PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

B. OPR and BOD documentation are included by reference for information only.

1.2 SUMMARY

A. Section includes general requirements that apply to implementation of commissioning without regard to specific systems, assemblies, or components.

(BEDIT TEXT BELOW FOR APPLICATION COMMISSIONING SECTIONS)

B. Related Sections:
   1. Division 01 Section “Commissioning of Building Enclosure” for commissioning process activities for the building enclosure systems, assemblies, equipment, and components.
   2. Division 21 Section "Commissioning of Fire Suppression Systems" for commissioning process activities for fire suppression systems, assemblies, equipment, and components.
   3. Division 22 Section "Commissioning of Plumbing" for commissioning process activities for plumbing systems, assemblies, equipment, and components.
   4. Division 23 Section "Commissioning of HVAC" for commissioning process activities for HVAC&R systems, assemblies, equipment, and components.
   5. Division 26 Section "Commissioning of Electrical Systems" for commissioning process activities for electrical systems, assemblies, equipment, and components.
   6. Division 27 Section "Commissioning of Communication Systems" for commissioning process activities for communication systems, assemblies, equipment, and components.
   8. Division 31 Section "Commissioning of Site Utility Systems" for commissioning process activities for site utility systems, assemblies, equipment, and components.

1.3 DEFINITIONS

A. A/E: Architect and Design Engineer.

B. BAS: Building Automation System.

C. BECx: Building Enclosure Commissioning.
D. BECxA: Building Enclosure Commissioning Authority.

E. BOD: Basis of Design. A document that records concepts, calculations, decisions, and product selections used to meet the OPR and to satisfy applicable regulatory requirements, standards, and guidelines. The document includes both narrative descriptions and lists of individual items that support the design process.

F. CAP: Corrective Action Plan

G. CC: Controls Contractor.

H. CM: Construction Manager.

I. Commissioning Plan (Cx Plan): A document that outlines the organization, schedule, allocation of resources, and documentation requirements of the commissioning process.

J. CxA: Commissioning Authority.

K. DDC: Direct Digital Controls.


M. GC: General Contractor.

N. HC: HVAC Contractor.

O. Owner: Owner’s Representative.


Q. OPR: Owner's Project Requirements. A document that details the functional requirements of a project and the expectations of how it will be used and operated. These include Project goals, measurable performance criteria, cost considerations, benchmarks, success criteria, and supporting information.

R. PC: Pre-functional Checklist.

S. PM: Project Manager.

T. Systems, Subsystems, Equipment, and Components: Where these terms are used together or separately, they shall mean "as-built" systems, subsystems, equipment, and components.


1.4 COMMISSIONING TEAM

A. Members Appointed by Contractor(s): Individuals, each having the authority to act on behalf of the entity he or she represents, explicitly organized to implement the commissioning process through coordinated action. The commissioning team shall consist of, but not be limited to,
representatives of Contractor, including Project superintendent and subcontractors, installers, suppliers, and specialists deemed appropriate by the CxA.

B. Members Appointed by Owner:

1. CxA: The designated person, company, or entity that plans, schedules, and coordinates the commissioning team to implement the commissioning process. Owner will engage the CxA under a separate contract.
2. Representatives of the facility user and operation and maintenance personnel.
3. Architect and Engineering design professionals.

1.5 RESPONSIBILITIES

A. OWNER’S RESPONSIBILITIES

1. Provide the OPR documentation to the CxA and Contractor for information and use.
2. Assign operation and maintenance personnel and schedule them to participate in commissioning team activities.
3. Provide the BOD documentation, prepared by Architect and approved by Owner, to the CxA and Contractor for use in developing the commissioning plan, systems manual, and operation and maintenance training plan.

B. CONTRACTOR’S RESPONSIBILITIES

1. Contractor shall assign representatives with expertise and authority to act on its behalf and shall schedule them to participate in and perform commissioning process activities including, but not limited to, the following:
   a. Evaluate performance deficiencies identified in test reports and, in collaboration with entity responsible for system and equipment installation, recommend corrective action.
   b. Cooperate with the CxA for resolution of issues recorded in the Issues Log.
   c. Attend commissioning team meetings held on a monthly basis.
   d. Integrate and coordinate commissioning process activities with construction schedule.
   e. Review and accept construction checklists provided by the CxA.
   f. Complete paper construction pre-functional checklists as Work is completed and provide to the Commissioning Authority on a weekly basis.
   g. Review and accept commissioning process test procedures provided by the Commissioning Authority.
   h. Complete commissioning process test procedures.
   i. Develop and document the following for CxA’s review
      1) Test, check and start up forms
      2) Air and water balance reports
   j. Complete opposite season functional test procedures as outline by the CxA.
   k. Respond, in writing to the CxA’s proposed Corrective Action Plan (CAP) within 15-working days
      1) For items where the contractor agrees, they shall provide a timetable to make corrective action.
      2) For items where the contractor disagrees, they shall describe why they disagree.
3) If the contractor believes a corrective action is outside the scope of their contract, they shall submit a field work order request with detailed justification.

l. The Contractor shall be responsible for the cost of CxA to witness more than one additional test per system at a rate of $1,000 per test (Refer to CxA’S Responsibilities)

C. CxA’s RESPONSIBILITIES

1. Provide review comments on the 100% DDs and 100% CDs related to the commissioned system for compliance with the design intent and Owner’s Project requirements. The CxA shall review the design; identify design issues and/or conflicts that would present a problem for the total system commissioning.

