

SECTION 23 05 93 – TESTING, ADJUSTING, AND BALANCING

PART 1 - GENERAL

1.1 SUMMARY

- A. Contractor shall start-up and operate the mechanical systems, and assist the Owner's testing, adjusting, and balancing (TAB) firm as required.
- B. Owner shall contract for the TAB firm to perform the final testing, adjusting, and balancing of the following systems:
 - 1. Chilled Water.
 - 2. Supply Air.
 - 3. Return Air.
 - 4. Exhaust Air.
 - 5. Condenser Water.
 - 6. Heat Recovery.
 - 7. Heating Hot Water.

1.2 START-UP

- A. Before starting the mechanical systems, provide a certificate stating that the systems are ready for start-up and the following conditions have been met:
 - 1. Safety controls installed and fully operational.
 - 2. Qualified personnel available to operate the systems.
 - 3. Permanent electrical connections made to all equipment.
 - 4. Chiller started up and adjusted by factory technicians.
 - 5. Clean air filters installed.
 - 6. Pump and fan drives properly aligned.
 - 7. Mechanical equipment rooms, including plenums, vacuum cleaned.
 - 8. Control devices calibrated, including air terminal unit volume controllers.
 - 9. Verify that the minimum overload relay rating is not less than the full load current of each motor to allow the motor to be operated at full load current.
 - 10. Open fire dampers and volume dampers.
 - 11. Position manual valves for normal system operation.
 - 12. Preliminary balancing report.

PART 2 - PRODUCTS

Not used.

PART 3 - EXECUTION

3.1 TESTING, ADJUSTING, AND BALANCING

- A. Notify the Owner at least 30 days before the balancing work can be started. Balancing shall not commence until all systems have been cleaned and treated and start-up requirements have been completed.
- B. Contractor and subcontractors shall coordinate their work with, and assist with, the Owner's TAB firm as required to include but not limited to the following:
 - 1. Furnish ladders, scaffold, staging, and accessories as required; change fan drive; provide sheaves and pump impellers as required; arrange for access to all dampers, valves, and balancing devices; and operate equipment during time TAB work is being performed. Control contractor and sheet metal contractor shall be made available, as their services are required.
 - 2. Remove and replace ceiling tile as necessary. The extent of ceiling tile removal for access and the time schedule of removal and replacement shall be as directed by the TAB firm.
- C. Work with the TAB firm to do the following:
 - 1. Provide sufficient time for testing and balancing prior to substantial completion.
 - 2. Make corrections to achieve system balance without delay.
 - 3. Adjust fan drives, and provide sheaves and belts as directed by the TAB firm to achieve system balance.
 - 4. Maintain all systems in full operation during the complete testing and balancing period.
 - 5. Employ control technicians to make necessary adjustments to the control systems to facilitate the balancing process.
 - 6. Check and realign any V-belt drives and/or shaft coupling drives if they have been adjusted during the balancing process.
 - 7. Provide pump-impellers to achieve the specified flow rate.
- D. Allowable deviation in the measured quantities shall not exceed plus or minus 5 percent of the design. Contractor shall correct any part of the air and water systems affecting balancing and/or temperature control.
- E. Balance Report submittals:
 - 1. Preliminary submittal: 3 copies of the rough draft report for review by the Commissioning Authority, UW Design Services and UW Engineering Services, to include the following:

- a. A list of items which will prevent the balancer from providing a full and complete balance.
 - b. Narratives that describe all problem areas that may require major construction or design changes.
 - c. Narratives that describe the building systems and control systems to demonstrate comprehension of system operation, including system diversity.
 - d. The balancing agenda which reiterates the scope of the balancing work and the intended order of activity.
- 2. Final submittal:
 - a. Provide 4 copies of the approved report in binders per requirements indicated in Division 01, Section "Closeout Procedures," (except imprint bound edge of volumes with the name of the building and the words "Testing, Adjusting, and Balancing Report".)
 - b. Imprint front of the volume with the name of the building, project name, project number, Owner, General Contractor, Mechanical Subcontractor, and the TAB firm.
 - c. Provide 3 copies for the Owner.
- F. The final report shall include a narrative and the data necessary to describe the system(s), operating equipment, and system's function.
- G. Identify equipment using the construction drawing identifiers.

END OF SECTION 23 05 93