

HVAC COMMISSIONING

DOCUMENT NUMBER: 23 08 00

APPLICATION: ELEMENTARY, MIDDLE AND HIGH SCHOOL

DATE OF ISSUE:

05-17-13 - Minor Revisions

06-14-11 - First Issue

NOTES:

1. HVAC systems are to be commissioned in accordance with the attached specification.

ATTACHMENTS:

Specification Section 23 08 00 – HVAC System Commissioning, **dated 05-17-13**

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

- A. The purpose of this contract is to provide HVAC construction commissioning.
- B. Refer to, and become familiar with the project's construction documents and the District's mechanical design criteria, standard 15100.

1.2 COMMISSIONER QUALIFICATIONS

- A. The Commissioning contractor shall be a member in good standing with the National Environmental Balancing Bureau's Building System Commissioning group [BSC], or the Associated Air Balance Council's Associated Commissioning Group [ACG]. The Commissioner must be totally independent, having no affiliation with any contractor, design engineer, or equipment manufacturer/supplier of HVAC related equipment.
- B. Selected Commissioning contractors are prohibited from:
 - 1. Performing, or being contracted for Test & Balancing on any **HCPS** project while on this list.
 - 2. Performing, or being contracted for engineering design services on any **HCPS** project while on this list.
- C. The Commissioner shall have a fully staffed office and have been regularly engaged in the testing and commissioning of heating, ventilating, and air conditioning systems.
- D. The Commissioner shall provide proof that personnel performing work has successfully completed at least five (5) projects of similar size and scope, A complete list of reference projects, including a person's name, phone number, and e-mail address of contacts, shall be submitted with the bid.
- E. All instruments used shall be accurately calibrated within six months use on this project, and maintained in good working order. If requested, the test shall be conducted in the presence of the **HCPS**.

PART 2 - PRODUCTS (not used)

PART 3 - RESPONSIBILITIES

3.1 COMMISSIONER'S RESPONSIBILITIES

- A. **Witness Pre-functional testing and start-up testing of all major HVAC equipment: air handlers, pumps, chillers, and so on. These tests are to be performed by the mechanical contractor.**
- B. The commissioner is to verify in writing the operational test data of the balancer's previously tested equipment. The quantity of verifications to be as follows:

SECTION 23 08 00
HVAC SYSTEM COMMISSIONING

1. 50% of Air Devices, Fan Coils, Fans, Variable Air Volume Boxes, Temperature and Humidity sensors.
 2. All Air Handlers, package HVAC equipment, etc.
 3. All chillers.
 4. All pumps.
 5. Heat Exchanger.
 6. All 100% outside air cooling units.
 7. Building Pressurization
 8. Building Automation System (BAS) – *see below*.
- C. Based on operational system availability, a minimum of 50% of all major system components including point- by-point controls verification shall be functionally tested and documented as early as possible and prior to any recommendation for substantial completion. If functional testing identifies any significant design/operating variance and upon written direction from the **HCPS**, additional system testing will take place. **HCPS** will determine the additional scope and approve charges for additional services prior to commencing work.
1. **Functional Test Reports forms will be provided by HCPS for project consistency.**
- D. Use Data-loggers and submit temperature and humidity Graphic Charts.
- E. Check 50% of all **BAS sensors** for proper calibrations, and list all controls requiring adjustment by control installers. A software functional performance point by point check-out and test, along with verification forms, shall be included in the commissioning report.
- F. Controls Testing: Functionally test and record control temperature or pressure readout of the device and compare to actual measured condition. Include in the commissioning report.
- G. Functionally test the Sequence Of Operation for all major systems such as AHU's, Chillers, DX equipment larger than 5 tons, and so on; and subsystems such as VAV's, Fans, Fan Coil Unit's, and so on; to verify proper operation. All interlocks shall be field verified. Include description of operation in the commissioning report.
- H. All deficiencies shall be noted by the commissioner in a field report and submitted to the SDHC on a weekly basis. All deficiencies will be uniquely numbered and tracked. All deficiency items are to be delineated as to the responsible party. The consolidated deficiency list is to be included with the commissioning report. Indicate each item as to the status; "not resolved" or "resolved". All parties involved in the contract shall sign off on the field report, including Engineer, GM (or GC), mechanical contractor, controls contractor, Test and Balance Agency, etc.
- I. Communicate with the installer that upon correction of the deficiencies, the installer shall notify the commissioner in writing that the problem is resolved. If the deficiency is not corrected, the installer and balancer will be responsible for the cost of additional re-testing.
- J. The commissioner shall verify the balancing of the HVAC systems (air, water, electrical, and capacities) to be the District's standard of +/- 5% of design.

