

SECTION 15990 - TESTING, ADJUSTING, BALANCING, AND COMMISSIONING

PART I - GENERAL

1.01 DESCRIPTION

- A. The Mechanical Contractor shall furnish the testing, adjusting, balancing, and commissioning of the HVAC system as a part of the HVAC rooftop purchase from the rooftop manufacturer. The rooftop manufacturer shall incorporate the services of a certified national TAB firm for all of the stores in their assigned territories.
- B. The TAB firm shall be responsible for scheduling the testing, adjusting, and balancing directly with the Walgreens project superintendent at least 2 weeks in advance. The TAB firm will e-mail a completion checklist (see item D below, add any other items as deemed necessary) to Walgreen's superintendent, to be filled-out by GC to assure that HVAC system shall be fully ready before TAB firm arrives at site. Walgreens will provide an updated project list and superintendent contact list with e-mail addresses and cell phone numbers to the HVAC manufacturer and TAB firm on a regular basis via e-mail. The TAB firm will request project design mechanical drawings (M1. 1, M2. 1, M2.2: CAD files via e-mail) and specifications from GC two weeks prior to site visit.
- C. The Walgreens superintendent shall notify the GC of the scheduled balancing date. The GC shall coordinate with the mechanical and electrical sub-contractors in order to have the appropriate tradesmen on site to correct any deficiencies in wiring, ductwork, or equipment start-up. See the standard format in the appendix of this section.
- D. This work shall be scheduled to be performed after the HVAC system has been started by the mechanical contractor and prior to fixture date. The following must be complete prior to the TAB firm's visit:
 - 1. All field mounted accessories must be assembled and economizer/OA dampers installed and wired. Units must be properly tagged per design drawings.
 - 2. Gas piping completed and gas turned on.
 - 3. All power wiring completed, disconnects mounted, and power turned on, fan rotation checked.
 - 4. All control wiring completed including thermostats and smoke detectors.
 - 5. All doors and windows installed and ceiling files in place.
 - 6. All duct work with balancing dampers and diffusers fully installed.
 - 7. Clean filters installed.
- E. If, for any reason, the HVAC system is not operational in time for the TAB firm to schedule the work prior to fixture date, the GC shall be responsible for any and all additional costs incurred by rescheduling the TAB firm.

1.02 TESTING, ADJUSTING, BALANCING, AND COMMISSIONING

- A. The purpose of testing, adjusting, and balancing the HVAC system is to ensure optimal performance, comfort, and energy efficiency for the Owner's benefit. This service covers all heating and air-conditioning and exhaust ventilation systems.
- B. A certified report shall be submitted to the Walgreens superintendent (2 copies), the General Contractor, and the Mechanical Contractor within 2 weeks of completion.
- C. The TAB work shall be completed in accordance with the following checklist:

GENERAL

1. Inquire about any design, equipment, and installation problems.
2. Compare installed system to design mechanical plans for the specific store.
3. Compare design system with prototype for variations, additions, deletions.
4. Document design specifications for report.
5. Ensure all fans are running for balance.
6. Measure initial building pressure.

INSPECT THE HVAC SYSTEM

7. Inspect rooftop units and document any deficiencies.
8. Record unit nameplate data.
9. Check thermostats for proper wiring and settings.
10. Check for correct fan rotation (include condenser fans).
11. Check conditions of filters and coils.
12. Check position of outside air dampers.
13. Check gas lines and condensate lines.
14. Check belt tension and pulley alignment.
15. Check disconnects switches and covers.
16. Check any fan noise and vibration.
17. Check heating/cooling, and economizer modes of RTU's.
18. Check condensate trap (Costguard) installation
19. Check exhaust fans and distance between OA intake and exhaust
20. Check entrance heater and door air curtain (at receiving door) for proper installation
21. Check exhaust diffuser and register at the one hour photo machine for proper location.
22. Check supply diffuser locations at entrance, at windows and in-front of cooler/freezer
23. Check electric wall heaters for quantity, locations and proper operation.
24. Check ERV (in applicable areas per Walgreens criteria) installation with its ductwork and controls.
25. Check proper installation of all volume dampers

26. Check for proper installation of flexible ducts for bends, lengths and clamps.

TEST, ADJUST AND BALANCE THE HVAC SYSTEM

27. Measure and adjust diffuser supply and return airflows within 10% of the design, using balancing dampers and locking them in that position. Mark damper balance positions.

