SECTION **01 91 23**

**HVAC COMMISSIONING**

1. GENERAL
   * + 1. RELATED DOCUMENTS
          1. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
       2. SUMMARY
          1. Section includes the contractor commissioning responsibilities.
          2. Related Sections:

Materials, Equipment and Systems included in commissioning scope are identified in other Division 23 Specification Sections:

Section 01 91 00 Commissioning

Section 01 91 07 Building Envelope Commissioning

Section 01 91 21 Fire Suppression Commissioning

Section 01 91 22 Plumbing Commissioning

Section 01 91 26 Electrical Commissioning

Section 01 91 27 Communications Commissioning

Section 01 91 28 Electronic Safety and Security Commissioning

Section 01 77 00 Closeout Procedures

Section 01 79 00 Demonstration and Training

* + - * 1. Section 01 91 00 includes detailed requirements for execution and support of the commissioning process for construction and post-occupancy phases. That section shall be reviewed thoroughly for full understanding of the commissioning process requirements.
        2. Additional Demonstration and Training requirements for commissioned materials, equipment and systems are defined in Section 01 91 79 Demonstration and Training for Commissioned Systems.
        3. For definitions related to Commissioning, refer to specification section 019100,1.5.
      1. QUALITY ASSURANCE
         1. The Contractor shall provide a Mechanical Commissioning Supervisor. The Mechanical Commissioning Supervisor shall have ten (10) years’ experience in mechanical contracting. The Mechanical Commissioning Supervisor shall become familiar with the Owner's project requirements and the requirements of the commissioning process as defined in this Section and in Section 019113, General Commissioning Requirements. Mechanical systems commissioning shall be accomplished under the supervision of the Commissioning Authority. The Mechanical Commissioning Supervisor shall assist the Commissioning Authority in coordinating and executing the required commissioning activities.
         2. The Mechanical Commissioning Supervisor shall review submittal data for conformance with the requirements of the Project, shall monitor compliance with the requirements specified herein for storage and protection of equipment during construction, shall authorize the initial starting of equipment and systems in a manner to avoid damage to equipment, shall oversee start-up, testing and balancing, and shall document that the scheduled and specified performance requirements of each system have been accomplished. The Owner’s Rep shall also be notified by the Supervisor in advance of start-up activities for all major equipment.
         3. Refer to ASHRAE Guideline 1-2013, The HVAC Commissioning Process, and Guideline 4-1993, and Preparation of Operating and Maintenance Documentation for Building Systems.

1. PRODUCTS
   * + 1. TEST EQUIPMENT
          1. As specified in Section 01 91 00 Commissioning.
          2. All test equipment shall be provided by the contractor.
2. EXECUTION

This Section uses the term "Architect." Change this term to match that used to identify the design professional as defined in the General and Supplementary Conditions.

Verify that Section titles referenced in this Section are correct for this Project's Specifications; Section titles may have changed.

* + - 1. COMMISSIONED SYSTEMS
         1. Commissioned Systems include:

HVAC systems including: steam and condensate system, hot water heating systems, boilers, chemical water treatment systems, chilled water system, chillers, air distribution systems, air terminal unit systems, VAV, AHU, chilled beams, duct silencers, dampers, humidifiers and controls, exhaust air systems and building pressurization controls, variable frequency drives & motors, refrigeration equipment and controls, dedicated split system air conditioners and heat pumps, test and balance verification, thermometers & gauges, vibration isolation, heat recovery systems

HVAC controls including: component FPT and calibration, control air supply, air terminal units (non-lab), laboratory air valves, trend logs, status review screens, checks and alarming, network communication, dashboard, metering (to include verification of communication to Ion database), controls sequences for HVAC systems (HVAC equipment, AHU, H&V, exhaust air fans, differential bypass valve, air terminal units, VAV / CV, heat exchangers, variable speed pumps, cabinet unit heaters, humidifiers, water heaters, heating coils / radiant panels, labs with VAV fume hoods, steam generator, switchover from normal to emergency power and vice versa, equipment failure modes and recovery, graphic display).

Lab and vivarium systems: fume hoods; monitoring systems for freezers, incubators; biological safety cabinets, animal transfer stations, emergency HVAC backup for vivarium

Environmental monitoring system for vivarium lighting, ventilation, and pressurization controls.

* + - 1. REPORTS, CHECKLISTS AND TESTS
         1. Prepare reports, checklists and tests as identified in each of the Division 23 specification sections.
         2. In addition to specific reports, checks and tests identified in each Division 23 specification sections, the table below identifies commissioned materials, equipment and systems that require the Receiving Reports (RR), Prefunctional Checks (PFC) and Functional Performance Testing (FPT).
         3. Materials, equipment and systems that require Receiving Reports (RR), Prefunctional Checklists (PFC) and Functional Performance Testing (FPT) are noted in the table below.
         4. The design drawings and specifications (contract documents) supercede if any conflicts exist between this table and the drawings and specifications.

| Material/Equipment /System | Section | RR | PFC | FPT | Notes |
| --- | --- | --- | --- | --- | --- |
| HVAC General | 23 00 10 | NR | Req |  |  |
| Variable frequency drives | 23 00 10 | NR | Req | Req |  |
| Vibration isolation | 23 00 10 | NR | Req | NR |  |
| Performance Verification | 23 00 90 | NR | Req | Req |  |
| Testing, Adjusting and Balancing | 23 00 95 | NR | Req | Req |  |
| Piping, Valves and Accessories | 23 10 00 | NR | Req | Note 1 | Note 1: Not Required except as noted otherwise below |
| Meters | 23 10 00 | NR | Req | Req |  |
| Heat Trace | 23 10 00 | NR | Req | Req |  |
| Underground Preinsulated Piping Systems | 23 15 00 | Req | Req | NR |  |
| Insulation | 23 25 00 | NR | Req | NR |  |
| Equipment | 23 60 00 | Note 2 | Req | Note 1 | Note 1: Not Required except as noted otherwise below  Note 2: Required except as noted otherwise below |
| Chilled Beams | 23 60 00 | NR | Req | Req |  |
| Fan Coil Units | 23 60 00 | NR | Req | Req |  |
| Terminal Units, Unit Heaters | 23 60 00 | NR | Req | Req |  |
| Water Treatment Systems | 23 60 00 | NR | Req | Req |  |
| Humidifiers | 23 60 00 | NR | Req | Req |  |
| Glycol Makeup systems | 23 60 00 | NR | Req | Req |  |
| Blow down Separators | 23 60 00 | NR | Req | Req |  |
| Radiant Heating System | 23 60 00 | NR | Req | NR |  |
| Air Distribution | 23 70 00 | NR | Req | Note 1 | Note 1: Not Required except as noted otherwise below |
| Dampers | 23 70 00 | NR | Req | Req |  |
| Fans | 23 70 00 | NR | Req | Req |  |
| Gauges | 23 70 00 | NR | Req | Req |  |
| Fluid Measurement Device | 23 70 00 | NR | Req | Req |  |
| High Induction Lab Exhaust Fans | 23 70 10 | Req | Req | Req |  |
| Automatic Temperature Controls | 23 80 00 | NR | Req | Req |  |
| Variable Volume Pressurization Controls | 23 80 10 | NR | Req | Req |  |
| Integrated Systems Testing |  |  |  | Req |  |

* + - 1. SCHEDULE
         1. Refer to Specification Section 01 91 00, 3.4 for duration of functional testing for HVAC systems.

END OF SECTION