



## SECTION 230800 - COMMISSIONING OF HVAC SYSTEMS

### PART 1 – GENERAL

[Filed Sub Bid Required]

#### 1.1 GENERAL & FILED SUB BID PROVISIONS

- A. Related Documents: Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. Payment and Performance Bonds: Filed Subcontractors shall:
  - 1. Provide Payment and Performance Bonds for the full value of their Subcontract.
  - 2. Include the full cost of the required bond in their Bid.
- C. Eligibility: Bids will be accepted only from Filed Subcontractors with certificates of eligibility from the authorities having jurisdiction.
- D. Submitting Filed Sub Bids: Comply with directions of Awarding Authority and the State Statutes and the following:
  - 1. Comply with the Instructions to Bidders.
  - 2. Bid forms: Use only identified bid forms, acceptable to Awarding Authority.
  - 3. Bid bonds: Provide bid bonds as directed in the Instructions to Bidders in the form and manner indicated for 5% the total value of the Bid.
  - 4. Submit bid in sealed envelope in the manner and before the time and date indicated. On outside of envelope, Include name of Sub Bidder, Project name and number and identified as follows:  
**FILED SUBCONTRACTOR'S BID FOR SECTION:**  
**23 08 00 – COMMISSIONING OF HVAC SYSTEMS**
- E. Sub-Bid Requirements: Filed Subcontractors shall perform all work of the Sub Bid Contract with employees on the Filed Subcontractor's payroll except, if the Filed Subcontractors proposes to subcontract any work, then the Filed Subcontractors shall identify on the bid form:
  - 1. All subcontractors to the Filed Subcontractor, whose work is:
    - a. Valued at \$10,000 or more.
  - 2. The contract sum for each subcontractor required to be listed.
    - a. An affidavit that all subcontractors named on the Filed Subcontractors's bid form have been qualified or certified by the Filed Subcontractors using criteria similar to the criteria for the qualification or certification of Filed Subcontractors.
  - 3. Any sub-subcontracts listed below under Sub-sub Bid Requirements.
  - 4. Comply with the applicable General Laws and the following:
    - a. Each sub-bidder shall list in Paragraph E of the "Form for Sub-bids" the name and bid price of each person, firm or corporation performing each class of work or part thereof for which the Section of the Specifications for that sub trade requires such listing, provided that, in the absence of a contrary provision in the Specifications, any sub-bidder may, without listing any bid price, list his own name or part thereof and perform that work with persons on his own payroll, if such sub-bidders, after sub-bid openings, shows to the satisfaction of the Awarding Authority that he does customarily perform such class of work with persons on his own payroll and is qualified to do so. This Section of the Specifications requires that the following classes of work shall be listed in Paragraph E under the conditions indicated herein.



5. Sub-sub Bid Requirements: This Filed Subcontractors Sub-Bid requires the following classes of work be listed in the Bid Form:

Class of Work	Specification section number and name
a. None.	None.

- A. Reference Drawings: The Work of this Trade Bid is shown on the following Contract Drawings:

1. M1.00 – Mechanical Notes
2. M1.01 – Mechanical Details
3. M1.02 – Mechanical Specifications
4. M1.03 – Mechanical Zoning Plan
5. M2.00 – Mechanical Floor Plan
6. M2.01 – Mechanical Ventilation/Heating Plan
7. M2.02 – Mechanical Roof Plan

## 1.2 SUMMARY OF SUB BID CONTRACT

- A. Work Includes providing labor, materials and equipment necessary to complete the work of this Section, including but not limited to, all work of the following sections:

1. Section 23 00 00 – Common Work Results for HVAC
2. Section 23 05 13 – Common Motor Requirements for HVAC Equipment
3. Section 23 05 48 – Vibration and Controls for HVAC Piping and Equipment
4. Section 23 05 53 – Identification for HVAC Piping and Equipment
5. Section 23 05 93 – Testing, Adjusting, and Balancing for HVAC
6. Section 23 07 13 – Duct Insulation
7. Section 23 08 00 – Commissioning of HVAC
8. Section 23 09 00 – Instrumentation and Controls for HVAC
9. Section 23 31 13 – Metal Ducts
10. Section 23 33 00 – Air Duct Accessories
11. Section 23 34 23 – HVAC Power Ventilators
12. Section 23 37 13 – Diffusers, Registers, and Grilles
13. Section 23 37 23 – HVAC Gravity Ventilators
14. Section 23 34 00 – Particulate Air Filtration
15. Section 23 72 00 – Air-to-Air Energy Recovery Ventilator
16. Section 23 74 16 – Package Rooftop Air Conditioning Units
17. Section 23 82 39 – Unit Heaters

- B. Alternates: None.

