division versus those of other trades with the Hawaii Community Development Authority (HCDA) Engineer before proceeding with the work.
- C. Reasonable modifications to indicated locations and arrangement to suit job conditions shall not constitute a basis for requesting additional compensation.
- D. Work in this section must be coordinated with other trades to provide a properly installed and properly functioning system.

1.03 REQUIRED SUBMITTALS

- A. Submit in accordance with SUBMITTALS.
- B. Equipment/Materials Data and Shop Drawings: Prior to start of any installation, submit five (5) bound copies of shop drawings and equipment/materials data for all work to the HCDA Engineer for review. Contractor agrees that the purpose of equipment/materials data and shop drawings submittal is to demonstrate to the HCDA Engineer the Contractor's understanding of the design concept by indicating which materials he intends to furnish and install and the fabrication and installation methods he intends to use.

- C. Equipment/Materials Data: Submit five (5) bound copies of brochures or catalog cuts together with a cover sheet listing the items, manufacturers, and model numbers. Submit all items at one time; incomplete submittals are not acceptable and shall be returned without review. Submittal shall be clearly designated as to the intended item with identification (unit number or other marking) to show location, service, and function.
- D. Shop Drawings: Submit five (5) bound copies of shop drawings. Shop Drawings shall use a minimum scale of 1/8 inch per foot on drawing sheets the same size as contract drawings. Include floor plans, installation details of piping, and identifying and indicating proposed location, layout and arrangement of items of piping, and other items that must be shown to ensure a coordinated installation. Demolition work shall indicate proposed methods and sequence of operations. Include coordination for temporary shut-off and continuation of utility services as required. Drawings shall indicate adequate clearance for operation, maintenance. Contract drawings shall not be reproduced and submitted as shop drawings.
- E. Record Drawings: The Contractor shall keep at the jobsite a complete, neat and accurate record of all approved deviations from the contract drawings, shop drawings and specifications, indicating the work as actually installed. At the end of the job all record information shall be transferred to a clean set of reproducible prints.

1.04. PERMITS AND CERTIFICATES

- A. Obtain and pay for all applicable permits, certificates, fees, and inspections required by any public authority having jurisdiction over this work.
- B. The HCDA reserves the right to require a written certificate as a pre-condition to acceptance of work. Certificates shall be dated and signed by a responsible employee of this Contractor as proof of performance of the work.

1.05. CODES, RULES, AND REGULATIONS

- A. All work shall be performed in strict accordance with the applicable provisions of the Building Code and the Plumbing Code of the City and County of Honolulu, Construction Standards of the Board of Water Supply, Regulations of the Fire Marshall and Regulations of the Department of Health of the State of Hawaii.
- B. Where the Contract Documents indicate materials or construction in excess of code requirements, the Contract Documents shall govern.
- C. Should there be any direct conflict between applicable codes and the drawings and/or these specifications, the codes shall govern.

1.06 RESPONSIBILITIES OF CONTRACTOR

- A. Prior to submitting a bid, the Bidder shall examine all drawings and specifications issued and shall visit the site of the work to become familiar with all visible existing conditions, codes, rules, and regulations in effect at the site. As a result of having visited the site, the successful bidder (Contractor) shall be responsible for the installation of the work as it relates to such visible existing conditions.
- B. The Contractor shall verify all dimensions governing the mechanical work and examine adjoining work on which mechanical equipment is dependant and shall report any work that must be corrected. No waiver of responsibility for defective work shall be claimed or allowed due to failure to report unfavorable conditions affecting the mechanical work.
- C. Contractor is assumed to be skilled in his trade and is solely responsible for compliance with health and safety regulations, performing the work in a safe and competent manner, and in installation procedures required for the work outlined in these specifications.

1.07 GUARANTEE

- A. Contractor shall provide a written guarantee that all work is as specified, and shall be bound to reinstall material or equipment defective due to workmanship or materials for a period of one (1) year from the date of final acceptance of the installation by the HCDA except for equipment and materials noted otherwise. Contractor shall not be responsible, however, for defects proven to the HCDA's satisfaction to be due to misuse, accident or negligence by other parties.
- B. Further, Contractor shall be held responsible for all damages to any part of the premises, building or contents caused by leaks or other defects in pipe, fixtures, equipment or materials provided under this specification, for a period of one (1) year from the date of final acceptance of the installation by the HCDA.
- C. Terms of this guarantee are in addition to other guarantee provisions of the specifications, and do not substitute for other more stringent terms, if any.
- D. Existing conditions, materials, sizes and dimensions shown on these drawings represent the best available information obtained from existing drawings and field investigations. Prospective bidders shall visit the premises and familiarize themselves with all work details and conditions before submitting a bid. Reasonable modifications to indicated arrangements to suit actual conditions shall not constitute a basis for requesting additional funds from the HCDA.
- E. Prior to ordering materials the Contractor shall verify all existing conditions, materials, sizes and dimensions that effect their work, and shall coordinate

their work with all crafts involved.

