

SECTION 01455 - MECHANICAL EQUIPMENT TESTING, ADJUSTING, AND BALANCING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Contractor-employment of Test and Balance Agency.
2. Test and balance services for mechanical equipment.

B. Related Requirements:

1. Section 13810 - Energy Management System (EMS).
2. Section 15700 - Heating, Ventilating, and Air Conditioning Equipment: HVAC system equipment.
3. Section 15800 - Air Distribution: HVAC system ductwork and diffusers.
4. Appendix B - Testing, Inspection, and Observation by Owner:
 - a. Architect-Engineer Site Observation: Site observation by Owner's Architect and Engineer Consultants.
 - b. Civil Engineering Consultant Site Observation: Site observation by Owner's Civil Engineering Consultant.
 - c. Owner furnished Construction Laboratory (CTL) tests and inspections.

1.2 SELECTION AND PAYMENT

A. Employment and payment for services of a Test and Balance Agency (TBA) to perform specified testing and balancing of environmental systems shall be by Contractor.

B. Approved Test and Balance Agencies:

1. Melink Corporation, (513) 965-7300, Melink Corporation Email Group, retail@melinkcorp.com.
2. Precisionaire of Texas, (281) 449-0961, Mike Delcamp, mdelcamp@precisionaire-tx.com, Felix Garza, fgarza@precisionaire-tx.com.
3. Test and Balance Company, (678) 393-9401, John Skipper, jskipper@tabconline.com.

1.3 RESPONSIBILITIES

A. Contractor Responsibilities

1. Provide balancing dampers as specified and shown on the Drawings for proper balancing of systems.
2. Prepare system for test and balance as follows:
 - a. Install, start up, check out, and adjust HVAC systems per Drawings and Specifications and have fully operational with deficiencies corrected on or before Walmart's Substantial Completion Date. For new Lennox Rooftop Units and Munters Air handling Units, the contractor shall coordinate and schedule with the equipment manufacturer's commissioning technician for the commissioning, testing and unit air flow balancing. For equipment from other manufacturers, refer to the individual specification sections for start-up and balancing requirements.
 - b. One day prior to starting test and balance procedure, provide new filters equal in quality to factory installed filters. Filters: Class 1, 30 percent efficiency, radial pleat design with 15 pleats per linear foot.
 - c. Verify that duct work is clean and sealed tight against leaks.
 - d. Verify that controls, dampers, and actuators are installed, adjusted, and calibrated.
 - e. To maintain schedules and prevent return trips, have experienced personnel available to correct HVAC system deficiencies while TBA is scheduled on site.
 - f. Secure control dampers after test and balance as directed by TBA.
3. For balancing of air distribution devices and existing equipment noted to be balanced on the mechanical floor plans, obtain the services of one of the specified Test and Balance Agencies (TBA).
4. Upon completion of final systems Balance and Commissioning, a copy of TBA report and the equipment commissioning report shall be uploaded to the Building Portal EVOCO workspace for the Contractor and

Engineer of Record (EOR) review. If HVAC system deficiencies exist, a letter listing those deficiencies shall also be uploaded to the Building Portal for the Contractor's correction. If the Contractor fails to respond and correct these deficiencies within seven days after uploading letter, the Owner will authorize repairs as judged necessary and take necessary contractual action to recover adequate compensation for repair expenses.

5. As a result of HVAC system performance or operational deficiencies, a return trip by TBA to complete Test and Balance will be authorized when deemed necessary by Walmart Mechanical Services or the Engineer of Record, and shall be performed at no additional expense to Walmart.
6. Notify and schedule the TBA when HVAC systems are ready for test and balance. If Contractor fails to schedule the TBA, Walmart will authorize TBA to be scheduled into store during week following Contract Substantial Completion Date and take necessary contractual action to recover adequate compensation for the expenses.

