

SECTION 15990

TESTING AND BALANCING

PART 1 GENERAL

1.1 DESCRIPTION

- A. This section covers testing and balancing mechanical air and water systems by an Air Balance Agency (hereafter referred to as the Agency in this Section) directly employed by the General Contractor and not by the Subcontractor.
- B. Work in this Section: Principals items include:
  - 1. Coordinate the work in this section with related sections.
  - 2. Balance supply air systems.
  - 3. Furnish a typewritten report to the Architect.
- C. Related work not in this section: Cleaning of mechanical systems prior to final balancing.

1.2 QUALITY ASSURANCE

- A. Qualifications of Agency: Total systems balance shall be performed by an independent Agency certified by the Associated Air Balance Council (AABC), which specializes in and whose business is dedicated to the testing, adjusting, and verification of HVAC system performance. Work of this section shall conform to AABC Specifications referred to in Chapters 17 through 26 of the AABC National Standards and other criteria as set forth in this Section.
- B. Information furnished to the air balance agency: Agency shall be furnished with the following information and data:
  - 1. Preliminary: Within 30 days after selection and approval:
    - a. Drawings of the work.
    - b. Specifications covering all work to be tested and balanced.
    - c. Written consent.
  - 2. Exceptions: Following shall be furnished as submittals are approved and the work progresses:
    - a. Change orders affecting work to be tested and balanced.
    - b. Copies of approved submittals for work to be tested and balanced, including approved Shop Drawings, equipment submittals and the approved temperature control drawings.
    - c. Project schedule
    - d. Completely operable systems.

1.3 SUBMITTALS

- A. Conform to Division 1 and requirements herein.
- B. Preliminary Submittals: Within 30 days after receipt of above preliminary information and data, the Agency shall submit the following through Contractor:
  - 1. Agenda: Submit 3 sets of complete Agenda including drawings of the entire HVAC system to be balanced. Agenda shall represent final Total System Balance Report as per Chapter 29 of AABC National Standards, 1982, less field test data. Areas of intended field test inputs shall be represented by fully labeled blank spaces.

2. Pre-construction Plan Check and Construction Review Reports: Submit 3 sets of defined in AABC National Standards, 1982 (Chapter 25) including reports:
    - a. Demonstrating complete understanding of the design intent by the Test and Balance Agency.
    - b. Identifying potential problems for performing the Total System Balance and suggesting possible changes to allow most effective Total System Balance.
  3. Total System Balance Schedule: Submit 3 sets of this schedule based on critical-path-network-analysis method and furnishing the Contractor and Owner's representative with a planning tool to include the testing and balancing into overall project schedule. Schedule shall consist of graphical and columnar reports and shall be updated periodically to reflect total project schedule.
- C. Guarantee: Submit 3 sets of AABC National Project Performance Guaranty.
- D. Certifications: Submit the certificates from mechanical Subcontractor as specified hereinafter.
- E. Reports, Test Reports, and Information: Submit six sets as specified hereinafter.

#### 1.4 WORK BY MECHANICAL SUBCONTRACTOR

- A. Mechanical subcontractor shall certify in writing that the system, as scheduled for balancing, is operational and complete. Completeness shall include not only the physical installation, but mechanical subcontractor's certification that prime movers, fans, pumps, refrigeration machines, boilers, etc., are installed in good working order, and full load performance has been preliminarily tested under certification of mechanical subcontractor. Before any testing and balancing is started, a complete report shall be set to the Agency.

### PART 2 PRODUCTS (not applicable)

### PART 3 EXECUTION

#### 3.1 REQUIRED TESTING AND BALANCING SERVICES

- A. Chapters referred to below are detailed in the "National Standards Manual of Associated Air Balance Council" Current Edition, including, but not limited to, those mentioned herein.
- B. Pre-construction Services Include:
1. Total System Test and Balance Schedule.
  2. Preliminary Plan Review and Report - Chapter 26.
- C. Performance Testing and Balancing of Air Conditioning Systems Includes:
1. Supply Air Systems - General, Chapter 16.
  2. Return and Exhaust Air Systems - Chapter 19.
  3. Reports and Report Forms - Chapter 26.

#### 3.2 WORK BY MECHANICAL SUBCONTRACTOR

- A. Preparation: Before any testing or balancing operations are started, the Mechanical Subcontractor shall adjust belts and sheaves, align parts, oil and grease bearings in accordance with manufacturer's instructions, clean exterior surfaces of coil tubes and fins, flush interior of coil tubes until clean, and check mixing damper operation to insure free operation and activation by correct thermostat. Install filters and start up equipment.

- B. Certification: Mechanical Subcontractor shall certify in writing that the system, as scheduled for balancing, is operational and complete. Completeness shall include not only the physical installation, but also Mechanical Subcontractor's certification that prime movers, fans, pumps, refrigeration machines, boilers, etc., are installed in good working order, and full load performance has been preliminarily tested under certification of Mechanical Subcontractors. Before any testing and balancing is started a complete report shall be sent to Agency.

### 3.3 TOTAL SYSTEM BALANCE

- A. Each piece of equipment and the entire HVAC system shall be adjusted to ensure proper function of all controls, proper distribution of air, maintenance of temperatures, elimination of drafts and vibration, and left in first class operating condition.
- B. Air System: System shall be adjusted to obtain the air volumes as indicated, but shall be readjusted if required to obtain design temperature in each room. The Mechanical Subcontractor shall make drive changes, install additional dampers, vanes, grille baffles, etc., as may be required on the job, at no extra cost to Owner.
- C. Test Holes: The test holes shall be provided in a straight duct as far as possible downstream of elbows, bends, take-offs, and other turbulence generating devices, to optimize reliability of flow measurements.

### 3.4 REPORTS

- A. Submit all data reports in typewritten form.
- B. Supply Fans: Submit data from all supply, return and exhaust fans tabulating:
  - 1. Quantity of air in CFM at each air outlet or inlet.
  - 2. Dry and wet bulb temperatures at each thermostat to be the nearest 1/10 of 1 degree.
  - 3. Outdoor dry and wet bulb temperatures, wind direction and velocity, and barometric pressure at the time of tests are conducted.
  - 4. RPM of fan or blower.
  - 5. RPM of motor.
  - 6. Ampere input of each motor (one reading on each leg if 3-phase).
  - 7. "No Load" amperage and brake horsepower calculations on all motors 1/2 HP or larger.
  - 8. Static pressure in inches water gauge at inlet of fan or blower.
  - 9. Duct traverse data.

### 3.5 FINAL DRAWINGS

- A. The Agency shall prepare a complete set of full scale drawings showing actual duct runs and outlet/inlet locations. Drawings shall be keyed to and submitted with Air Balance Report; the Contract Mechanical Drawings are not acceptable for this purpose.

END OF SECTION