## 1.3 DESCRIPTION

- A. The requirements of this Section apply to all sections of Division 23.
- B. This project will have selected building systems commissioned. The complete list of equipment and systems to be commissioned is specified in Section 01 91 00 GENERAL COMMISSIONING REQUIREMENTS. The commissioning process, which the Contractor is responsible to execute, is defined in Section 01 91 00 GENERAL COMMISSIONING REQUIREMENTS.



#### 1.4 RELATED WORK

- A. Section 01 00 00 GENERAL REQUIREMENTS.
- B. Section 01 33 00 SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- C. Section 01 91 00 GENERAL COMMISSIONING REQUIREMENTS.
- D. Section 23 05 41 NOISE AND VIBRATION CONTROL for HVAC PIPING AND EQUIPMENT.
- E. Section 23 05 93 TESTING, ADJUSTING, AND BALANCING FOR HVAC.
- F. Section 23 09 00 INSTRUMENTATION AND CONTROL FOR HVAC.

#### 1.5 SUMMARY

- A. This Section includes requirements for commissioning the HVAC systems of the related subsystems and equipment. This Section supplements the general requirements specified in Section 01 91 00 GENERAL COMMISSIONING REQUIREMENTS.
- B. Refer to Section 01 91 00 GENERAL COMMISSIONING REQUIREMENTS for more details regarding processes and procedures as well as roles and responsibilities for all Commissioning Team members.

#### 1.6 DEFINITIONS

- A. Refer to Section 01 91 00 GENERAL COMMISSIONING REQUIREMENTS for definitions.

#### 1.7 COMMISSIONED SYSTEMS

- A. Commissioning of a system or systems specified in Division 23 is part of the construction process. Documentation and testing of these systems, as well as training of the Operation and Maintenance personnel in accordance with the requirements of Section 01 91 00 GENERAL COMMISSIONING REQUIREMENTS and of Division 23, is required in cooperation with the Commissioning Agent.
- B. The Facility HVAC systems commissioning will include the systems listed in Section 01 91 00 GENERAL COMMISSIONING REQUIREMENTS.

#### 1.8 SUBMITTALS

- A. The commissioning process requires review of selected Submittals that pertain to the systems to be commissioned. The Commissioning Agent will provide a list of submittals that will be reviewed by the Commissioning Agent. This list will be reviewed and approved by the engineer prior to forwarding to the Contractor. Refer to Section 01 33 23 SHOP DRAWINGS, PRODUCT DATA, and SAMPLES for further details.
- B. The commissioning process requires Submittal review simultaneously with engineering review. Specific submittal requirements related to the commissioning process are specified in Section 01 91 00 GENERAL COMMISSIONING REQUIREMENTS.



## 1.9 APPLICABLE PUBLICATIONS

- A. The following publications form a part of this specification to the extent indicated by the reference thereto. In text the publications are referenced to by the acronym of the organization.
- B. American Society of Heating, Refrigerating and Air Conditioning Engineers, Inc. (ASHRAE):  
HANDBOOK ..... HVAC Applications ASHRAE Handbook, Chapter 39, Testing, Adjusting, and Balancing, Chapter 44, HVAC Commissioning and Chapter 49, Sound and Vibration Control  
HANDBOOK ..... HVAC Fundamentals ASHRAE Handbook, Chapter 8, Sound and Vibration
- C. Associated Air Balance Council (AABC):  
7th Edition ..... AABC National Standards for Total System Balance
- D. National Environmental Balancing Bureau (NEBB):  
9th Edition ..... Procedural Standards for Testing, Adjusting, Balancing of Environmental Systems  
3rd Edition ..... Procedural Standards for the Measurement of Sound and Vibration  
2nd Edition ..... Standard for Whole Building Technical Commissioning of New Construction
- F. Sheet Metal and Air Conditioning Contractors National Association (SMACNA):  
..... HVAC Duct Construction Standard – Metal and Flexible Duct  
3rd Edition ..... HVAC Systems Testing, Adjusting and Balancing

