

## **1.1 SUMMARY**

- .1 TAB is used throughout this Section to describe the process, methods and requirements of testing, adjusting and balancing for HVAC.
- .2 TAB means to test, adjust and balance to perform in accordance with requirements of Contract Documents and to do other work as specified in this Section.

## **1.2 QUALIFICATIONS OF TAB PERSONNEL**

- .1 Submit names of personnel certified to AABC or NEBB to perform TAB to Consultant within 90 days of award of contract.
- .2 Provide documentation confirming qualifications, successful experience. TAB contractor must have a minimum of five (5) years' experience to AABC, NEBB or SMACNA.
- .3 TAB: performed in accordance with the requirements of standard under which TAB Firm's qualifications are approved:
  - .1 Associated Air Balance Council, (AABC) National Standards for Total System Balance, MN-1.
  - .2 National Environmental Balancing Bureau (NEBB) TABES, Procedural Standards for Testing, Adjusting, Balancing of Environmental Systems.
  - .3 Sheet Metal and Air Conditioning Contractors' National Association (SMACNA), HVAC TAB HVAC Systems - Testing, Adjusting and Balancing.
- .4 Recommendations and suggested practices contained in the TAB Standard: mandatory.
- .5 Use TAB Standard provisions, including checklists, and report forms to satisfy Contract requirements.
- .6 Use TAB standard for TAB, including qualifications for TAB Firm and Specialist and calibration of TAB instruments.
- .7 Where instrument manufacturer calibration recommendations are more stringent than those listed in the TAB standard, use manufacturer's recommendations.
- .8 TAB Standard quality assurance provisions such as performance guarantees form part of this contract.
  - .1 For systems or system components not covered in TAB standard, use TAB procedures developed by TAB Specialist.
  - .2 Where new procedures and requirements are applicable to Contract requirements have been published or adopted by body

responsible for TAB Standard used (AABC, NEBB, or SMACNA), requirements and recommendations contained in these procedures and requirements are mandatory.

### **1.3 PURPOSE OF TAB**

- .1 Test to verify proper and safe operation, determine actual point of performance, evaluate qualitative and quantitative performance of equipment, systems and controls at design, average and low loads using actual or simulated loads.
- .2 Adjust and regulate equipment and systems so as to meet specified performance requirements and to achieve specified interaction with other related systems under normal and emergency loads and operating conditions.
- .3 Balance systems and equipment to regulate flow rates to match load requirements over full operating ranges.

### **1.4 EXCEPTIONS**

- .1 TAB of systems and equipment regulated by codes, standards to be to satisfaction of authority having jurisdiction.

### **1.5 CO-ORDINATION**

- .1 Schedule time required for TAB (including repairs, re-testing) into project construction and completion schedule so as to ensure completion before acceptance of project.
- .2 Do TAB of each system independently and subsequently, where interlocked with other systems, in unison with those systems.

### **1.6 PRE-TAB REVIEW**

- .1 Review contract documents before project construction is started and confirm in writing to the Departmental Representative adequacy of provisions for TAB and other aspects of design and installation pertinent to success of TAB.
- .2 Review specified standards and report to Consultant in writing all proposed procedures which vary from standard.
- .3 During construction, co-ordinate location and installation of TAB devices, equipment, accessories, measurement ports and fittings.

## **1.7 START-UP**

- .1 Follow start-up procedures as recommended by equipment manufacturer unless specified otherwise.
- .2 Follow special start-up procedures specified elsewhere in other Divisions.

## **1.8 OPERATION OF SYSTEMS DURING TAB**

- .1 Operate systems for length of time required for TAB and as required by the Departmental Representative for verification of TAB reports.

