

## SECTION 23 00 10 - BASIC MECHANICAL REQUIREMENTS

### PART 1 - GENERAL

#### 1.1 SECTION INCLUDES

- A. Basic Mechanical Requirements specifically applicable to Division 23 Sections, in addition to any requirements set forth in the General Conditions and Special Conditions of the Contract Documents.

#### 1.2 DESCRIPTION

- A. Furnish materials and perform labor required to execute this work as indicated on the drawings, as specified and as required to complete the work of this section, except as otherwise herein specifically excluded.

#### 1.3 WORK INCLUDED

- A. The complete Heating, Ventilating and Air Conditioning (HVAC) systems including, but not limited to, these major items:
  - 1. Coordinate work of this Section with related trades
  - 2. Verify applicable dimensions at the jobsite
  - 3. Diffusers and registers
  - 4. Furnishing and installation of miscellaneous hangers, supports, sleeves, inserts, anchors and other auxiliary equipment for systems under this Division
  - 5. Installation and connection of Contractor furnished equipment
  - 6. Shop drawings
  - 7. Equipment identification
  - 8. Equipment and systems adjustments and balancing
  - 9. Air, water and gas systems testing, adjusting and balancing
  - 10. Written operating and maintenance instructions
  - 11. Record drawings
  - 12. Guarantee

#### 1.4 WORK SPECIFIED ELSEWHERE

- A. None.

#### 1.5 SITE INSPECTION

- A. Contractor shall become familiar with the conditions at the site. No allowance will be made subsequently for any error through negligence in observing the site conditions. Contractor shall observe and make cost allowance for any mechanical and/or electrical items that must be relocated to accommodate the installation or servicing of any item covered under this contract.

#### 1.6 ORDINANCES, REGULATIONS AND CODES

- A. References to Technical Societies, Trade Organizations, Governmental Agencies is made in accordance with the following abbreviations:
  - 1. AFI - Air Filter Institute
  - 2. AMCA - Air Moving & Conditioning Association

3. ARI - Air Conditioning & Refrigeration Institute
4. ASHRAE - American Society of Heating, Refrigerating and Air Conditioning Engineers
5. ASME - American Society of Mechanical Engineers
6. ASTM - American Society of Testing Materials
7. AWS - American Welding Society Code
8. ANSI - American National Standards Institute
9. CBC - California Building Code
10. CCR - California Code of Regulations
11. CEC - California Electrical Code
12. CFC - California Fire Codes
13. CMC - California Mechanical Code
14. CPC - California Plumbing Code
15. FIA - Factory Insurance Association
16. NAFM - National Association of Fan Manufacturers
17. NEMA - National Electrical Manufacturer's Association
18. NFPA - National Fire Protection Association
19. ORS - Office of Regulatory Services
20. SCAQMD - South Coast Air Quality Management District
21. SMACNA - Sheet Metal and Air Conditioning Contractors National Association
22. UFC - Uniform Fire Code
23. UL - Underwriter's Laboratories
24. UPC - Uniform Plumbing Code

A. Requirements of Regulatory Agencies: Materials and installation shall comply with applicable local, state, and national codes and ordinances. Rulings and interpretations of the enforcing agencies shall be considered as part of the local codes. No extras will be permitted for furnishing items required by the local codes but not specified or shown on the drawings.

B. Codes and Standards:

1. UBC and California Amendments (California Building Code - Part 2, Title 24, CCR)
2. UMC and California Amendments (California Mechanical Code - Part 4, Title 24 CCR)
3. UPC and California Amendments (California Plumbing Code - Part 5, Title 24 CCR)
4. Uniform Fire Code with State Amendments (California Fire Code - Part 9, Title 24 CCR)
5. National Fire Protection Associations - National Fire Code

C. Nothing in these drawings and specifications is to be construed to permit work in violation thereof. Ordinances, regulations and codes are to be construed as minimum requirements.

D. It is the responsibility of the Contractor to conduct periodic safety reviews to access the adequacy of the Contractor's safety measures in, on, or near the construction site.

E. Ventilating, refrigeration and electrical equipment and appliances are required to be approved by the Underwriters Laboratory, Inc., or other nationally recognized testing agency and installed per the testing agency's specifications.

