SECTION 23 01 00

BASIC HVAC REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

B. Where contradiction occurs between this section, drawing specifications and Division 1, the more stringent of the three shall apply.

1.2 WORK INCLUDED

A. Work includes:

1. Provision of labor, material, equipment and transportation required to complete the Work as shown on the drawings, specified herein and/or implied thereby.

B. Applicable provisions of General Conditions, Supplementary Conditions and all sections in Division No. 1 “General Requirements” govern work under this section.

1.3 DEFINITIONS

A. “Provide” means furnish and install referenced item with all appurtenances.

B. “Shall” indicates a mandatory requirement.

C. “Air Conditioning” is defined as the treatment and/or handling of any air to any degree by the systems shown on the drawings and herein specified and is not restricted to refrigerated cooling.

D. “Or Equal” is defined as approved as equal by the Owner’s Authorized Representative.

1.4 DELIVERY AND STORAGE OF MATERIALS

A. Provide for the safety and good condition of all materials and equipment until final acceptance by the Owner. Protect all materials and equipment from damage from any cause whatever, and provide adequate and proper storage facilities during the progress of the work. Replace all damaged and defective work, material or equipment prior to filing application for final acceptance.

B. Cap or plug openings in equipment, piping, ducts and other systems to exclude entrance of dirt and other foreign material during construction.

C. Material and Equipment storage shall be the contractor’s responsibility. Coordinate the storage of materials and equipment prior to purchasing of materials. Contractor shall store equipment off-site, with delivery and mobilization of new equipment coordinated with hospital staff prior to commencing work.

1.5 CODES AND STANDARDS

A. All work and materials shall be in full accordance with the latest adopted rules and regulations of the Local Fire Marshall; the International Electrical Code (NEC); the Uniform Plumbing Code; local Building Codes and Amendments; the Uniform Mechanical

Code; International Building Code; and other applicable codes, laws or regulations of bodies lawfully empowered and having jurisdiction over this project. In addition, all work shall meet the 2006 Guidelines for Design and Construction of Health Care Facilities, published by The Facilities Guidelines Institute, American Institute of Architects and U.S. Department of Health and Human Services. Nothing in the plans or specifications is to be construed to permit work not conforming to these codes. When codes conflict with one another, provide larger, higher or more restrictive standards without additional costs.

1.6 PERMITS

A. Obtain all permits, patent rights, and licenses that are required for the performing of this work by all laws, ordinances, rules and regulations, or orders of any officer and/or body. Provide all notices necessary in connection therewith, and pay all fees relating thereto and all costs and expenses incurred on account thereof. No work shall be covered before inspection by the jurisdictional authorities and observation by the Architect.

B. Contractor shall coordinate with the AHJ inspection times and processes required for system to be operational within the project limitations.

1.7 EXPLANATION AND PRECEDENCE OF DRAWINGS

A. Drawings and specifications are intended to be read together so that any work mentioned in one and not the other shall be executed the same as if mentioned in both.

B. For purposes of clearness and legibility, drawings are essentially diagrammatic, and, although size and location of equipment are drawn to scale where possible, Contractor shall make use of all data in all the contract documents and shall verify this information at building site. At various locations, systems are drawn distorted for clarity.

C. Where the contract specifications and/or drawings are in conflict, obtain clarification of such during bidding. Clarification will only be given in written addendum form. Where addenda for clarification of such is not timely, base the bid on the higher standards or more restrictive requirements; prior to submission of product submittals, preparation of shop drawings and fabrication, obtain written clarification.

D. The drawings indicate required size and points of termination of piping and ductwork, and suggest proper routes to conform to structure avoid obstructions and preserve clearances. However, it is not intended that drawings indicate all necessary offsets, and it shall be the work of the Contractor to make the installation in such a manner as to conform to the structure, avoid obstructions, preserve headroom and keep openings and passageways clear, without further instructions or cost to the Owner.

E. It is intended that all HVAC devices, piping, etc. be located symmetrically with all architectural elements. All system offsets, unless noted on drawings, shall be rectilinear. Offsets and transitions shall comply with best practices and applicable standards.