## **1.9 START OF TAB**

- .1 Notify the Departmental Representative seven (7) days prior to start of TAB.
- .2 Start TAB when building is essentially completed, including:
  - .1 Installation of ceilings, doors, windows, other construction affecting TAB.
  - .2 Application of weather stripping, sealing, caulking.
  - .3 All pressure, leakage, other tests specified elsewhere in other Divisions.
  - .4 All provisions for TAB installed and operational.
- .3 Start-up, verification for proper, normal and safe operation of mechanical and associated electrical and control systems affecting TAB including but not limited to:
  - .1 Proper thermal overload protection in place for electrical equipment.
  - .2 Air systems:
    - .1 Duct systems clean.
    - .2 Ducts are airtight to within specified tolerances.
    - .3 Correct fan rotation.
    - .4 Fire, smoke, volume control dampers installed and open.
    - .5 Access doors, installed, closed.
    - .6 Outlets installed, volume control dampers open.

## **1.10 APPLICATION TOLERANCES**

- .1 Do TAB to following tolerances of design values:
  - .1 HVAC systems: plus 5%, minus 5%.

#### **1.11 ACCURACY TOLERANCES**

- .1 Measured values to be accurate to within plus or minus 2% of actual values.

#### **1.12 INSTRUMENTS**

- .1 Prior to TAB, submit to the Departmental Representative list of instruments to be used together with serial numbers.
- .2 Calibrate in accordance with requirements of most stringent of referenced standard for either applicable system or HVAC system.
- .3 Calibrate within three (3) months of TAB. Provide certificate of calibration to the Departmental Representative.

#### **1.13 SUBMITTALS**

- .1 Submit, prior to commencement of TAB:
  - .1 Proposed methodology and procedures for performing TAB if different from referenced standard.

#### **1.14 PRELIMINARY TAB REPORT**

- .1 Submit for checking and approval of the Departmental Representative prior to submission of formal TAB report, sample of rough TAB sheets. Include:
  - .1 Details of instruments used.
  - .2 Details of TAB procedures employed.
  - .3 Calculations procedures.
  - .4 Summaries.

#### **1.15 TAB REPORT**

- .1 Format to be in accordance with referenced standard.
- .2 TAB report to show results in SI units and to include:
  - .1 Project record drawings.
  - .2 System schematics.
- .3 Submit an electronic copy of TAB Report to the Departmental Representative for verification and approval, in English.

#### **1.16 VERIFICATION**

- .1 Reported results subject to verification by the Departmental Representative.
- .2 Provide manpower and instrumentation to verify up to 30% of reported results.
- .3 Number and location of verified results to be at discretion of the Departmental Representative.
- .4 Bear costs to repeat TAB as required to satisfaction of the Departmental Representative.

#### **1.17 SETTINGS**

- .1 After TAB is completed to satisfaction of the Departmental Representative, replace drive guards, close access doors, lock devices in set positions, ensure sensors are at required settings.
- .2 Permanently mark settings to allow restoration at any time during life of facility. Markings not to be eradicated or covered in any way.

#### **1.18 COMPLETION OF TAB**

- .1 TAB will be considered complete when final TAB Report received and approved by the Departmental Representative.

#### **1.19 AIR SYSTEMS**

- .1 Standard: TAB to be to most stringent of this section or TAB standards of AABC or NEBB.
- .2 Do TAB of systems, equipment, components, controls specified in other Divisions.
- .3 Qualifications: personnel performing TAB to be qualified to standards of AABC or NEBB.
- .4 Quality assurance: Perform TAB under direction of supervisor qualified to standards of AABC or NEBB.
- .5 Measurements: to include, but not limited to, following as appropriate for systems, equipment, components, controls: air velocity, static pressure, flow rate, pressure drop (or loss), temperatures (dry bulb, wet bulb, dew point), duct cross- sectional area, RPM, electrical power, voltage, noise, vibration, amperage and volts for each stage of electrical heating coils.
- .6 Locations of equipment measurements: To include, but not be limited to, following as appropriate:

- .1 Inlet and outlet of dampers, filter, coil, fan, other equipment causing changes in conditions.
- .2 At controllers, controlled device.
  
- .7 Locations of systems measurements to include, but not be limited to the following as appropriate: Main ducts, main branch, sub-branch, run-out (or grille, register or diffuser).

**END OF SECTION**