## **1.7 PERMITS, FEES AND INSPECTIONS**

A. Obtain and pay for all necessary permits, fees, assessments, complimentary drawings, required by any legally constituted public authority having jurisdiction.

## **1.8 DRAWINGS AND SPECIFICATIONS**

- A. The Project Managers decision will be final on interpretation of the Drawings and Specifications.
- B. The Drawings and Specifications are complimentary. Any work called for on the Drawings and not mentioned in the Specifications, or vice versa, shall be performed as though fully set forth in both.
- C. Piping, ductwork and other equipment shown as existing has been taken from the Owner's drawings. Contractor shall verify exact location in field before proceeding with the work.
- D. Where codes, standards, drawings or specifications conflict, the most stringent shall prevail, unless prior approval for variance is obtained. Specific details on the drawings shall supersede the specification in the event of a conflict.
- E. Alternate support or seismic detail shall have prior approval by the Project Manager; the Contractor shall obtain agency approval without any additional cost or time to the contract and without any time penalty on the work schedule.

## **1.9 SUBMITTALS**

- A. Before starting work, the Contractor shall furnish for the approval of the Project Manager, Shop Drawings and Submittals with itemized equipment lists, complete in all details that they proposes to install. All items shall be submitted at the same time.
- B. Submittals must be specific to this project with respect to model number, capacities, performance, etc., generic submittals will not be accepted.
- C. Variations or deviations on submitted items from those specified must be clearly tagged and/or identified.
- D. Submittals shall include, but not necessarily be limited to, the following, which are mandatory:
  - 1. Draw Equipment Layouts to 1/4" scale, including equipment, piping accessories, and showing clearances for operating and servicing
  - 2. Foundations, supports, hangers, inserts
  - 3. Insulation
  - 4. Ventilation and air conditioning equipment, specialties and the air control systems
  - 5. Fans, fan characteristic curves, fan tests
  - 6. Dampers, louvers, grilles, registers, diffusers
  - 7. Shop fabrication drawings and installation drawings of ductwork and piping layouts. Submit for approval prior to fabrication. Drawings shall indicate dimensions from bottom of piping and ductwork to finish floor level.
  - 8. Wiring diagrams, control panel board, motor starters and controls for electrically operated equipment furnished by mechanical trades
  - 9. Automatic control system diagrams
  - 10. Exhaust, supply and return fans
  - 11. Access panels
  - 12. Hangers, inserts, supports, anchors
  - 13. Sleeves, escutcheons, caulking, waterproofing, fireproofing
  - 14. Expansion joints, guides and anchors
  - 15. Shop fabrications drawings and calculations
  - 16. Special and miscellaneous products furnished under this section and not listed herein

## **1.10 RECORD DRAWINGS AND MANUALS**

- A. Record Set During the Work: At the site, maintain at least one set of drawings as a Field As-Built drawing set. Also, maintain at least one copy of all addenda, modifications, approved submittals,

correspondence, and transmittals, at the site. Keep drawings and data in good order and readily available for the Construction Manager, Project Manager, and Owner's representatives. Changes: Clearly and correctly mark As-Built drawings to reflect changes made during the construction process at the time the changed work takes place. No such changes shall be made to the work unless authorized by the Project Manager and the Owner.

- B. Final Record Set drawings: Conform to General Conditions and Special Conditions of the Contract Documents.
- C. Preparation of Final Record Set drawings: Contractor shall transfer recorded changes in the work indicated on the Field As-Built Set to the Record Set. Changes shall be neatly and clearly drawn and noted by skilled draftsmen, and shown technically correct.
- D. Approval: Prior to Project Manger's inspection for Substantial Completion, submit the Final Record Set drawings to the Construction Manager for review, and make such revisions as may be necessary for Final Record Set drawings to reflect a true, complete, and accurate record of the work.
- E. Manuals: Obtain data from the various manufacturers and submit instruction, installation, operation, and maintenance manuals as required and to the extent required under other Sections.
- F. Contents: Each manual shall have an index listing the contents. Information in the manuals shall include not less than:
  - 1. General introductions and overall equipment description, purpose, functions and simplified theory of operation.
  - 2. Specifications
  - 3. Installation instructions, procedures, sequences, and precautions, including tolerances for level, horizontal and vertical alignment.
  - 4. Grouting requirements.
  - 5. List showing lubricants for each item of mechanical equipment and recommended lubrication intervals.
  - 6. Start-up and beginning operation procedures.
  - 7. Operational procedures.
  - 8. Shutdown procedures.
  - 9. Maintenance and calibration procedures
  - 10. Parts lists
  - 11. Name, address and telephone number of each manufacturer's local representative.
- H. Manual Submittals: Unless otherwise specified, each submittal shall include two copies of each manual, one of which will be returned to the Contractor, marked to show the required review. When approved, deliver four copies to Architect unless otherwise specified.
- I. As-Built drawings of ductwork and piping, including all elbows, transitions, damper and valve locations shall be provided prior to commencement of air and water balance.