F. The Contractor shall fully inform himself regarding any and all peculiarities and limitations of the spaces available for the installation of all work and materials furnished and installed under the Contract. He shall exercise due and particular caution to determine that all parts of his work are made quickly and easily accessible.

G. Submittal of bid shall indicate the Contractor has examined the site, drawings and specifications and has included all required allowances in his bid. No allowances shall be made for any error resulting from Contractor's failure to visit job site and to review drawings and specifications.

1.8 COORDINATION DRAWINGS

A. Prepare coordination drawings at a scale not less than 1/4” equals 1’-0” for all areas of work. Submit and receive approval prior to commencing fabrication and/or installation. Major discrepancies from design documents shall be clearly identified.

B. These drawings shall be mutually prepared by all contractors.

C. If locations arise during construction where multiple disciplinary systems cannot fit in the space allocated as a result of one non-coordinate disciplinary system installation. The general contractor or the subcontractor who fails to coordinate shall be responsible for the system modifications required to make them fit.

D. Where conflicts arise during the completion of the coordination drawings, the general contractor shall determine resolution.

1.9 RECORD DRAWINGS

A. Provide and maintain on the job one complete set of blueline prints of the drawings for the HVAC work. Carefully record on this set of prints, all work including ductwork, piping, valves, etc., which is installed differently from that indicated on the drawings; locate dimensionally from fixed points all buried piping including depths relative to finish floor elevations. Mark all changes of location of piping, ducts, and equipment in accordance with Division 1.

B. These drawings shall be continuously kept up-to-date, and shall be available for inspection at all times. Major discrepancies from approved shop drawings shall be clearly identified and resubmitted.

C. At completion of work, provide a neat and legible reproducible set of these up-to-date drawings which shall be individually signed and dated by the Contractor and the job inspector as to their accuracy.

D. Such drawings shall be submitted for acceptance and approval to the Owner’s Authorized Representative before final certificate of acceptance will be issued.

1.10 CUTTING AND PATCHING

A. Perform all cutting and fitting required for work of this section in rough construction of the building.

B. All patching of finished construction of building shall be performed under the sections of specifications covering these materials by the trades at no additional cost to the Owner.

C. All cutting of concrete work by Contractor shall be by concrete saw. Verify all connections to structure and cutting/core drilling sizes and locations with structural engineer prior to commencing work.

D. All patching of surfaces shall match adjacent material and finish.

1.11 DAMAGE BY LEAKS

A. Contractor shall be responsible for damage to the grounds, walks, roads, buildings, piping systems, electrical systems and their equipment and contents, caused by leaks in the piping system being installed or having been installed herein. He shall repair at his expense all damage so caused. All repair work shall be done as directed by the Owner’s Authorized Representative.

1.12 EMERGENCY REPAIRS

A. 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.

1.13 COORDINATION

A. The Contractor shall fully inform himself regarding any and all peculiarities and limitations of the spaces available for the installation of all work and materials furnished and installed under the contract. Coordinate with all other trades in advance of the work, requirements for openings, recesses and chases in the walls, partitions, equipment housekeeping pads, framing or openings and routing of piping, ductwork, conduit, etc. relative to each trade to alleviate conflicts. Should furnishing, requesting and coordinating this information be neglected, delayed or incorrect and additional work is found to be required, the cost of same shall be borne by the responsible Contractor.

B. This contractor shall coordinate at minimum the following:

1. All duct conduit and pipe openings with general contractor.
2. All equipment support locations (hung or floor mounted) with general contractor.
3. All duct detectors and powered equipment locations with the electrical and fire alarm contractor.

1.14 SUBMITTALS

A. Prior to commencement of work and in accordance with the General Requirements, submit for review a list of all proposed equipment and material to be provided. By submitting the proposed equipment lists, it is deemed that the Contractor has performed the following: verified the delivery dates and such are compatible with the specified construction schedule; verified that the equipment is of proper size to accommodate the conditions specified or indicated. Where manufacturers without specific model numbers are named, such shall be regarded as acceptable as to the manufacturer only and not as to any specific equipment of the named manufacturer. Specific equipment of such name manufacturers shall comply with all requirements and shall be submitted for review. By proposing substitutions, it is deemed that the Contractor shall bear the cost of any construction <u>or</u> design changes necessary to accommodate the substitutions including but not limited to electrical, structural, architectural, plumbing modifications. Refer to Substitution Section in this section for additional requirements.

