



HVAC Testing, Adjusting, and Balancing (TAB) of Air Distribution Systems

An Online Continuing Education Course for Engineers

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HVAC Testing, Adjusting, and Balancing (TAB) of Air Distribution Systems

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HVAC system efficiency, sound levels, and most important of human comfort are all influenced by system airflow. Testing, Adjusting, and Balancing (TAB) of the HVAC system is a useful process of measuring and regulating the amount of airflow in each area of the building.

Balancing is essential for any HVAC system to perform as per plans and expectations. It is an overall health check for your HVAC systems for providing the occupants with a comfortably conditioned space at the lowest energy cost possible. A well-balanced system will ensure the right amounts of air, to the right place, at the right temperature, and humidity, and at the right time while minimizing the distribution losses. To achieve this, it is important that the air distribution system and duct design are planned and installed in such a way that the balancing and the measuring of airflow are possible and that this work can be done accurately at minimum cost. TAB requires services of the specialized contractors who hold a professional certification to perform the measurements and adjustments on the HVAC systems.

In this 7-hr course, we will discuss why balancing an HVAC system is so important, why systems become unbalanced, what the balancing process entails and more. This 7-hour course will help engineers, architects, mechanical contractors in understanding the TAB process and interpreting the certified ventilation/balance report information. For those with knowledge and experience in TAB, this course will serve as a review and preparation for the CTAB Exam.

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Chapter 1 - Overview of Testing, Adjusting And Balancing

1.0. INTRODUCTION

Testing, adjusting and balancing (TAB) is a procedure that enables systematic checking and adjusting all the environmental systems in a building to ensure that the system is delivering the design air quantities at the required conditions to each air outlet. This involves adjusting dampers and measuring air throughput to each area. It also involves validating that the air handling equipment and fans are delivering the rated quantities of air according to the manufacturer's specifications.

TAB procedures are generally performed after the equipment is completely installed and serviced. It has three major steps:

- **Testing:** Testing is the use of specialized and calibrated portable instruments to measure temperatures, pressures, rotational speeds, electrical characteristics, velocities, and air and water quantities for an evaluation of equipment and system performance.
- **Adjusting:** Adjusting is the setting of balancing devices such as dampers and/or fan speed in addition to automatic control devices such as thermostats and pressure controllers with respect to design data.
- **Balancing:** Balancing is the regulation of airflow to achieve the desired or specified indoor air quality.

1.1 Why is TAB Important?

If the system is not balanced, it will lead to:

- Uncontrolled temperatures and humidity levels in different zones
- Uncomfortable hot and cold spots
- Uncontrolled positive or negative pressures and dust and odor issues
- Complaints of drafts and/or excessive noise

- Poor indoor air quality, stuffiness, and increased CO₂ concentration
- Potential equipment failures and a higher energy bill.

Properly tested, adjusted, and balanced HVAC systems will ensure uniform comfort conditions and in addition, identifies the problems associated with:

- Design and Installation: improper duct and fittings, leakage, missing grilles, and dampers, etc.
- Equipment: poorly performing, undersized, oversized, wrong speed, wrong voltages, etc.

Much of this information is not evident from a visual inspection and not obvious until you put test instruments on the equipment.

1.2 When is the Proper Time to Balance?

It is highly recommended for newly installed systems. One may also consider it when one or more of the following conditions exist:

- The space configuration has changed since the last air balance;
- Indoor air quality does not meet the ASHRAE 62.1 (2010) (Energy Compliance);
- Odors are present and cannot be traced to a specific source; mold spots exist;
- The building is being renovated or expanded;
- Doors stay open for extended periods of time;
- Excessive condensation is observed on the cooling coil;
- Flies and other insects are present in the space;
- Excessive condensation is observed on the cooling coil or ductwork.

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1.3 Responsibility

- HVAC design engineer is responsible for the system design drawings and specifications. He/she performs the calculations and selects the appropriate equipment from a mix of