How to Balance an HVAC System Using a Flow Hood

Balancing an HVAC system means adjusting the manual dampers at each supply grill so that every room receives the correct volume of air. This procedure walks you through how to balance an HVAC system using a flow hood to measure baseline airflow, identify over- and under-supplied rooms, and fine-tune each damper until every vent reaches its target CFM (Cubic Feet per Minute).

Close-up of the flow hood display showing a reading of 60 CFM.

Purpose

This procedure standardizes the process of measuring supply airflow, diagnosing imbalances, and adjusting manual dampers so that airflow is distributed correctly throughout a house.

Scope

This procedure applies to residential HVAC systems with supply grills equipped with manual dampers and a shared duct junction box feeding multiple rooms.

Required equipment

- A flow hood (e.g., ALNOR LoFlo Balometer or TSI ALNOR LoFlo Balometer)
- A phone or notepad for recording CFM readings
- A communication device (phone) if a helper will be adjusting dampers remotely, such as from an attic

Close-up of the flow hood display showing a reading of 123 CFM.

Step 1: Understand the system setup

Each supply grill in the system is equipped with a manual damper that can be opened or closed to control airflow. You will use these dampers throughout this procedure to balance airflow across the house, particularly in areas receiving too much or too little air.

A person holds a flow hood up to a duct in a residential hallway, preparing to take an airflow measurement. The device display is visible.

Step 2: Prepare to measure airflow

Before making any adjustments, measure the airflow at every vent to establish a baseline. Gather your flow hood and confirm it is ready for use. If needed, keep a phone or notepad on hand to record readings for each space.

Close-up of the flow hood display showing a reading of 152 CFM.

Step 3: Zero out the flow hood

Power on the flow hood and confirm it reads zero before taking any measurements. Zeroing the device first ensures accurate readings at each vent.

Step 4: Measure airflow at each vent

Place the flow hood securely over the supply grill and wait for the reading to stabilize before recording it. Record the CFM value displayed on the flow hood for each vent.

Close-up of the flow hood display showing a reading of 111 CFM.

Example readings recorded during this procedure:

- First vent: 58–60 CFM
- Second vent: 60 CFM
- Third vent: 152 CFM
- Fourth vent: 111 CFM

Step 5: Record each measurement

After each reading, write down the CFM value for the corresponding space using a notepad, phone, or other recording method.

Step 6: Repeat for all supply grills

Move systematically from one vent to the next, repeating the measurement and recording steps until you have covered every supply grill in the house. This gives you a complete airflow profile to work from.

Step 7: Analyze the results

Compare the airflow readings across all rooms and identify areas with significantly higher or lower airflow (for example, 152 CFM versus 60 CFM). Keep in mind that corner rooms may require more airflow due to increased heat load.

Close-up of the flow hood display showing a reading of 58 CFM.

Step 8: Prepare for balancing

Use the recorded data to determine which manual dampers need adjustment. Plan which dampers to open or close to achieve balanced airflow throughout the house.

A person holds a flow hood up to a ceiling vent in a different room, continuing the airflow measurement process.

Step 9: Identify oversupplied rooms

Review your recorded CFM measurements to determine which rooms are receiving more airflow than needed. For example, a master bedroom may be oversized for its supply and currently receiving more airflow than required.

A person stands under a ceiling vent, holding the flow hood in place while the damper is adjusted.

Step 10: Understand the benefit of dampers

Oversizing a supply and installing a manual damper gives you precise control, since you can always reduce airflow by damping down as needed.

Step 11: Prepare to adjust the damper

Position yourself at the supply vent with the flow hood in place. If adjustments will be made remotely, for example by a helper in the attic, confirm you can communicate with them by phone.

Close-up of the flow hood display showing a reading of 138 CFM.

Step 12: Begin closing the damper

Instruct your helper, or adjust the damper yourself if it is accessible, to close it in small increments—taking it almost all the way closed to observe the effect on airflow. Monitor the flow hood display for real-time CFM changes as the damper closes.

A person holds a flow hood up to a ceiling supply vent in a residential bedroom, preparing to measure and adjust airflow.

Step 13: Observe the reduction in airflow

Confirm that closing the damper significantly reduces the CFM reading—airflow may drop by more than half. Record the new CFM value after the damper is closed.

Step 14: Partially reopen the damper

Gradually open the damper to about 15% open. Most of your control over airflow occurs when the damper is nearly closed, so continue monitoring the flow hood as you make this adjustment.