B. Provide formal submittal to Owner and Engineer. Review of the formal submittal is only for general conformance with design concept of project and general compliance with the information given in the contract documents. The Contractor is responsible for confirmation and correlation of the dimensions, quantities and sizes, for information that pertains to fabrication methods or construction techniques, and for coordination of work of all trades. Deviations from Drawings and Specifications shall be clearly and completely indicated by a separate letter in the formal submittals, and the lack of such is deemed complete compliance with Drawings and Specifications without any deviations. Submittals favorably processed will not relieve the Contractor of responsibility for errors or deviations not so reported by a separate letter.

1. Products and equipment specified and/or scheduled on the drawings with manufacturers names and models identified, constitutes the basis of design, including but not limited to performance, acoustical characteristics, fir in allocated space, service and maintenance clearances, equipment replacement access space, and availability of reliable service at the project location and substitution of products and equipment specified and/or scheduled on the drawings with products or equipment of another manufacturer requires prior approval by Owners Authorized Representative in accordance with General Requirements.

2. Model numbers used may not indicate all features or options required for this specific installation. Modify the specified models to comply with all requirements, as specified and/or shown.

3. Product Data for Proposed Substitutions:
   a. Submit copies of complete data, with drawings and samples as appropriate, including:
      i. Comparison of the qualities of the proposed substitution with that specified.
      ii. Changes required in other elements of the work because of the substitution.
      iii. Affect on construction schedule.
      iv. Cost data comparing the proposed substitution with the product specified.
      v. Availability of maintenance service and source of replacement materials at the project location.
      vi. Any requests for equipment substitution shall include ¼" =1'-0" scale layouts of proposed equipment in plan, elevations and sections complete with piping and ductwork hookups as applicable, to verify fit within allocated spaces, service and maintenance clearances and equipment replacement access spaces.

   b. Acceptance of substitutions is entirely at the discretion of the Owner's Authorized Representative.

C. All formal submittals shall be complete and with catalog data and information properly marked to show, among other things, equality of material (where substitution is allowed and desired), adequacy in capacity and performance to meet minimum capacities or performance as specified or indicated. Arrange the submittals in the same sequence as these Specifications.

D. Do not fabricate or deliver materials or equipment until formal submittals have been approved. Where material or equipment is used without such approval, it is deemed that the material or equipment shall be in complete compliance with drawings and specifications, without additional cost where such compliance is lacking.

E. Submittals shall be bound and shall include, as a minimum, the following:

1. Complete bill of materials listing equipment furnished and quantity of each component as applicable.

2. Catalog cut sheets of every component being provided with all items clearly highlighted.

3. Provide complete blueline shop drawings of the equipment detailing all field connection points.

4. Dimensions including weights and capacities.

5. Wiring diagrams showing control interface as applicable.

6. Warranty sheets.

7. Pressure drops as applicable.

8. Required clearances for maintenance.

F. Upon permission to proceed, after review of the formal submittal and prior to the installation of work, submit dimensional and scaled, not less than ¼" equal to one foot,

coordination drawings of all ductwork and piping floor plans and mechanical equipment rooms and areas. Such layouts shall indicate but not necessarily be limited to, all mechanical equipment, control panels, pipe risers, routes of major pipes, housekeeping pads, electrical stub-ups and points of connection, clearances for servicing and maintaining equipment, proposed routing of larger equipment into and thru the building during construction and other like items. The layouts shall also indicate major equipment to be provided under other sections of work. Prepare floor plans, reflected ceiling plans, elevations, sections and details as required to indicate a coordinated effort has been addressed between all trades to alleviate problem areas due to limited space, sequencing of construction, etc. so as to not impede the efficient flow of work and account for unwarranted delays and costs.

1.15 SUBSTITUTIONS

A. If substitutions of controls or equipment requires any changes in the structural design and/or electrical work from that shown on the drawings, the extra cost of the equipment, added structural and/or electrical work shall be the responsibility of the Contractor requesting the substitution.

