

TULALIP, WASHINGTON

**SECTION 018100 - GENERAL COMMISSIONING REQUIREMENTS**

**PART 1 – GENERAL**

**1.01 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Special Conditions and other Specification sections, apply to work in this section.

**1.02 SUMMARY**

- A. This Section includes general requirements that apply to implementation of commissioning without regard to systems, subsystems, and equipment being commissioned.
- B. This Section describes the process for the commissioning of the various building systems, defines the responsibilities for Contractor, and outlines the duties of all parties involved.
- C. The commissioning process shall be applied to all equipment, components, and systems as listed herein, including specified interfaces to and from equipment and systems provided under other Specification Sections. Basic requirements of commissioning are also listed within other Specification Sections.
- D. Contractor shall respond to commissioning agent requests in writing within 48 hours of notification.

**1.03 DEFINITIONS**

- A. Systems, Subsystems, and Equipment: Where these terms are used together or separately, they shall mean “as-built” systems, subsystems, and equipment.

**1.04 CONTRACTOR**

- A. Contractor shall be responsible for cooperating and coordinating their work during the commissioning process. They shall be responsible for performing all work required for the installation of the components and systems, and for operation during the commissioning process. They shall furnish all necessary resources to accomplish the installation and the commissioning.

**1.05 COMMISSIONING AUTHORITY**

- A. The Owner will secure the services of an independent Commissioning Authority for this project. The Commissioning Authority is responsible to the Owner and shall have the authority to grant final acceptance of each system commissioned.
- B. If conditions beyond Contractor’s control prevent full performance of these systems, then testing, verification and documentation of the systems’ performance shall be carried out at an appropriate, and mutually agreed upon time during the 12 months after Contract Completion at no additional cost to the Owner.

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### 1.06 COMMISSIONING DOCUMENTATION

- A. Commissioning Plan – Created by the Commissioning Authority during the design phase of the project to identify scope of commissioning for the project and a preliminary schedule of activities for use during the project by members of the Commissioning Team.
- B. Meeting Minutes – Issued to all members of the Commissioning Team after each commissioning meeting. Generated by the Commissioning Authority.
- C. Start-up Plan – Submitted by Contractor to identify methods used for start-up, start-up schedule, and reports document completion. ALL equipment and system deficiencies and corrections made in the field shall be documented as part of start-up.
- D. Prefunctional Tests – Performed by Contractor prior to formal functional performance testing of systems, subsystems and or equipment demonstrated to the Commissioning Authority.
- E. Test Reports – Reports generated by Contractor to document testing included in the Contract.
- F. Commissioning Progress Report – Issued at the termination of each phase of the project by the Commissioning Authority.
- G. Commissioning Issues Log – Identifies system deficiencies found through the commissioning process.
- H. Functional Tests – Submitted by the Commissioning Authority for use during functional testing.
- I. Training Plan – Submitted by Contractor identifying personnel providing training and their qualifications, training supplemental materials and training session agendas.
- J. Closeout Documentation – As described in sections of the Contract.

### PART 2 – MATERIALS

#### 2.01 TESTING EQUIPMENT & INSTRUMENTATION

- A. Contractor shall provide all industry standard test equipment required for performing the specified tests. Any proprietary vendor specific test equipment shall be provided by that vendor or manufacturer.
- B. Any industry standard portable or hand-held setup / calibration devices required to verify the system setup shall be made available by Contractor at no cost to the Commissioning Authority or Owner.
- C. Contractor's instrumentation shall be of sufficient quality and accuracy to test and or measure system performance within the tolerances required. Instrumentation

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shall be calibrated at the manufacturer's recommendation intervals with calibration tags permanently affixed to the instrument. Instrumentation shall be maintained in good repair and operating condition throughout the duration of use on this project and shall be immediately re-calibrated or repaired if dropped and or damaged in any way during use on the project.