#### **1.11 QUALITY OF EQUIPMENT, MATERIALS AND WORKMANSHIP**

- A. Unless otherwise specified, equipment and materials used in the installation shall be new and in perfect condition when installed. Articles provided for the same general purpose or use shall be of the same make. Workmanship shall be of the best quality and none but competent mechanics skilled in their trades shall be employed. Furnish the services of an experienced superintendent, who shall be constantly in charge of the work, together with all necessary journeymen, helpers and laborers required.

### **1.12 SEISMIC DESIGN**

- A. Contractor shall be responsible for anchors and connections of mechanical work to the building structure including calculations for approval by structural engineer or for approval by inspector of record, as applies, for items or work, where approval is deferred or where alternate support or anchorage detail is proposed to prevent damage as a result of an earthquake, including manufactured equipment, the connection and integrity of shop fabricated and field fabricated materials and equipment. The anchorage of all pipes, ducts, conduits, fixtures, equipment, etc. shall withstand the lateral forces and shall accommodate calculated building displacement as required by the California Building Code, and local city/county codes. (Building equipment and connections therefore shall be designed to resist lateral seismic forces equal to 1.0 of equipment weight to working allowable stress. Cantilever posts supporting equipment shall be designed to resist lateral seismic forces equal to 0.5 of equipment weight to allowable working stress. Conform to the following:
1. In accordance with Title 24, 2010 CBC Chapter 16, details shall be provided for the seismic anchorage of all mechanical and electrical equipment, anchorage details shall be based upon appropriate design calculations.
  2. For equipment weighing 400 pounds or more anchorage details and appropriate design calculations shall be submitted as part of the mechanical and electrical drawings. "Deferred Approval" items will not be permitted unless specifically approved by the plan check supervisor.
    - a. Exception: Attachments of equipment weighing less than 400 pounds and supported directly on the floor or roof structure, furniture, or temporary or movable equipment and equipment weighing less than 20 pounds which is supported by vibration isolation devices suspended from the roof, wall or floor, need not be detailed on the plans provided the following notes are included on the mechanical and electrical plans.
  3. The seismic anchorage of mechanical and electrical equipment shall conform to C.C.R. Title 24, 2010 CBC Chapter 16. Anchorage details for roof/floor-mounted equipment shall be shown on plans.

### **1.13 SUBSTITUTIONS AND CHANGES**

- A. The design has been based on data from certain manufacturers, suitable for each application. Recommendations for alternative manufacturers are made for each product, except when "no substitutions permitted" is indicated.
- B. It is the intent of the Owner to have this project constructed with materials, products and system originally designed and specified for this project.
- C. Alternatives that may require the modification, realignment and/or adjustment of other associated components, including impact on other trades, shall be accomplished at no additional cost or time to the contract and shall have the approval of the Architect.
- D. Substitutions shall be submitted addressing all features listed in the specifications. Features that deviate from the plans and specifications shall be clearly identified including justification for deviations. The Project Manager will review initial submittal on substitutes only. Subsequent submittals made to correct deficiencies in original submittals will be reviewed at Contractor's expense based on a mechanical engineering consultant's hourly rate for HVAC engineering services.
- E. Should the Contractor elect to propose substitutions for the Owner's interest, the substitutions

shall be in compliance with General Conditions and Special Conditions in the Contract Documents, and all other applicable conditions specified in drawings and Contract Documents.

#### **1.14 APPROVALS**

- A. The Owner will have the right to accept or reject equipment, materials, workmanship, tests, and determine when the Contractor has complied with the requirements herein specified.