B. If the Contractor proposes substitutions of any equipment specified herein or on the drawings, it shall be the Contractor's responsibility to obtain approval for such equipment as well as approval for anchorage of such equipment from governing approval agencies. All costs required for such approval shall be the responsibility of the Contractor requesting the substitution.

C. The Contractor shall coordinate the installation of an approved substitution, make such changes as may be required for the work to be completed and be made compatible with other systems in all respects.

1.16 ELECTRICAL REQUIREMENTS

A. When electrical work is specified in subsequent sections to be furnished and installed by the Mechanical Contractor, it shall be installed in strict and full accordance with the requirements of Division 26.

B. The power wiring, safety switches, combination controllers, (indicated on the electrical drawings), circuit breakers, ,motor-control equipment forming part of motor control centers or switchgear assemblies, and the electrical connections of the HVAC equipment to the electrical power source shall be provided under Division 26 (unless noted otherwise).

C. The electrical components of HVAC equipment including, but not limited to, motor controllers (starters), control or push-button stations, float/pressure switches, solenoid valves, thermostats, junction boxes and other devices functioning to control HVAC equipment shall be provided under Division 23. Interconnecting wiring for packaged equipment shall be provided as an integral part of the equipment.

D. Control Wiring: Line voltage wiring and conduit controlling HVAC equipment not shown on electrical drawings shall be provided under Division 23. All low voltage wiring required for controlling HVAC equipment shall be provide under Division 23 (unless otherwise shown on Electrical Drawings). Installation of these items shall comply with Division 26.

1.17 SEISMIC RESTRAINT

A. This contractor shall submit stamped and signed documents by a professional structural engineer registered in the same state as the project certifying that all the associated systems meet the seismic requirements set forth in all the applicable codes associated with the project. This shall apply to all HVAC systems.

1.18 USE OF ENGINEERS DRAWINGS

A. HVAC drawings will be furnished by JBA at contractor's request via Architect/Owner. Prior to furnishing such files. Contractor shall provide and sign a disclaimer noting the following:

1. JBA is not responsible for any use by the contractor of such drawings.

2. The contractor shall not use such drawings for any purposes other than the associated project.

PART 2 - PRODUCTS

2.1 GENERAL

A. Products and materials shall be described in the pertinent section for Division 23 – HVAC.

B. Products and materials not specified within the specifications but specified on the drawings shall be as described on the drawings.

C. Materials and equipment: Wherever possible, all materials and/or equipment used for similar service shall be of the same manufacturer.

2.2 MATERIALS

A. All labor shall be carefully skilled for this kind of work and under the direction of a competent foreman (HVAC work).

B. All materials shall be new and in perfect condition.

C. Equipment shall bear the manufacturer's label showing performance characteristics. Identifying size number shall be given only when it is not practicable or customary to show performance characteristics.

D. Equipment shall bear the label of a nationally recognized listing agency and shall be installed in accordance with the manufacturer's installation requirements to maintain the listing.

E. All valves, pipe, fitting, etc., shall bear the manufacturer's name or trademark.

F. Unless otherwise specified herein, all equipment and fixtures shall be installed in accordance with the manufacturer's recommendations, including recommended service and removal or clearances.

PART 3 - EXECUTION

3.1 TESTS

A. Contractor shall make all tests required by all legally constituted authorities and as follows:

1. All tests shall be made in the presence of the Owner's Authorized Representative and a duly Authorized inspector. The Owner's Authorized Representative shall be notified in writing five (5) working days before test are made.
2. Concealed work and insulated work shall remain uncovered until required testing has been performed and approved by the Owner's Authorized Representative. If work required to be tested is covered before the approval of the Owner's Authorized Representative has been obtained, it shall be uncovered for testing at the Contractor's expense.
3. Obtain all required documents of certification indicating approval, acceptance and compliance with the requirements of all administrative authorities having jurisdiction over the work. No final payment shall be made until all such certificates are delivered to the Owner's Authorized Representative.
4. Furnish labor, materials, instruments and bear other costs in connection with all test.
5. All piping, equipment and appurtenances shall be capable of operating within the given pressure and temperature characteristics of the project conditions. All piping systems, except as hereinafter specified, shall be given hydrodrastic (with water) test of at least 150% of the maximum operating pressure unless otherwise noted.