### PART 3 – EXECUTION

#### 3.01 THE COMMISSIONING TEAM

- A. In addition to the Commissioning Authority, the Commissioning Team shall consist of:
1. Construction Manager(s).
  2. Construction Manager's representative(s).
  3. Contractor's representative(s).
  4. Plumbing Contractor's representative(s).
  5. Fire Protection Contractor's representative(s).
  6. HVAC Contractor's representative(s).
    - a. Controls Contractor's representative(s).
    - b. Air Balance Contractor's representative(s).
  7. Electrical Contractor's representative(s).
    - a. Fire Detection Contractor's representative(s).
  8. System Designer representative(s).
- B. Representatives for the team shall be fully qualified service personnel, capable of performing the tasks of testing, starting, and trouble shooting the various building systems under their responsibility. Contractor shall submit the name of each representative to be part of the Commissioning team within 30 days of the award of Contract.
- C. Other personnel resources include manufacturer's representatives and service personnel as required by the Specifications.

#### 3.02 COMMISSIONING RESPONSIBILITIES

A. Commissioning Authority

Commissioning Authority shall plan, organize and implement the commissioning process, including the following:

1. Commissioning Meetings: Commissioning Authority shall chair commissioning meetings and prepare and distribute minutes to all Commissioning Team members.
2. Construction Observations: Commissioning Authority will make periodic site visits in order to evaluate system readiness for functional testing and to verify the installation is performed in a manner to allow system commissioning.

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3. Project Document Review: Commissioning Authority will review project submittals associated with systems to be commissioned in addition to the Designer review. Acceptance of submittals remains the responsibility of the system designer.
4. Operation & Maintenance Documentation Review: Commissioning Authority will review operation and maintenance documentation provided by Contractor for content and applicability to the project.
5. Equipment & System Start-ups: Commissioning Authority will review the start-up plans submitted by Contractor. Commissioning Authority shall be given the opportunity by Contractor to observe equipment start-ups and initial system operation test and checks.
6. Prefunctional Testing: Commissioning Authority shall develop prefunctional testing documentation for use on the project by Contractor.
7. Functional Testing: Commissioning Authority shall develop functional testing documentation for use on the project and supervise system functional testing and document results.
8. System Training: Commissioning Authority shall review the Training Plan submitted by Contractor and document that satisfactory training has been provided to the Owner' designated operating staff. Training program shall include system demonstration. Adequacy of training shall be determined by the Commissioning Authority and Construction Manager(s). Attendance at training sessions shall be at the Commissioning Authority's option.
9. Performance Monitoring: Commissioning Authority shall monitor performance of the temperature control system after building occupancy through the use of the system trending capabilities.

### **B. Contractor**

Within 30 days of the award of Contract, Contractor shall submit the names of all the trades people who will be part of the commissioning process. Contractor, and all his sub-trades and suppliers, shall cooperate with the Commissioning Authority in the commissioning process. Contractor's responsibilities shall include:

1. At the initial commissioning scope meeting, to be held within 60 days of Contract award, Contractor shall review the project schedule and identify the milestone commissioning activities. Milestone commissioning activities shall include, but are not limited to; equipment start-ups, system start-ups, testing activities performed by Contractor, readiness of each major system, and system functional testing as part of the commissioning process.

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2. Attend commissioning meetings, and complete action items arising from them, as required to allow the commissioning process to proceed on schedule.
3. Complete and provide all system readiness documentation required by the commissioning process including, without limitation, prefunctional testing documentation.
4. Provide a Start-up Plan for each piece of equipment and system that is identified to be commissioned. Notify the Commissioning Authority a minimum of 14 days before start-up of major equipment and or systems.
5. Provide personnel and testing instrumentation required to operate and test equipment and systems as part of functional performance testing. Testing may include calibration verification of system devices. Testing shall take place under the direct supervision of the Commissioning Authority. Contractor shall be responsible for reimbursing the Owner and Commissioning Authority for costs associated with retesting of systems that fail initial testing.
6. Closeout Documentation: Contractor shall assemble and submit for review by the Commissioning Authority all documentation associated with each system before acceptance of the system will be granted.

C. Owner

1. The Owner will ensure the availability of operating staff for all scheduled instruction and demonstration sessions. This staff will possess sufficient skills and knowledge to operate and maintain the installation following attendance at these sessions.
2. Attendance at system functional testing activities shall be at the Owner's option, although testing activities shall not be delayed to permit this opportunity.