2. Organize and lead the commissioning team.

3. Provide commissioning plan.

4. Convene commissioning team meetings.

5. Provide Project-specific construction checklists and commissioning process test procedures.

6. Verify the execution of commissioning process activities using random sampling. The sampling rate may vary from 1 to 100 percent. Verification will include, but is not limited to, equipment submittals, construction checklists, training, operating and maintenance data, tests, and test reports to verify compliance with the OPR. When a random sample does not meet the requirement, the CxA will report the failure in the Issues Log.

7. Prepare and maintain the Issues Log.

8. Prepare and maintain completed construction checklist log.

9. Witness systems, assemblies, equipment, and component startup.

10. Compile test data, inspection reports, and certificates; include them in the systems manual and commissioning process report.

11. The CxA will witness the initial functional test and one additional functional test for each system that failed the initial functional test. In addition, the CxA will witness opposite season functional testing.
   a. The CxA will issue a Corrective Action Plan (CAP) after the initial functional tests are complete for each failed functional test. The CAP is to be reviewed and commented by the Contractor (Refer to Contractor’s Responsibilities).
   b. If more than one additional functional test is needed the cost of this test is the responsibility of the Contractor at a rate of $1,000 per test. (Refer to Contractor’s Responsibilities)

12. The CxA shall sign off on the warranty period start for the major pieces of equipment.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 GENERAL DOCUMENTATION REQUIREMENTS

A. With assistance from the installing contractors, the CxA will prepare Pre-Functional Checklists for all commissioned components, equipment, and systems
B. Red-lined Drawings: The contractor will verify all equipment, systems, instrumentation, wiring and components are shown correctly on red-lined drawings. Preliminary red-lined drawings must be made available to the Commissioning Team for use prior to the start of Functional Performance Testing. Changes, as a result of Functional Testing, must be incorporated into the final as-built drawings, which will be created from the red-lined drawings. The contracted party, as defined in the Contract Documents will create the as-built drawings.

C. Operation and Maintenance Data: Contractor will provide a copy of O&M literature within 45 days of each submittal acceptance for use during the commissioning process for all commissioned equipment and systems. The CxA will review the O&M literature once for conformance to project requirements. The CxA will receive a copy of the final approved O&M literature once corrections have been made by the Contractor.

D. Demonstration and Training: Contractor will provide demonstration and training as required by the specifications. A complete training plan and schedule must be submitted by the Contractor to the CxA four (4) weeks prior to any training. A training agenda for each training session must be submitted to the CxA one (1) week prior the training session.

3.2 SYSTEMS TO BE COMMISSIONED

(EDIT TEXT BELOW FOR APPLICABLE SYSTEMS TO BE COMMISSIONED)

A. ENVELOPE
   1. New wall, glazing and roof construction is to be verified.
      a. A mach-up of each should be performed and compared to detail before construction proceeds.

B. FIRE SUPPRESSION
   1. Fire Alarm System
   2. Fire Sprinkler System

C. HVAC
   1. Cooling Plant, including but not limited to the following equipment:
      a. Two (2) chillers
      b. One (1) cooling tower
      c. Two (2) primary chilled water pumps
      d. Two (2) secondary chilled water pumps
      e. One (1) condenser water pump
      f. Refrigerant detection and ventilation system
      g. Associated electrical systems
      h. Associated controls
   2. Heating Plant including but not limited to the following equipment:
      a. Two (2) water tube non-condensing hot water boilers
      b. Two (2) heating hot water pumps
      c. Associated electrical systems
      d. Associated controls
   3. Air handler, exhaust fans, unit heaters and associated controls serving the [Building] including but not limited two:
      a. One (1) dual duct air handler
      b. One (1) kitchen exhaust/make-up air unit
c. Dual duct VAV boxes
   d. Toilet Exhaust Fans

4. Building Metering
   a. Natural Gas
   b. Water

5. Building Automation System

D. PLUMBING
   1. Rain-water harvesting system, including but not limited to the following equipment:
      a. Two (2) cisterns
      b. Associated pumps
      c. Associated electrical systems
      d. Associated controls
   2. Domestic hot water system, including but not limited to the following equipment:
      a. Domestic water heater
      b. Re-circulating pump
      c. Associated electrical systems
      d. Associated controls
   3. Water softening system. (If Applicable)

E. ELECTRICAL
   1. Lighting Control System
   2. Generation System, including but not limited to the following equipment:
      a. Solar PV array
      b. Wind Turbine
   3. Existing switchgear and substations
   4. Existing Emergency Generators
   5. Emergency Generators, ATS Switches, and Emergency power systems.
   6. Electrical Monitoring System
   7. Building Metering
      a. Electric Incoming (Main)
      b. Generated Wind Power
      c. Generated Solar Power

F. COMMUNICATION SYSTEMS
   1. Medical Call Systems

END OF SECTION 019113