3.2 COMMISSIONER SUBMITTALS

- A. Provide a commissioning plan and document review within thirty days upon receipt of contract. The plan review should include comments and recommendations on any discrepancies that may hinder balancing or commissioning. This plan review shall be transmitted directly to the District's mechanical engineer.
- B. **The commissioner is to receive approved equipment submittal data from the engineer, completed equipment pre-function testing forms from the balancer, and completed start-up forms from the balance.**
- C. Submit agenda of test procedures for each system, describing standards for the testing and commissioning of the air conditioning, heating, and ventilating systems for the approval of the **HCPS**. This agenda shall include all forms for each system and component, with specified data from the project plans and specifications included on the forms.
- D. The commissioning report shall be submitted within 30 calendar days after the T&B report is accepted. The report shall document the function of all systems at the time of substantial completion of the project. All outstanding deficiencies shall be documented in the report. After occupancy testing of any outstanding deficiencies, temperature and humidity logging and after occupancy visits will be submitted as supplemental reports. When all commissioning activities are complete, a final commissioning report will be submitted including all documentation and testing results.

3.3 COMMISSIONER MEETINGS, INSPECTIONS AND TESTS

- A. Inspections: 1) Make weekly meetings with the contractor and inspections of the systems during a summer construction project, and 2) bi-weekly meetings with the contractor and inspections for phased projects. Systems shall be to be tested for proper installation of balancing devices and general construction as related to HVAC design intent testing, and commissioning work. A written report of each job visit and meeting shall be sent to the HCPS.
- B. A minimum of one after-occupancy inspection shall be made within 90 days of the final commissioning. Observe and report any thermal comfort, humidity, drafts, water leaks or puddling, noise problems, etc. Any alterations to the final commissioning report shall be transmitted as a revised report to the **HCPS**.
- C. Provide temperature and humidity Graphic Charts by the use of Data-loggers furnished by the Agency. One Graphic Chart per Data-logger. The 8.5"x11" Graphic Chart to be continuous for five school days and the weekend. Refer to Figure 1 and Figure 2 for examples. Data-loggers to be in place after the site has been occupied.
 - 1. Where classrooms have self contained, individual ac units, provide one data logger for 50% of the classrooms. The same applies to Media Centers and Cafeterias.
 - 2. For central VAV systems, provide two data-loggers for each system.
 - 3. Provide 8.5"x11" floor plans showing the location of the Data-loggers.
 - 4. The commissioner to provide two Graphic Charts of recordings; one, soon after occupancy and another, during the intermediate season.

3.4 COMMISSIONER WARRANTY AND REPORTS

SECTION 23 08 00
HVAC SYSTEM COMMISSIONING

- A. Provide a one year warranty commencing on the date of the accepted Final Commissioning Report. During the warranty period the HCPS may request a recheck of any equipment or device listed in test report.

- B. Provide five copies of tabulated report (also provide one CD) in neatly organized typed form with AABC or NEBB approved minimum data. Report will include start-up reports and drawings to coincide with the commissioning report. In addition, all reports shall incorporate a summary page(s) which shall include:
 - 1. General description of project (building type, system type, equipment description, etc.)
 - 2. Copies of reduced plan drawings that uniquely identify and cross reference air devices, VAV boxes, dampers, equipment, etc.
 - 3. Functional Performance Test Reports
 - 4. Temperature and Humidity Graphic Charts.
 - 5. Weekly/ Biweekly inspection reports.
 - 6. Consolidated deficiency list.
 - 7. Point by Point control verification.

