

TABB Lab Performance Testing Certification Requirements

ICB Requirements for an Approved TABB Performance Testing Facility

Introduction

This document outlines the criteria for a Testing, Adjusting, and Balancing (TAB) facility to become an ICB-approved TABB Performance Testing Facility. The components that are outlined below are designed for a candidate to demonstrate the minimum competency for skills that are necessary to perform TAB work on major components of a typical HVAC system.

This document outlines the requirements for systems and components that are necessary to successfully conduct a TABB performance exam test at a facility. Some items that are necessary for the examination will be provided by the ICB prior to the examination and are not described here.

Minimum Instrumentation for an Approved TABB Practical Testing Facility

Instrumentation can be of any name brand considered industry standard for testing, adjusting, and balancing of HVAC systems but enough must be available to allow 5 candidates to work simultaneously in the facility.

Instrumentation **CANNOT** contain a functional camera or software intended to provide automatic balancing calculations of any kind. A testing facility is **NOT** required to maintain the calibration of an instrument so long as the instrument remains operational, and readings or measurements are repeatable.

TABB Instruments List

An Approved TABB Performance Testing Facility shall ensure that the instruments utilized for practical testing conform to the ICB standards listed below. Each instrument shall meet the Range, Minimum Accuracy, and Required Calibration (only for candidate provided equipment) criteria for each function.

1. Temperature Measuring Instrument
 - a. Range: 25° - 180°F
 - b. Minimum Accuracy: $\pm 1^\circ\text{F}$ from 25° - 180°F
 - c. Required Calibration: 24 Months
2. Electrical Measuring Instrument
 - a. Range: 0 - 600 Volts, 0 - 100 amps, 0 - 30 VDC

- b. Minimum Accuracy: 3% of Full Scale
 - c. Required Calibration: Digital - 12 Months, Analog - 6 Months
- 3. Rotation Measuring Instrument (Tachometer)
 - a. Range: 100 - 3,000 RPM
 - b. Minimum Accuracy: $\pm 1\%$ of reading
 - c. Required Calibration: 24 Months
- 4. Air Pressure Measuring Instrument - Static and Differential
 - a. Range: 0 - 10" WC
 - b. Minimum Accuracy: $\pm 3\%$ of reading
 - c. Required Calibration: 24 months
- 5. Air Velocity Measuring Instrument
 - a. Range: 100 - 2,500 FPM
 - b. Minimum Accuracy: $\pm 4\%$ of reading
 - c. Required Calibration: 24 months
- 6. Air Volume Measuring Instrument
 - a. Range: 100 - 1,500 CFM
 - b. Minimum Accuracy: $\pm 3\%$ of reading
 - c. Required Calibration: 24 months
- 7. Humidity Measuring Instrument
 - a. Range: 10% - 90% RH
 - b. Minimum Accuracy: 2% RH
 - c. Required Calibration: 24 Months

No calibration required for analog thermometer type of psychrometer
- 8. Hydronic Pressure Measuring Instrument Static and Differential
 - a. Range: 0 - 150 PSI
 - b. Minimum Accuracy: $\pm 3\%$ of reading
 - c. Required Calibration: 24 Months

Instrumentation Tool List with (Quantities)

- Digital Air Manometers (3)
- Airflow Capture Hoods (2) with skirt/hood sizes suitable for facility inlet/outlets
- Pitot Tube (3) sizes dependent on facility measurement locations
- Static Pressure Probes (3)
- Non-contact Tachometer (1)
- Contact Tachometer (1)
- Clamp On Ammeter, True RMS (1)
- Digital Anemometer (1)
- Digital Hydronic Manometers with hoses (2)
- Immersion probes to match p/t test port, if Schrader valves are not installed (3 sets)
- Hoses of sufficient quantity for facilities instrumentation
- Thermometer capable of reading dry bulb and wet bulb or relative humidity (1)
- Small adjustable wrench (3)
- Inspection mirror (5)
- Flashlight (5)
- Tape measure (5)



- Lockout Tagout Board/Kit
- Ladders of sufficient size, load capacity, and quantity for all contestants to safely perform tasks.
- Any required tools to gain access to fan and motor information and drive assembly

It is recommended that an Approved TABB Performance Testing Facility has additional instrumentation and batteries on hand, if an instrument fails during an exam.

Mechanical Systems:

The following requirements outline the equipment and components needed to successfully conduct each task during a TABB Performance Examination at a training facility.

Each of the systems and components listed below will be required. Equipment substitutions are generally not allowed and will need approval by ICB/TABB.

All ductwork will be designed and installed in accordance with SMACNA standards.

Station #1a

This station includes a section of rectangular duct on a duct system that meets the following requirements:

- The duct system will have enough straight duct to achieve reasonably laminar flow.
- The duct will have holes drilled in accordance with SMACNA TAB guidelines.
- The fan system can be either supply, return, or exhaust but must be capable of constant volume.
- The fan system must not be used for any other task to prevent interruptions in readings.
- The fan system must be capable of being safely turned on and off by the candidate.

Station #1b

This station encompasses sidewall registers. The fan system can provide either supply or return/exhaust air, but must meet the following requirements:

- The fan system shall have 4 terminals of the same size and type installed to SMACNA Standards and include manual volume dampers. The dampers shall not be face dampers.
- The fan system must be capable of delivering a constant volume of airflow and must be the same system as Station #1a.
- The fan system must be capable of being safely turned on and off by the candidate.