PART 2 - PRODUCTS

2.01 GENERAL

- A. All products, materials, and equipment except as otherwise noted, shall be new and of the best quality available in their respective kinds, free from all defects and shall be of the make and types specified or approved equal. Trade names and manufacturers names denote the character and quality of equipment desired and shall not be construed as limiting competition.
- B. The supplier, by submitting, certifies that the equipment and materials being proposed are proper for the application intended and that equipment has the capacity called for.
- C. All products, materials, and accessories shall be furnished and installed as a complete system ready for the HCDA's beneficial use.

2.05 PIPING MATERIALS

- A. Water Piping, Above Grade: Above ground piping shall be Type "L" seamless rigid copper tubing conforming to ASTM B88 with wrought copper or cast copper alloy solder type fittings conforming to ANSI B16.22 or ANSI B16.18. Solder shall be 95-5 tin-antimony or approved equal.

2.06 HANGERS AND SUPPORTS

Products of Grinnell, Superstrut, B-Line, PHD Manufacturing, or approved equal. Hangers, supports and accessories used shall be applied in accordance with the manufacturer's recommendation for type of service and application. All supports, rods and accessories shall be galvanized. In addition, supports for copper pipe shall be plastic coated. All hangers and supports shall allow for expansion and contraction. Suspended lines shall be suitably braced to prevent vibration and shall maintain required grading by proper adjustment.

2.07 CHECK VALVE

Bronze body, , swing type, renewable disc, screwed cap and ends, 125 psi SWP.

2.08 BALL VALVE

Bronze construction, two-piece body, 600-psi WOG, full-port, insulated quarter-turn handle, double O-ring stem seals, blowout-proof stem, PTFE seats.

2.09 CIRCUIT SETTER VALVES:

Bell & Gossett bronze plug cock with square head, screwed ends.

2.10 STRAINER:

Y-strainers for lines 2" and smaller, bronze body, 20 mesh stainless steel screen, screwed ends, hose end valve, 300 psi WOG.

2.11 SLEEVES

Furnish and install 24-gauge galvanized sheet metal sleeves for all pipes through stud walls and galvanized steel pipe for sleeves through concrete walls. Seal exterior wall sleeve watertight.

2.12 UNIONS

Provide unions at all equipment and accessory locations and at screwed valves. Provide dielectric unions at lines of dissimilar metals. EPCO Model FX or approved equal.

2.13 PIPE INSULATION

Pipe insulation for hot water return piping shall be black flexible elastomeric performed pipe insulation, UL listed 25/50 flame/smoke developed rating. Armstrong standard Armaflex pipe insulation, 3/4-inch thickness or approved equal. All hot water return piping shall be wrapped with 0.016-inch thick aluminum jacketing. Installation of snap and metal bands shall be as recommended by the manufacturer.

2.14 ACCESS PANELS

Access panels for access to valves, etc., shall be hinged, Milcor 12" x 12" or approved equal.

PART 3 - EXECUTION

3.01 GENERAL

- A. Perform work using adequate numbers of personnel skilled in the appropriate trades and provide adequate supervision and management of the work.
- B. All workmanship shall be of the highest standards. The piping system shall be laid out to insure a neat, systematic and orderly arrangement of all work. Vertical piping lines shall be plumb. Exposed pipes, where indicated shall be run parallel with walls.
- C. Obtain approval of shop drawings before proceeding with any fabrication of

materials or installation. Equipment shall be installed and located in conformity to detailed shop drawings.

3.02 PROTECTION OF MATERIALS AND EQUIPMENT

Pipe openings shall be closed with caps or plugs during installation. Equipment shall be tightly covered and protected against dirt, water and chemical or mechanical injury. At completion of the work, materials and equipment shall be thoroughly cleaned and in a condition satisfactory to the HCDA.

3.03 CUTTING AND PATCHING

- A. The Contractor shall arrange for all cutting, fitting and patching necessary to accommodate the plumbing work as the job progresses and such cutting and patching shall be done by that trade experienced in the particular type of work required.
- B. Where cutting framing or structural members is unavoidable, the Contractor shall obtain the approval of the HCDA before proceeding.