3.03 COMMISSIONING PROCESS

A. General

The commissioning process depends upon proper coordination between all Commissioning Team members, strict adherence to schedule and completion of all required documentation. Responsibilities of each team member are described in this and other sections of the Contract.

B. Commissioning Project Phases

1. Construction Phase
2. Acceptance Phase
3. Post Acceptance Phase

C. Construction Phase

1. Commissioning Meetings:

An initial Commissioning Scope Review meeting will be held with all members of the Commissioning Team at the beginning of the project. Periodic Commissioning Team meetings will be held as necessary to review progress of commissioning work and coordinate activities. Meetings will be held as determined necessary by the Commissioning Authority. Contractor shall anticipate one (1) commissioning meeting per month during the construction phase.

2. Commissioning Schedule:

Assist in the development of a written schedule that integrates the commissioning activities into the construction schedule specified in Division 1. Update of the commissioning schedule to reflect changes in the Work will be done as necessary. The commissioning schedule shall include at least the following:

- a. Submission of Operation & Maintenance information for commissioned systems.
- b. Schedule for systems, subsystems, and equipment startup, including services of manufacturers' authorized service representatives, and performance of pretest checks.
- c. Schedule for functional performance testing, including seasonal testing.

3. Schedule for Owner's operating personnel training.

4. Equipment & System Start-Up:

Before any equipment or system is started, the Start-up Plan, including all prestart checks provided by the equipment manufacturer, must be completed and results documented.

5. Initial Operation

Contractor is responsible to inspect systems, subsystems, and equipment to determine readiness for operation. Once Contractor completes the testing, balancing, and calibration of all components and systems, Contractor shall operate all systems through all specified modes of operation, and test the system responses to specified abnormal or emergency conditions. It is the responsibility of Contractor to complete the system and perform this functional and performance check before the commissioning team performs functional acceptance testing.

Functional acceptance testing included in the commissioning process is verification that Contractor has provided a complete and functioning

system in accordance with the Contract requirements. It is NOT an opportunity for Contractor to determine deficiencies and work remaining.

Functional testing of the system shall be terminated and re-scheduled if it is deemed by the Commissioning Authority that the system is not ready for functional testing. Costs associated with the additional time and resources required to re-schedule and repeat testing due to a lack of system readiness, shall be born by Contractor.

D. Acceptance Phase

1. Functional Acceptance Testing:

Systems identified for commissioning shall be operated through the entire specified sequence of operations as directed by the Commissioning Authority for verifying acceptable operation. Contractor shall provide all testing instrumentation required for verification of proper system operation and calibration of devices.

2. Training and Demonstration:

Training for Owner's operating staff shall commence once system functional acceptance testing has been successfully completed, and the Training Plan has been reviewed and approved. Training shall be as required in sections of the specification.

3.04 SYSTEM(S) TO BE COMMISSIONED

A. Commission all equipment, components, and systems, including specified interfaces to and from equipment and systems as specified in other Specification Sections.

B. The following equipment and or systems, as applicable, shall be commissioned as part of the Work of this Contract:

1. Domestic hot water heating system (water heaters, pumps, controls, etc.);
2. Heating hot water (boiler, hydronic ceiling radiation, pumps, glycol feed equipment, etc.) generation and distribution system;
3. Cooling (chillers, ice storage system, pumps, heat exchanger, etc.) generation and distribution system;
4. Air distribution systems (central air handling units, gas-fired make-up air units, VAV boxes, cabinet unit heaters, unit heaters, dampers, valves, operators, variable frequency drives, etc.);
5. Exhaust Systems (roof ventilators, exhaust fans, etc.);
6. Intake Systems (relative to location with exhaust air from building exhaust systems, delivery truck exhausts, etc.);
7. Automatic Temperature Controls system (Direct Digital Control);
8. Controls Sequence of Operation;
9. Computer room split systems (computer room air conditioners, etc.);
10. Plumbing System (sewage pumps, booster pumps, etc.);
11. Kitchen Hood Equipment and make-up air systems;

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12. Fire Protection System;
13. HVAC Integration Systems;
14. Energy Management Systems; and
15. Indoor Air Quality.

**END OF SECTION 01810**