1.4 TESTING, ADJUSTING, AND BALANCING BY CONTRACTOR AND EQUIPMENT MANUFACTURER.

A. Procedures:

1. Contractor shall be responsible for unit start-up and to coordinate unit testing and balancing with the manufacturer's commissioning technician for new HVAC Rooftop Units and Air Handling Units. Unit controls and Energy Management systems and equipment shall be verified to determine that equipment, duct work, etc. is installed and will operate. Deficiencies shall be immediately reported to Contractor's job site superintendent and the Walmart Mechanical Services Construction Manager.
2. The equipment manufacturer's commissioning technician shall inspect and test Novar Controls for the following control functions as a minimum:
 - a. Fan control.
 - b. Stage 1 cooling control.
 - c. Stage 1 heating control.
 - d. Stage 2 cooling control.
 - e. Stage 2 heating control.
 - f. Dehumidification control.
 - g. Economizer control.
 - h. Unit shut down upon fan operation loss, and alarm received at offices. (Novar, Danfoss or CPC, Walmart Maint. Dept., Walmart EMS). Verify with Walmart Support Service. Contact: Walmart Support Service, Novar Controls Corporation , 114 South College Ave. Suite-D, P.O. Box 3345, Fayetteville, AR 72702, (479) 521-7795
3. Record readings and testing data for inclusion into final report.
4. Perform the following testing and balancing. Record readings for inclusion into final report:
 - a. Test and adjust fan speeds to deliver design CFM and record rpm and full load amperes at design CFM. Record voltage at each unit.
 - b. Test and adjust system for design CFM outside air.
 - c. Test and record suction and discharge external static pressures at respective plenums. Seal access holes with rubber or metal snap-in plugs. The use of duct tape to seal access holes will not be permitted.
 - d. Test and record entering air temperatures. (Dry Bulb heating and cooling; Wet Bulb cooling.)
 - e. Test and record leaving air temperature. (Dry Bulb heating and cooling; Wet Bulb cooling.)
 - f. Test and record outside air Dry Bulb and Wet Bulb temperatures.
 - g. Test and adjust the volume dampers in the main duct runs to each diffuser, grille, and register to provide $\pm 10\%$ of design CFM requirements.
 - h. Identify each diffuser, grille, and register to location and area.
 - i. Record Unit Data and Motor Data for each air system tested per appropriate NEBB or AABC test report.
5. Test and record voltage and amperage measurements and calculate KW rating per appropriate NEBB or AABC procedure for each electric heater or electric coil heating section.
6. Verify and record proper operation of all stages of gas heating sections or gas radiant heaters.

B. Reports:

1. Using data obtained during test, determine if cooling side of roof top unit is performing in accordance with published data. One representative unit's record data for each size RTU shall be plotted on a psychometric

- chart for comparison to manufacturer's published literature. These psychometric charts shall be part of the final test report. Any deficiencies shall be listed on the HVAC Deficiency Report.
2. Before leaving job site, provide Contractor's representative a neat, legible deficiency list of all remaining HVAC system deficiencies for correction. The content of this HVAC Deficiency Report shall be provided to Walmart by phone before leaving job site.
 3. Submit three bound copies of the start-up commissioning report..

1.5 TESTING, ADJUSTING, AND BALANCING BY TBA.

- A. Testing and balancing shall be supervised by a Registered Professional Engineer. Personnel involved in execution of the work for TBA shall be technicians experienced and trained specifically in testing and balancing of mechanical systems. Instruments used by TBA shall be recently and accurately calibrated and maintained in good working order. Verification of calibration shall be submitted in final test report if so requested by Walmart. Test, adjust, and balance in accordance with governing NEBB or AABC Procedural Standards.
- B. Procedures:
 1. Coordinate and schedule with contractor to confirm equipment commissioning has been completed by the equipment manufacturer's commissioning technician prior to balancing.
 2. Perform the following testing and balancing. Record readings for inclusion into final report:
 - a. Test and adjust system for design CFM outside air for existing equipment indicated to be balanced on the mechanical floor plans.
 - b. Test and adjust the volume dampers in the duct runs to each diffuser, grille, and register to provide $\pm 10\%$ of design CFM requirements.
 - c. Identify each diffuser, grille, and register to location and area.
- C. Reports:
 1. If any air system or outlet is not within ± 10 percent of design capacity after the start-up and commissioning is completed, determine the reason. Check duct work and plenums for leaks; coils, filter, for excessive pressure drop, etc.; and list on HVAC Deficiency Report.
 2. Before leaving job site, the TBA shall provide Contractor's representative a neat, legible deficiency list of all remaining HVAC air balance deficiencies for correction. The content of this HVAC Deficiency Report shall be provided to Walmart by phone before leaving job site.
 3. Record data on applicable NEBB or AABC certified reporting forms. Report shall include data provided by the equipment commissioning technician and final airflow balance by the TBA including a summary sheet of deficiencies with status (corrected or not corrected at time of report) and recommendations. TBA is required to upload final report to the Test and Balance Folder on project's workspace in EVOCO within 14 days after final test and balance.
- D. Guarantee
 1. Test and balance for period of ninety days from date of final acceptance of the Test and Balance Report. During this period, TBA shall correct deficiencies at no cost to Walmart.

PART 2 - PRODUCTS

Not Used.

PART 3 - EXECUTION

Not Used.

END OF SECTION