Step 15: Fine-tune the damper position

Make small adjustments to the damper, opening it slightly more each time, and check the flow hood reading after each change. Work toward your target airflow (for example, 150 CFM for a given vent).

Close-up of the flow hood display showing a reading of 105 CFM.

Example readings recorded during fine-tuning:

- 104–105 CFM
- 123 CFM
- 138 CFM

Step 16: Use incremental adjustments for precision

As you approach the target CFM, make very small, fine adjustments. If you overshoot the target, slightly close the damper again and recheck the reading. Communicate clearly with your helper to maintain precise control.

Close-up of the flow hood display showing a reading of 104 CFM as the damper is partially reopened.

Step 17: Document the final setting

Once airflow is as close as possible to the target CFM, record the final damper position and CFM value for future reference.

Step 18: Monitor airflow after adjustment at a shared junction box

When multiple supply runs connect to the same junction box, observe the flow hood display immediately after each damper adjustment. For example, a display may show 167 CFM after an adjustment.

Close-up of the flow hood display showing a reading of 184 CFM.

Step 19: Incrementally adjust dampers and observe changes

Make small damper adjustments and immediately check the new CFM reading. For example, after an adjustment the display may read 184 CFM.

Step 20: Switch between supply runs for balancing

Move to the next supply vent in the same room or an adjacent room as needed. For example, the reading at the next vent may be 175 CFM.

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Step 21: Understand the interdependence of supply runs

Adjusting one damper affects the airflow in the other supply runs connected to the same junction box. Lowering airflow in one run will increase it in the others, so balancing multiple runs requires a back-and-forth process.

Close-up of a flow hood display reading 167 CFM, with a person holding a phone to communicate with a helper.

Step 22: Iteratively adjust and record CFM values

Continue making incremental adjustments, switching between supply runs as needed. For example, a display may show 249 CFM after an adjustment at another vent.

A person monitors a flow hood display reading 249 CFM while holding a phone and adjusting a damper in a room with unfinished wall patches.

Step 23: Fine-tune each run to target values

Gradually bring each supply run to its target CFM by repeating the adjustment and measurement process.

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Close-up of the flow hood display showing a reading of 236 CFM after a fine adjustment.

Close-up of the flow hood display showing a reading of 243 CFM after another adjustment.

Close-up of the flow hood display showing a reading of 246 CFM while the technician communicates by phone.

Step 24: Communicate with your helper for remote adjustments

If a helper is making adjustments from another location, such as an attic, use a phone or other communication device to coordinate each change and maintain precise, timely adjustments.

Step 25: Confirm comfort and environmental conditions

Check the working environment, such as attic temperature, to confirm conditions remain safe and comfortable for everyone involved before continuing.

A technician holds a flow hood and phone while checking environmental conditions in a room with unfinished wall patches.

Step 26: Repeat adjustments as needed

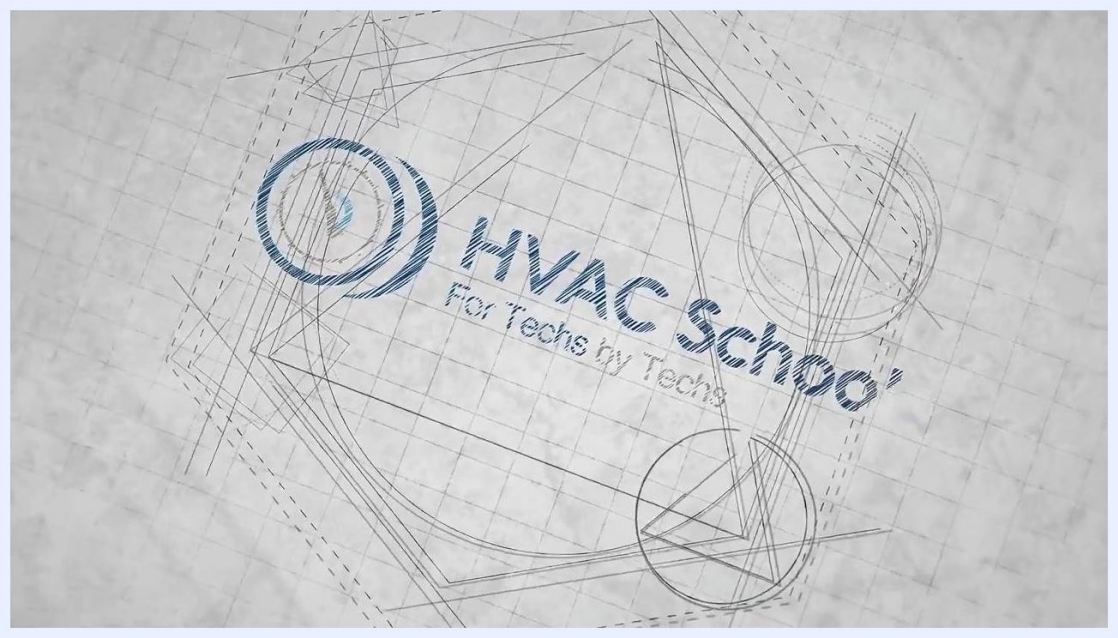
Continue the iterative process of making small changes and monitoring CFM until all supply runs are balanced to their target values. For example, a reading may return to 175 CFM after a final adjustment.