## PART 2 - PRODUCTS (NOT USED)

## PART 3 - EXECUTION

### 3.1 CONSTRUCTION INSPECTIONS

- A. Commissioning of HVAC systems will require inspection of individual elements of the HVAC systems construction throughout the construction period. The Contractor shall coordinate with the Commissioning Agent in accordance with Section 01 91 00 GENERAL COMMISSIONING REQUIREMENTS and the Commissioning plan to schedule HVAC systems inspections as required to support the Commissioning Process.

### 3.2 PRE-FUNCTIONAL CHECKLISTS

- A. The Contractor shall complete Pre-Functional Checklists to verify systems, subsystems, and equipment installation is complete and systems are ready for Systems Functional Performance Testing. The Commissioning Agent will prepare Pre-Functional Checklists to be used to document equipment



installation. Refer to Sections 23 05 41 NOISE AND VIBRATION CONTROL for HVAC PIPING AND EQUIPMENT, Section 23 05 93 TESTING, ADJUSTING, AND BALANCING FOR HVAC and Section 23 09 23 DIRECT-DIGITAL CONTROL SYSTEM FOR HVAC requirements. The Contractor shall complete the checklists. Completed checklists shall be submitted to the Commissioning Agent for review. The Commissioning Agent may spot check a sample of completed checklists. If the Commissioning Agent determines that the information provided on the checklist is not accurate, the Commissioning Agent will return the marked-up checklist to the Contractor for correction and resubmission. If the Commissioning Agent determines that a significant number of completed checklists for similar equipment are not accurate, the Commissioning Agent will select a broader sample of checklists for review. If the Commissioning Agent determines that a significant number of the broader sample of checklists is also inaccurate, all the checklists for the type of equipment will be returned to the Contractor for correction and resubmission. Refer to SECTION 01 91 00 GENERAL COMMISSIONING REQUIREMENTS for submittal requirements for Pre-Functional Checklists, Equipment Startup Reports, and other commissioning documents.

### 3.3 CONTRACTORS TESTS

- A. Contractor tests as required by other sections of Division 23 shall be scheduled and documented in accordance with Section 01 00 00 GENERAL REQUIREMENTS. All testing shall be incorporated into the project schedule. Contractor shall provide no less than 7 calendar days' notice of testing. The Commissioning Agent will witness selected Contractor tests at the sole discretion of the Commissioning Agent. Contractor tests shall be completed prior to scheduling Systems Functional Performance Testing.

### 3.4 SYSTEMS FUNCTIONAL PERFORMANCE TESTING:

- A. The Commissioning Process includes Systems Functional Performance Testing that is intended to test systems functional performance under steady state conditions, to test system reaction to changes in operating conditions, and system performance under emergency conditions. The Commissioning Agent will prepare detailed Systems Functional Performance Test procedures for review and approval by the Resident Engineer. The Contractor shall review and comment on the tests prior to approval. The Contractor shall provide the required labor, materials, and test equipment identified in the test procedure to perform the tests. The Commissioning Agent will witness and document the testing. The Contractor shall sign the test reports to verify tests were performed. See Section 01 91 00 GENERAL COMMISSIONING REQUIREMENTS, for additional requirements.



### 3.5 TRAINING OF PERSONNEL

- A. Training of the operation and maintenance personnel is required in cooperation with the Resident Engineer and Commissioning Agent. Provide competent, factory authorized personnel to provide instruction to operation and maintenance personnel concerning the location, operation, and troubleshooting of the installed systems. Contractor shall submit training agendas and trainer resumes in accordance with the requirements of Section 01 91 00 GENERAL COMMISSIONING REQUIREMENTS. The instruction shall be scheduled in coordination with the VA Resident Engineer after submission and approval of formal training plans. Refer to Section 01 91 00 GENERAL COMMISSIONING REQUIREMENTS and Division 23 Sections for additional Contractor training requirements.

**END OF SECTION**