Station #2a

This station comprises of rectangular section of ductwork and outlets. It is important that the location of this station is the same system as that which is used in Station #2b, but Station #2a and Station #2b do not necessarily need to be on the same air side of the fan system so long as the duct system meets the following criteria:

- The duct system will have enough straight duct to achieve reasonably laminar flow.
- The duct will have holes drilled in accordance with SMACNA TAB guidelines.
- The fan system can be either supply, return, or exhaust but must be capable of constant volume.
- The fan system must not be used at any other station to prevent interruptions in readings.
- The fan system must be capable of being safely turned on and off by the candidate.

Station #2b

This station involves a fan system that can be a variety of options, such as a supply fan, exhaust fan, or return fan. The system filter, or simulated filter, can be functional or non-functional and installed only during testing, if desired. The fan system can be a normally operational fan system or a mock-up but must contain the following features:

- The fan system must be capable of being safely turned on and off by the candidate.
- The fan system must have a filter installed that causes a measurable pressure drop, simulated filters are also acceptable.
- The fan system must be able to have a static pressure measurement taken at the following locations: fan inlet, fan discharge, and both sides of the filter or simulated filter.

Station #2c

This station includes a fan system's motor and drive components. The fan system can be a functional fan or a mock-up (details provided by ICB upon request) that have the following requirements:

- The fan system must be capable of being safely turned on and off by the candidate.
- The fan system must have the motor and fan information available.
- The fan system must have a fan sheave and motor pulley that is safely accessible.
- The fan system must include an operational fan, motor, belt, guards, and disconnect box.

Station #3

This station encompasses a DDC controlled VAV and downstream outlets. The VAV and associated system must include the following:

- The fan system must have at least one single point calibration, pressure independent, Variable Air Volume (VAV) terminal unit attached to the ductwork. If necessary, provide adequate relief ductwork, or outlets/inlets installed as necessary to maintain sufficient static pressure.
- The fan system will have 4 outlets or inlets of the same size that can maintain a constant volume and rely on an AK (or similar) factor to calibrate airflow rate.
- The fan system will be capable of supplying sufficient pressure to adequately operate at least one VAV per manufacturer's specifications to provide a minimum of 600 Cubic Feet Per Minute (CFM).
- The fan system and associated VAV shall be installed so that the total airflow of the VAV can be verified by outlet summation utilizing a capture hood without modification.
- The VAV must have a Magnehelic (or similar) permanently installed at the flow sensor to display the differential pressure of the VAV.
- The fan system must be capable of being safely turned on and off by the candidate.

Hydronic Systems

Note that the hydronic systems do not require heating or cooling capability, only simulation of heating and cooling.

Station #4a

This station comprises of a pump that can be connected to a variety of hydronic systems but must include the following criteria:

- The hydronic system shall be physically separate from the hydronic station utilized for Station #5.
- The hydronic system will include at least one pump capable of having operating pressures accurately read by a hydronic manometer (or similar) at test ports, a block tight test performed, total water flow plotted and estimated, and the required operating conditions plotted on a manufacturer's chart to determine water flows, and impeller size.
- The pump will be a direct drive, centrifugal type (or similar) that provides a constant volume and is capable of being throttled by manual means to achieve the given system design.
- The pump must have a pump curve available, or one created, that can plot operating conditions to determine impeller size and estimated water flow.
- The pump curve must have a minimum of 3 impeller size options for the candidates to choose from.

- The target design value of the pump should sit in the design portion of the pump curve. A “flat” curve must not be utilized, unless the operational readings are clearly not plotted on the flat portion of the curve.
- The throttle valve at the pump outlet will be a ball, Calibrated Balance Valve (CBV), or triple duty type, correctly sized for circuit flow and connected load.
- A flow measuring station, either Venturi, CBV, orifice plate, or triple duty valve will be provided at an appropriate location to read total flow.
- An appropriate chart shall be provided for the flow measuring station.
- “Pete’s plugs” or other fittings (Schrader valves are recommended) shall be installed at the inlet and outlet of the pump and all flow measuring stations for pressure readings. The installed pressure gauges (if present) are not to be used for the practical examination.

Station #4b

The mock-up design for Station #4b is as follows:

- A simulated (i.e. non-powered) single-phase and three-phase circuit mock-up will be constructed to the design narrative provided by the ICB and utilized for the practical testing.
- Both circuits will be properly labeled with equipment data nameplates and include:
 - Knife switch for single phase circuit
 - Fused disconnect or starter for the 3-phase circuit
- Candidates will NOT be required to utilize NFPA 70E PPE at this station.

Station #5

This station is a waterboard circuit built to the following criteria:

- The hydronic system shall be a waterboard and will include at least one pump that can deliver a constant volume of measurable water flow to three water coils or simulated water coils regardless of valve position(s).
- The waterboard will have at least three water coils that are able to be measured and adjusted. If a waterboard has more than three coils, the additional coils shall be isolated for the duration of the practical exam.
- The waterboard will have a three-way valve on one coil with a calibrated balancing valve **OR** a ball valve with pressure ports on either side of it installed in the bypass line.
- The three-way valve must be able to have the position switched to full bypass mode by the candidate or proctor during the practical examination.
- Calibrated balancing valves to be installed at each coil to measure and adjust flow.
- Flow charts shall be provided for all CBVs or flow measuring devices in hard-copy form. If this presents an undue burden or one cannot be found for a necessary component, please consult ICB.