#### **1.15 SELECTION AND ORDERING OF EQUIPMENT AND MATERIALS**

- A. Immediately after award of the Contract, and after the approval of submittals by the Project Manager, the Contractor shall arrange for the purchase and delivery of equipment and materials required, in ample quantities, and at the proper time. He shall deliver to the Owner and Project Manager a complete list of equipment and materials ordered, giving descriptions, plate numbers, brochures, name of the wholesalers, date of the orders, and approximate delivery dates.

#### **1.16 LOCATIONS AND ACCESSIBILITY**

- A. Drawings show pipe and ductwork diagrammatically. Conform to Drawings as closely as possible in layout work. Vary run of piping, run and shape of ductwork and make offsets during progress of work as required to meet structural and other interferences as approved by the Owner. Install piping and ductwork to best suit field conditions after coordinating with other trades. Run exposed piping and ductwork parallel to, or at right angle to, building walls. Keep horizontal lines as close to bottom of structures as possible. Conform to ceiling heights established on Drawings.
- B. Install equipment in such a manner as to be readily accessible for maintenance and repairs. Install piping, ducts and conduit in such a manner as to preserve headroom, avoid obstructions and keep openings and passageways clear.
- C. Installation at valves, thermometers, gauges, cleanouts, dampers, controls, steam and water specialties, duct access doors, or any other indicating equipment or specialties requiring reading, adjustment, inspection, maintenance, shall be conveniently and accessible located with reference to the finished building.
- D. Where wall and ceiling access doors are required but not shown, such doors shall be furnished under other sections and as directed by the Owner. Coordinate this requirement with appropriate trades.
- E. If changes in the indicated locations or arrangements are required, they shall be made without additional charges to the Owner.
- F. In an existing area, where required, remove, reinstall, reconnect or replace, etc., any existing work to accommodate new work without any additional cost to the Owner. Material shall match existing, unless otherwise specified or approved in writing by the Owner.
- G. Provide sheaves and belts if required, to Test, Adjust and Balance Agency, to allow air moving equipment to meet flow requirements specified at no additional cost to the Owner.

#### **1.17 COORDINATION OF TRADES**

- A. Contractor shall coordinate all trades in the interest of obtaining the most practical overall arrangement of equipment, piping, conduit, and ducts, and to maintain maximum headroom and accessibility.
- B. No extras will be allowed for changes made necessary by interference between trades.
- C. Submit Composite Drawings in accordance with contract General Conditions and Special Conditions. Include dimensioned plans, elevations, sections and details, and give complete

information particularly as to the kinds and types of materials and equipment, size and location of sleeves, inserts, attachments, chases, openings, conduits, ducts, boxes, lighting, and structural interferences. Coordinate these Composite Drawings and field layouts in the field for proper relationship to work of applicable trades based on field conditions. Contractor shall have competent personnel readily available for coordinating, checking, and supervision of field layouts. The procedures for submittals and re-submittals, and final distribution, shall be as specified in Division 01. Do not start installation of work involved under Composite Drawings until the Architect reviews applicable submittal. Discrepancies between the Drawings and Composite Drawings shall be specifically noted and identified on the Composite Drawings. Drawings for the various trades involved shall be submitted as required and reviewed prior to preparation of Composite Drawings.

1. Equipment Foundations and Bases: Furnish certified details and drawings for approval before fabrication. Furnish parts necessary for each foundation sub base and support.
2. Pipe Sleeves and Inserts: Furnish and install pipe sleeves and pipe support inserts before concrete is poured.
3. Roof, Wall and Floor Openings: Furnish Shop Drawings showing exact locations and sizes of openings through roofs, walls and floors.
4. Concrete: Conform to Concrete Section of the Specifications.

#### **1.18 GUARANTEES**

- A. Contractor shall guarantee workmanship, equipment and materials installed under his contract for a period of not less than one (1) year from the date of Substantial Completion. Should any defects occur during this period, the Contractor shall promptly repair or replace the defective item and any other damage caused to the building free of charge to the Owner, including cost of labor and materials.
- B. Guarantee included in this section to cover:
  1. Faulty or inadequate design of equipment or material installed
  2. Improper assembly or erection
  3. Defective workmanship or material
  4. Incorrect or inadequate operation or other failure
- C. Contractor shall guarantee the complete and perfect operation of the entire system, and that equipment will be supported in such a way as to be free of objectionable vibration and noise.
- D. Furnish the parts and labor to replace any items found to be defective in the refrigeration equipment with the guarantee period.
- E. In addition to other guarantees, Contractor will furnish free maintenance for the refrigeration equipment, including replacement of refrigerant and oil, for a period of one (1) year. This shall include regular monthly maintenance and "On Call" service if required.
- F. For equipment bearing a manufacturer's warranty in excess of one year, furnish a copy of the warranty to the Owner, who shall be named as beneficiary.