6. Before making test, remove or valve off from the system, gauges, traps, and other apparatus or equipment which may be damaged by test pressure.
7. Install a calibrated test pressure gauge in the system to observe any loss in pressure. Maintain the required test pressure for a sufficient length of time to enable an inspection to be made of all joints and connections. Perform tests after installation and prior to acceptance.
8. Final pressures at the end of the test period shall be no more or less than that caused by expansion or contraction of the test medium due to temperature changes.
9. After tests have been made and leaks repaired, clean and flush systems as hereinafter specified. Water piping shall be left under supply main pressure for the balance of the construction period.

3.2 PROTECTION AND CLEAN-UP

A. Protection: Provide for the safety and good condition of all materials and equipment until final acceptance of the Owner's Authorized Representative. Protect all materials and equipment from damage from any cause whatever, and provide adequate and proper storage facilities during the progress of the work and replace all damaged and defective material, equipment or work prior to filing application for final acceptance. Equipment, piping and ductwork shall be stored at least six inches off the ground on blocking and kept clean. During construction properly cap all ducts, pipes and equipment and appurtenances to prevent the entrance of sand and dirt.

B. Cleaning

1. Thoroughly clean all piping, ductwork and all parts of the fixtures, apparatus and equipment. Clean all ductwork, piping apparatus and equipment that are to be insulated prior to installation of insulation. All parts shall be thoroughly cleaned of sand, dirt, cement, plaster, rust, and other materials, and all grease and oil spots removed. Such surfaces shall be carefully wiped and all cracks and corners scraped out. All code stamps and nameplates shall be protected from damage and must be clean and legible before final inspection.
2. Exposed rough metal work shall be carefully brushed down with steel brushes to remove rust and other spots and left in clean condition to receive painter's finish. Where factory prime coat has been damaged, this Contractor shall be responsible for restoration of same.
3. All piping shall be flushed out or blown out after pressure testing is complete and before being put into use. All strainer screens shall be removed and cleaned. After start-up and testing, strainer screens shall again be removed and cleaned.

3.3 STRUCTURAL STEEL

A. Provide all materials, equipment, supplies and labor necessary to construct all structural steel required for supporting piping, ductwork and equipment and miscellaneous steel work shown on the Drawings; as herein specified, or as may be required for installation of the HVAC system.

B. All miscellaneous structural steel for support of HVAC work is not shown on the Drawings. Whether structural steel is shown or not shown on the drawings, it shall be provided. The Contractor shall confirm all structural steel sized components which are shown on the drawings.

C. Structural steel shall be provided in the following locations

1. For all pipe supports for piping 8 inches in diameter and larger.
2. For all pipe racks.
3. For all pipe hangers which are not listed or shown in reputable pipe hanger manufacturer catalogues or shown in the latest issue of MSS SP69.

D. All structural steel shall be designed to attach to the main building structure in such a manner as to not over stress this structure. Reinforcement of the building structure may be required in work areas located in existing buildings; reinforcement of the existing structure under the base contract will not be required unless specifically called for on the drawings. In areas where the Contractor has relocated ductwork, piping, and equipment to areas other than is shown on the Drawings, the Contractor shall bear all costs of additional reinforcement which may be required.

E. Structural design shall be provided through the Contractor by a Civil or Structural Engineer who is registered in the State of Nevada.

F. Details of all structural steel shall be provided in shop drawing format. All structural steel shop drawings shall be stamped by the Contractor's design Engineer prior to submittal. All attachments to building structure shall be approved by the project structural engineer prior to fabrication or installation.

G. The design, materials, fabrication and erection shall conform to "Specifications for the Design, Fabrication and Erection of Structural Steel for Buildings" of the American Institute of Steel Construction, "Code of Standard Practice for Steel Buildings and Bridges", of the American Institute of Steel Construction, and also, when applicable, shall conform to the "Code for Welding Building Construction" of the American Welding Society.

H. The Contractor shall be responsible for cutting and patching fireproofing, as required, when connecting new miscellaneous steel to the building structure.