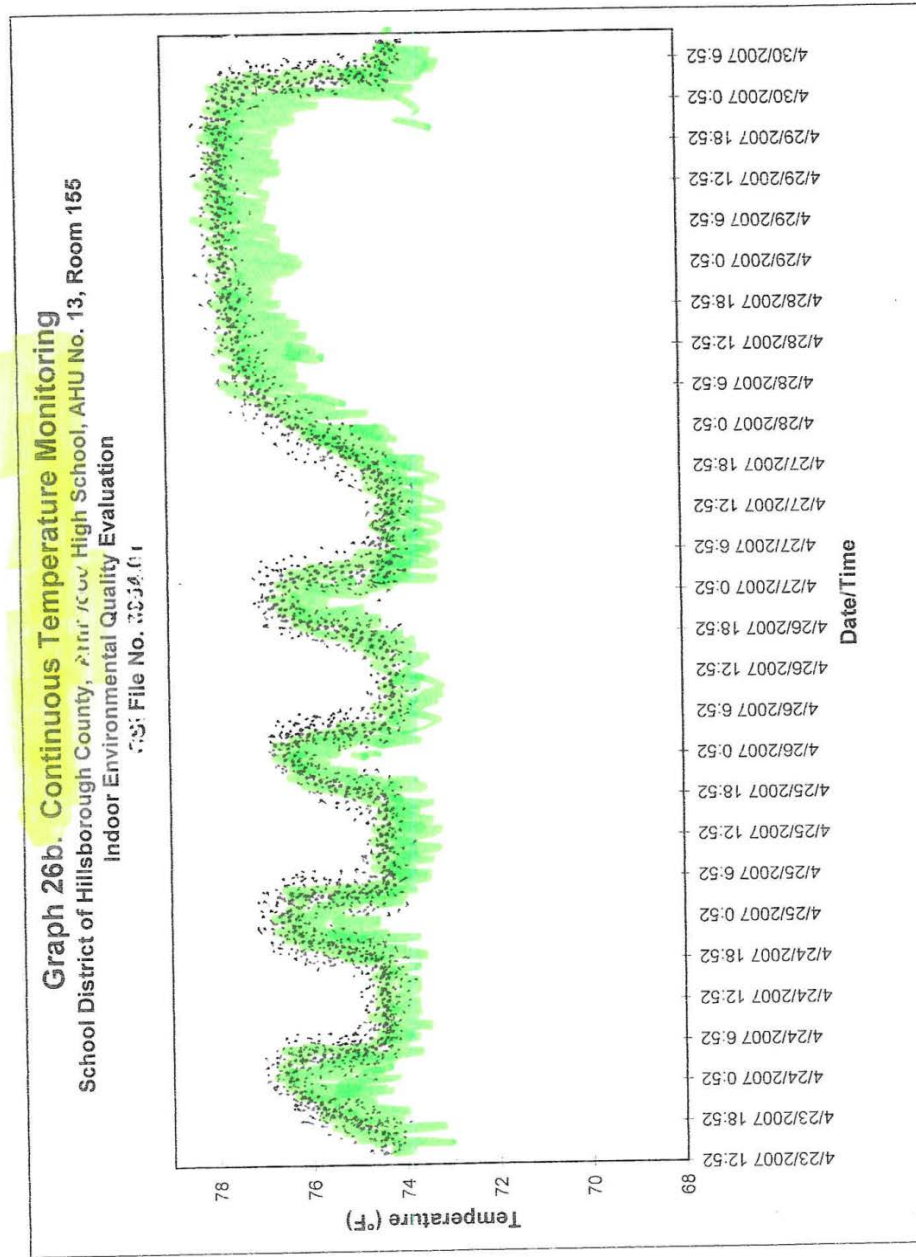


FIGURE 1 – Sample Graphic Chart of Recorded Temperatures