28. Adjust flows to provide design OA flow for proper pressurization.

29. Adjust RPM as necessary to achieve design.

- Check actual amps versus motor FLA for evaporator fan, compressors and condenser fans.
- Note adjustments made on pulleys.
- Measure final RPMs.
- Measure space temperatures (Checkout, 1hr photo, pharmacy, office, three spot temperatures in sales area, and SA/RA/OA temperatures. Temperature readings shall be recorded after the system has been running over 8 hours and thermostats have been properly set in.

30. Adjust damper airflows at branch take-off s first and at diffusers second.

31. Check for drafts and hot/cold spots.

32. Ensure slightly positive building pressure.

- Fine tune position of OA dampers.
- Measure final building pressure.

FINAL REVIEW

33. Prepare the final test report per forms included in the Walgreens web site.

34. Provide HVAC punch-list to Walgreen's superintendent before leaving the site; also e-mail it to Walgreen's construction manager.

35. Review report and data for completeness.

36. Discuss findings and results with Walgreen's superintendent.

- D. Air quantities shall be balanced to within +/-10% of design as a general rule. However, in some cases, the air quantities may need to be adjusted differently in order to ensure acceptable comfort levels, positive building pressure, noise consideration etc. Any excessive variation at certain diffusers (over 20%) must be reported with explanations if it cannot be balanced as required. However the total RTU supply CFM must be within +/- 10%.
- E. The TAB technician shall notify the GC and the Walgreen's project superintendents of any deficiencies needing immediate attention. The G.C. shall have the mechanical and electrical contractors available to promptly correct any such problems (i.e. replace burned out motors, failed thermostats, incorrect wiring, bad circuit breakers and starters, dirty filters, missing dampers, undersized RTU outside air intakes).

- F. In the event that the TAB firm is unable to perform a complete TAB and commissioning of the entire system due to deficiencies in the completion of items outlined above, the Walgreens superintendent may request that the TAB firm schedule a follow up visit to test, balance, and commission any equipment that could not be completed on the initial visit. The G.C. shall be responsible to issue a purchase order and reimburse the HVAC manufacturer for the additional cost incurred, including travel and applicable expenses.

1.03 **REPORTS TO BE SUBMITTED**

(Obtain the copies of the report forms from Walgreens web site)

<http://facilities.walgreens.com> (A/E Tools, under "Engineering")

A. TAB SCHEDULING

E-mail the TAB scheduling form to Walgreen superintendent with a copy to construction manager at Deerfield, to obtain project completion status and to schedule site visit for air balancing. The response must be requested via email with copy to project manager at Deerfield in a "YES or NO" format with explanation as necessary.

B. HVAC PUNCH LIST

E-mail a rough draft HVAC punch-list of the following items to Walgreen's field superintendent and Walgreen's construction project manager at Deerfield for this project.

1. Any HVAC items not completed as of air balance date.
(RTUs, ERV, Exhaust Fans, Ductwork, Dampers, Diffusers, Insulation, Heaters)
2. Any incorrect installations that need to be addressed.
3. Any items omitted or revised from the design drawings.
4. If TAB firm needs to be rescheduled due to incompleteness of the systems.
5. Include copy of the checklist of system completion received by TAB firm
6. A field summary report outlining all appropriate observations

C. SYSTEM STARTUP REPORT

RTU Startup report: Provide full report for each rooftop unit along with any deficiencies that need to be corrected.

D. CHECK LIST REPORT

HVAC Check-list report: Provide full report for all items listed in three pages of the check-list included in the output forms on Walgreen's web site.

E. AIR BALANCE REPORT

1. Provide air balance report for each diffuser and RTU/Exh fan to include design/actual CFM, along with store plan with diffuser and RTU locations and tag matching with CFM summary.
2. Use forms in the attached report forms for air balance report.

3. Provide exhaust CFM report along with exhaust fan locations on above plan.
4. Provide balance & pressurization schedule for the store.
5. Space temperatures, SA/RA/OA temperatures.

F. EQUIPMENT DATA

1. Provide RTU nameplate data listing make, model #, serial #, nominal tons, number of compressors, HP and model # of each compressor along with make, evaporator fan motor data, condenser fan motor data, final RPM of evaporative fan, pulley and belt sizes, filter sizes etc.
2. Exhaust fan make, model #, motor data, CFM.

G. HVAC PLAN SHOWING DIFFUSER/RTU/EXH FANS

CAD plan received from design engineer showing RTU, diffusers and exhaust fans along with tags as described above in item #F.

H. PHOTOGRAPHS

Include digital pictures of RTUs, ERV, and any other items that would help in understanding the items reported as deficient in the inspection report as per item # D.

I. ADDITIONAL INFORMATION (if any)

Include any additional information not listed above that might be useful for the specific store in understanding above report.

END OF SECTION