3.04 PIPING INSTALLATION

- A. No pipe shall be closed up, furred in, buried or otherwise hidden until it has been inspected, tested, and approved by the Plumbing Inspector and the HCDA. Should any of the work be covered up or enclosed prior to all required inspections and approvals, uncover the work as required and, after it has been completely inspected and approved, make all repairs and replacements with such materials and workmanship as are necessary to the approval of the HCDA and at no additional cost to the HCDA.
- B. All piping shall be inspected inside and out before installation and no obstructions shall be allowed. Pipe ends shall be taper reamed to full I.D. and all burrs removed.
- C. Anchor piping in building with approved clamps. Straps for copper tubing shall be copper or brass or copper plated. Where copper contacts ferrous materials, wrap with two layers of plastic tape.
- D. Provide dielectric unions where copper piping is connected to ferrous pipe.
- E. Install all piping generally level and plumb, free from traps, and in a manner to conserve space for other work.
- F. Piping except where specifically shown otherwise shall be concealed in walls, utility chases, partitions, ceiling spaces and roof spaces. Piping shall be installed to maintain headroom and keep passageways and access openings clear. Where necessary, piping shall offset to maintain the required clearances to coincide with structural features of building.

- G. Escutcheons shall be installed around all exposed pipe passing through a finished floor, wall, or ceiling. Escutcheons shall be of sufficient outside diameter to cover the sleeve opening and shall fit snugly around the pipe.

3.05 HANGERS

- A. Hangers and supports for all pipe work shall be installed to provide for expansion and contraction, prevent vibrations, prevent sags, and maintain required grading by proper adjustment.

- B. Support Spacing:

1. Hangers and supports shall be placed at each offset or change in direction, at ends of branches over five feet in length, at riser pipes and along piping as necessary.
2. Horizontal piping support spacing shall be as follows:

Steel and Copper:	1-1/4" and larger	8 ft.
	1" and smaller	6 ft.
PVC:	1-1/2" - 4"	6 ft.
	4" - 6"	4 ft.

3.06 PIPE INSULATION

Installation shall be performed by skilled mechanics and shall conform to the manufacturer's printed instructions.

3.07 WATER SYSTEM

- A. Cross Connections and Interconnections:

No plumbing devices or piping shall provide a cross connection or interconnection between a distribution supply for drinking or domestic purposes and a polluted supply such as a drainage system or a soil or waste pipe, so as to make possible the backflow of sewage, polluted water, or waste into the water supply system.

- B. Pipe Joints:

1. All joints shall be tight; any joint found leaking when tested shall be completely rejoined and re-tested. Threaded joints shall be made up with approved, non-hardening thread lubricant and screwed tight.
2. Provide dielectric unions where copper tubing connects to steel pipe.

- C. Pipe Testing:

Contractor shall furnish all equipment for tests and any required retests and

pay for all cost of repairing any damage resulting from such tests. Contractor shall adjust systems until they are approved. Tests shall be performed in the presence of, and to the satisfaction of the HCDA and inspector of the HCDA.

1. Water piping shall be tested in accordance with the Plumbing Code. Water piping shall be tested at 150 psig.
2. Any faulty or defective material or installation workmanship discovered at this time shall be replaced by Contractor at no cost to the HCDA.

D. Pipe Disinfection of Water Lines:

1. All domestic hot water and hot water return lines shall be thoroughly flushed and drained after installation. Sterilization shall be accomplished by opening taps at the end of all branches, and slowly filling the system adding liquid chlorine, or hypochlorite solution, to the water until water flowing from all branches indicates not less than 200 P.P.M. residual chlorine; the system allowed to stand for not less than three (3) hours, with all valves opened and closed several times during this period; then drained and thoroughly flushed until all traces of chlorine are eliminated (less than 0.2 P.P.M.) Certificate shall be submitted to the Project Engineer. The Contractor shall be responsible for the proper disposal of chlorinated water to safeguard public health and environment in accordance with applicable Department of Health requirements.

3.08 CLEAN UP AND REPAIRS

- A. Debris shall not be allowed as a result of this work. Upon completion of this work, remove all debris and excess materials, tools, etc., resulting from this work from the jobsite and leave the locations of this work broom-clean and in acceptable manner as approved by the HCDA.
- B. This Contractor shall clean all equipment set by him of oil, grease, stains, etc. All plates, trims, etc., shall be polished.
- C. All equipment piping and lines shall be thoroughly cleaned before leaving the work.

END OF SECTION