#### **1.19 PROTECTION OF EQUIPMENT AND MATERIALS**

- A. Provide adequate storage facilities for equipment and materials on the site and shall make provisions to protect such materials and equipment from damage.

#### **1.20 CLOSING-IN OF UNINSPECTED WORK**

- A. Contractor shall not allow or cause any of the work, specifically ductwork and piping, to be

covered up or enclosed until it has been inspected, tested, and approved by the Architect. Should any of work be covered up or enclosed before such inspection and test, Contractor will at his own expense, uncover the work, and after it has been inspected, tested, and approved, make repairs with such materials as may be necessary to restore work to its original condition.

#### **1.21 BUILDING FOOTING CLEARANCES**

- A. Under no circumstances shall pipes, ducts, or conduits penetrate footings. They shall cross below footings or through sleeves above footings. Those running parallel to footings shall have the minimum clearance from the cone of influence indicated on the Drawings or as required by Code.

#### **1.22 DAMAGE BY LEAKS**

- A. Contractor shall be responsible for all damage to any part of the premises caused by rain leaks through or around ducts or pipes, leaks or breaks in piping, equipment or fixtures furnished or installed by him for a period of one (1) year from the date of Substantial Completion.

#### **1.23 EQUIPMENT LABELS**

- A. Equipment provided under this Section shall be provided with the manufacturer's metal identification labels attached to each individual piece of equipment showing complete performance characteristics, size, model, and serial number.

#### **1.24 PRELIMINARY OPERATION**

- A. Should the Owner request that any portion of the plant, apparatus, or equipment be operated for the Owner's beneficial use prior to the final completion and acceptance of the work, the Contractor shall conform to Beneficial Occupancy Provisions of the General Conditions. Such operation shall be under the supervision and direction of the Contractor. Such preliminary operation shall not be construed as an acceptance of any portion of the work.

#### **1.25 MAINTAINING EXISTING SERVICES**

- A. The premises and existing building at the site will be in use at the time the work of this Section is in progress. Contractor shall conduct his work so as to cause no inconvenience or danger to the personnel on the premises.
- B. Contractor shall maintain continuity of service to the existing mechanical systems, except for designated intervals during which connections can be made. The scheduling of the shut down period shall be at a time directed by the Owner, or the Owner's representatives.
- C. In some instances, it may be necessary to defer work in certain areas and locations until such time as existing facilities can be relocated or rearranged by the Owner. Therefore, whenever it becomes necessary for the Contractor to perform work under this contract in areas in which the Owner's work is being performed, the contractor shall advise the Construction Manager relative to this requirement and shall follow closely the directive issued by the Construction Manager insofar as time and procedure are concerned. **Provide Owner a minimum of 72 hours prior notice.**
- D. The contractor shall include in his bid all premium time to which he may be subjected for performing work in such procedure and at such time as may be necessary to cause the least interference with the function of the Owner.

#### **1.26 ELECTRICAL WORK**

- A. Coordinate with Division 26 in making the line and low *voltage* electrical connections and be



responsible for the operation of the equipment furnished under this section.

- B. Voltage for electrical work will be included in Division 26. However, any control wiring which is required that is not shown on the control diagram shall be as described under this Section. In the event that the Contractor chooses to provide equipment that requires extra expense in the power or control wiring, Contractor shall pay additional electrical costs.
- C. Safety switches, starters, circuit breakers, unless provided as a portion of package equipment, and the electrical connections of mechanical equipment to the electrical power service, shall be provided under Division 26.
- D. Interconnecting wiring, safety switches, relays, controllers and motor starters which are integral components of packaged equipment shall be provided as an integral part of that equipment.
- E. All interconnecting power wiring and conduits shall be provided by Division 26.
- F. Control wiring shall be provided by Division 23, unless otherwise indicated on the drawings.
- G. Conduit for control wiring shall be provided by Division 26.

**\*END OF SECTION 23 00 10\***