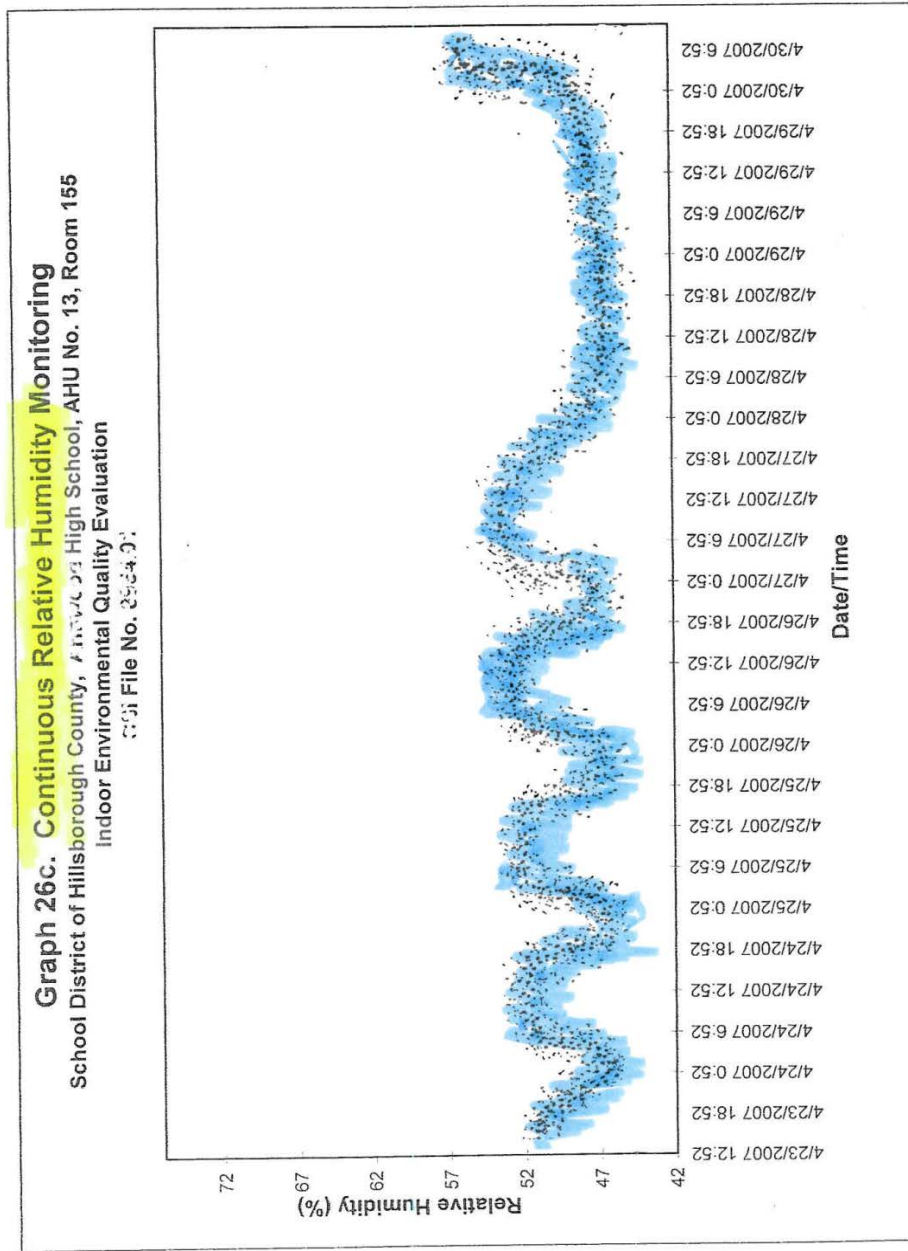


FIGURE 2 – Sample Graphic Chart of Recorded Humidity

END OF SECTION 23 08 00