Close-up of the flow hood display showing a reading of 175 CFM while a damper is adjusted.

A technician monitors a flow hood display reading 175 CFM after completing an adjustment.

Step 27: Allow airflow to stabilize

After making your final damper adjustment, wait for the reading to stabilize on the flow hood before recording it. For example, the display may show a stabilized reading of 153 CFM.



A technician closely monitors a flow hood displaying a stabilized reading of 153 CFM.

Step 28: Review and record final readings

Confirm that all supply runs are balanced to their target CFM values. Record the final CFM readings and damper positions for future reference.

Step 29: Wrap up the job

Collect all tools and equipment, and double-check that all vents and dampers are securely in place before finishing the job.

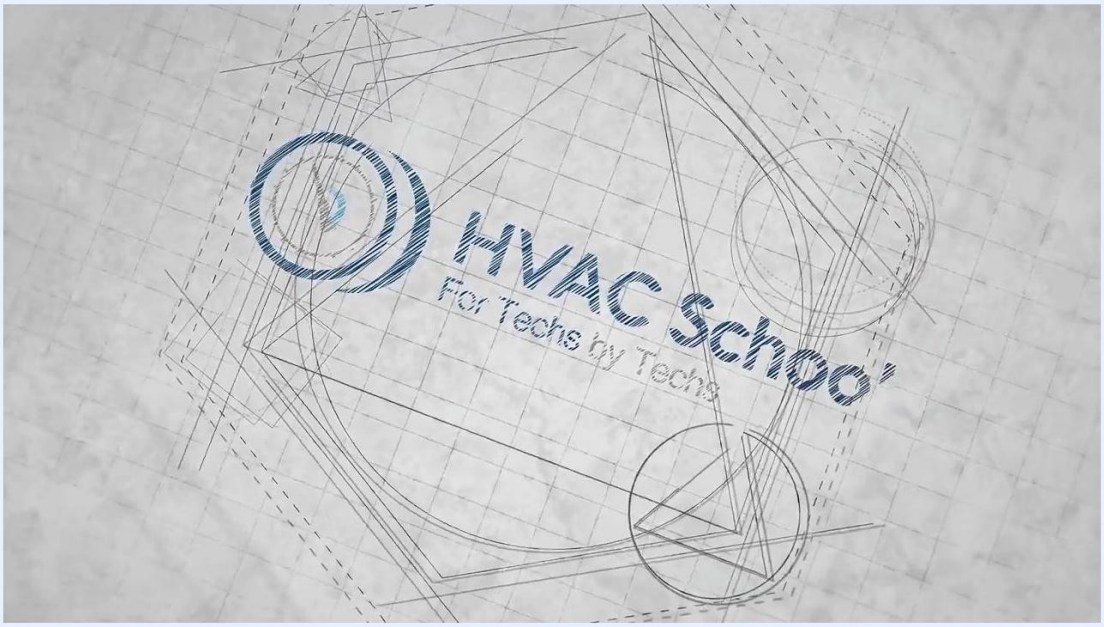
Verification and summary

- Confirm every supply grill's final CFM reading matches its target value before closing out the job.
- Record all final damper positions and CFM readings for future maintenance reference.

- Remember that balancing multiple runs on a shared junction box is an iterative, back-and-forth process—allow time for readings to stabilize between adjustments.
- Always take readings with the flow hood securely in place to ensure accuracy.

A person stands in a hallway, recording an airflow reading on a phone or notepad with the flow hood nearby.

Following this procedure ensures airflow is measured accurately and adjusted correctly, resulting in a properly balanced HVAC system with consistent comfort throughout the house.



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