3.4 COMMISSIONING AND PRELIMINARY OPERATIONAL TEST

A. Prior to inspection to determine substantial completion, the Contractor shall put all HVAC systems into service and check that work required for that purpose has been done, including but not limited to the following condensed check list

1. Correct rotation of motors and ratings of overload heaters are verified.
2. Specified clean filters are installed and spares are on hand when specified.
3. All equipment has been started, checked, lubricated and adjusted in accordance with the manufacturer's recommendations.
4. All manufacturers certificates of start-up specified have been delivered to the Owners Authorized Representative.
5. All equipment has been cleaned, and damaged painted finishes touched-up.
6. Flushing and chemical treatment of piping systems has been done and water treatment equipment, where specified, is in operation.
7. Equipment labels, pipe marker labels, and valve tags are installed.

8. Valve tag schedules, correct control diagrams, sequence of operation lists and start-stop instructions have been posted.
9. Test and balance work is complete.
10. Maintenance manuals have been delivered and instructions to the Owners operating personnel have been made.
11. Provide all instruments, equipment, labor and materials to complete the tests. These tests may be required at any time between the installation of the work and the end of the warranty period. Should these tests expose any defective materials, poor workmanship or variance with requirements, make any changes necessary and remedy any defects at no cost to the Owner.

B. Prior to the inspection to determine substantial completion, the Contractor shall operate all HVAC systems as required to demonstrate that the installation and performance of these systems conform to the requirements of the Contract Documents.

C. Before handing over the system to Owner, replace temporary filters with complete new set of filters.

3.5 REVIEW OF CONTRACTOR'S TEST

A. All tests made by the Contractor or manufacturer's representatives are subject to observation and review by the Owner's Authorized Representative; the Contractor shall provide written notice five (5) days prior to testing. Testing shall be grouped and sequential as practical.

3.6 TEST LOGS

A. The contract shall maintain test logs listing the tests on all HVAC systems showing dates, items tested, inspector's names, remarks on success or failure of the tests.

3.7 CLEANING UP AND REMOVAL OF SCRAP

A. For work under all HVAC sections, trash and scrap shall be cleaned up and removed from the site as the work progresses.

3.8 DAMAGE RESPONSIBILITY

A. The contractor shall be responsible for damage to the grounds, buildings or equipment, and the loss of refrigerants, fuels or gases, caused by leaks or breaks in pipes for equipment furnished or installed under this Division.

3.9 PRELIMINARY OPERATION

A. The Owner reserves the right to operate portions of the HVAC system on a preliminary basis without voiding the guarantee.

3.10 OPERATIONAL TEST

A. Before operational tests are performed, demonstrate that all systems and components are complete and fully charged with operating fluid and lubricants.

B. Systems shall be operable and capable of maintaining continuous uninterrupted operation during the operating and demonstration period. After all systems have been completely installed, connections made, and tests completed, operate the systems continuously for a period of five (5) working days during the hours of a normal working day.

C. Control systems shall be completely operable with settings properly calibrated and adjusted.

D. Rotating equipment shall be in dynamic balance and alignment.

E. If the system fails to operate continuously during the test period, the deficiencies shall be corrected and the entire test repeated.

3.11 MAINTENANCE AND OPERATION INSTRUCTIONS, ETC.

A. General: Thoroughly instruct the Owner's operators in every detail of operation of the system. Provide the Owner with a list of all equipment, giving the manufacturer's name, model number, serial number, parts list and complete internal wiring diagrams. All directions for operation furnished by the manufacturer shall be carefully saved and turned over to the Owner, together with written sequence of operation, operating and maintenance instructions for each system and its equipment. Coordinate scheduling of instruction times with Owner's operators.

B. Specific Data: Provide complete sets of documentation in accordance with Division 1 requirements. Where quantities are not clearly defined in Division 1, submit four (4)

complete sets. The following data shall be submitted to the Owner for approval prior to acceptance of the installation, complete and at one time; (partial or separate data will not be accepted) data shall consist of the following:

1. Valve Directory: Indicating valve number, location, function and normal operating position for each.
2. Piping identification schedule.
3. Equipment: List of nameplates, including nameplate data.
4. Manufacturer's Literature: Copies of manufacturer's instructions for operation and maintenance of all mechanical equipment, including replacement parts lists and drawings. Mark or highlight brochure literature indicating the models, sizes, capacities, curve operating points, etc., in a manner to clearly indicate the equipment in-stalled. Remove all pages or sheets from the bulletin and catalogs that do not pertain to equipment installed on the project.
5. Written Instructions: Typewritten instructions for operation and maintenance of the system composed or OPERATING INSTRUCTIONS, MAINTENANCE INSTRUCTIONS and a MAINTENANCE SCHEDULE.
   a. OPERATING INSTRUCTIONS shall contain a brief description of the system. Adjustments requiring the technical knowledge of the service agency personnel shall not be included in the operating instructions. The fact such adjustments are required, however, shall be noted.
   b. MAINTENANCE INSTRUCTIONS shall list each item of equipment requiring inspection, lubrication or service and describe the performance of such maintenance.
   c. MAINTENANCE SCHEDULE shall list each item of equipment requiring maintenance, shall show the exact type of bearing on every component of each item of equipment, and shall show when each item of equipment should be inspected or serviced.
6. Instructions: Operating personnel shall be instructed in the operation of the system in accordance with typewritten, approved instructions.
7. Letters of certification as required under other sections.
8. A CD or similar electronic storages media including original PDF files for each of the above shall be included with each copy. Furnish a dedicated index of the electronic media contents identifying the file name associated with each document.

C. Binders: Assemble sets of the above data in loose-leaf ring-type binders with permanent covers, with identification on front and on spine. Provide appropriate sleeve for electronic media.

D. The above shall in no way preclude the requirements of other sections of these specifications – and is to be supplemental to other paragraphs on this subject found in this section and other sections.

3.12 SPECIAL REQUIREMENTS

A. During the guarantee period and as directed by the Owner, make any additional tests, adjustment, etc., that may be required and correct any defects or deficiencies arising from operation of the systems. Operational tests shall be made during both heating and cooling seasons and on all systems.

B. Guards: Furnish and install removable guards around all moving parts of all equipment and/or apparatus. Guards shall be securely anchored to floor or equipment, and shall provide protection at ends and sides to prevent contract with sheaves, belts, couplings, etc. Holes in suitable locations shall be provided for measuring speeds.

C. Completion:

1. When the installation is complete and adjustments specified herein have been made, the system shall be operated for a period of one week, during which time it shall be demonstrated to the Owner's Authorized Representative as being completed and operating in conformance with these specifications. The Contractor shall schedule all work so that this time period, which is to confirm a "bug-free" system, will occur be-fore the total project is accepted for substantial completion by Owner.
2. The work hereunder shall not be reviewed for final acceptance until operating and maintenance data, manufacturer's literature, valve directories, piping identification code directory, and nameplates specified herein have been approved and properly posted in the building.

3.13 GUARANTEE/WARRANTY

A. Guarantees and warranties shall be as defined in Division 1 Sections.

B. All materials, apparatus and equipment furnished and installed under the HVAC division of these specifications, shall be new and fee from any defects. Should any problems develop within one year from date of acceptance of the work, due to inferior or faulty materials and/or workmanship, the problems shall be corrected by this Contractor without expense to the Owner. Any defective materials or inferior workmanship noticed at the time of installation or during the guarantee period shall be corrected immediately to the entire satisfaction of the Owner.

C. The work shall be installed of such materials and in such a manner that:

1. All apparatus or equipment shall operate in accordance with detailed specifications covering each item.
2. Contractor shall guarantee that his installation of all materials and equipment will meet the performance requirements of these specifications and that all equipment will deliver the specified or required capacities.
3. The Owner reserves the right to make temporary or emergency repairs as necessary to keep equipment in operating condition without voiding the guarantee contained herein nor relieving the Contractor of his responsibilities during the guarantee period.
4. Contractor shall be responsible for all damage to any part of the premises caused by leaks or break in pipe lines, fixtures or equipment furnished and installed under his contract for a period of one year after date of acceptance of the project by Owner. He shall replace in kind, at his own expense, any and all items so damaged to the complete satisfaction of the Owner.
5. The above shall be supplemental to and in no way preclude the requirements of other sections of these specifications
6. After operation of any liquid system and if any piping, coils or other components be-come air bound, this contractor shall make all necessary system modifications including but not limited to repiping (as approved), installation or air vents or fittings at no extra cost to the Owner.

END OF SECTION 230100