



ENERGY STAR Certified Homes

Clearing the Air: Ventilation

March 2, 2016





Agenda

- Value and components of ventilation & indoor air quality
- Live demo of RESNET-approved tools
- Best practices for Raters
- Question and Answer session

The Value & Components of Mechanical Ventilation




Value of mechanical ventilation

- Consumers place value on indoor air quality.



Value of mechanical ventilation

- Homeowner is satisfied (e.g., no odors or irritants).
 - Low levels of contaminants known to pose health risks.
- 
- This is the basic definition of indoor air quality in the industry standard, ASHRAE 62.2-2010/2013.
 - Don't sacrifice indoor air quality in exchange for efficiency.

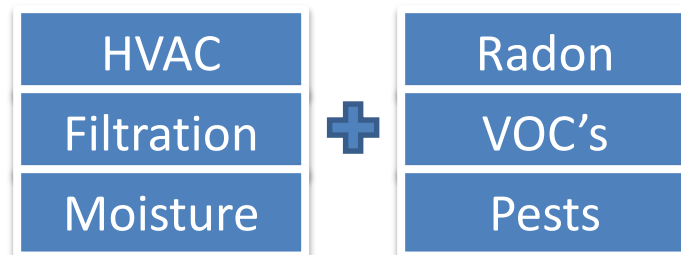
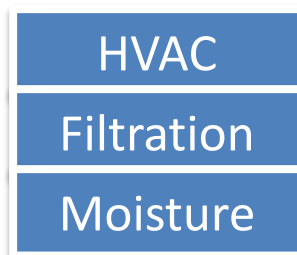


The ENERGY STAR approach

1. Build the home tight to improve efficiency & comfort.
2. Remove contaminants using occupant-controlled exhaust fan in kitchens & bathrooms and a filter in HVAC system.
3. Bring in outdoor air in a controlled way to dilute contaminants.
4. Include key durability details relating to water management.

ENERGY STAR + Indoor airPLUS

- Both are voluntary labeling programs run by EPA.
- ENERGY STAR is better than standard practice, while Indoor airPLUS offers a complete indoor air quality package.
- For more information, visit www.epa.gov/indoorairplus/



Complete IAQ Protection

Measuring airflow & RESNET Standard 380



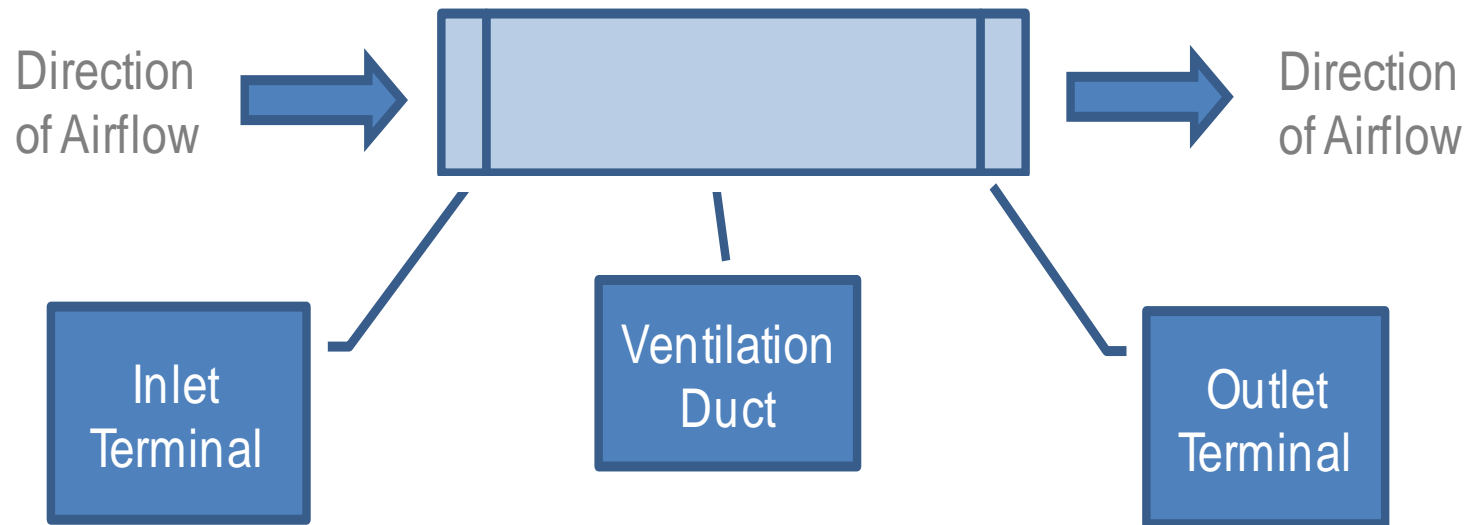


RESNET Standard 380

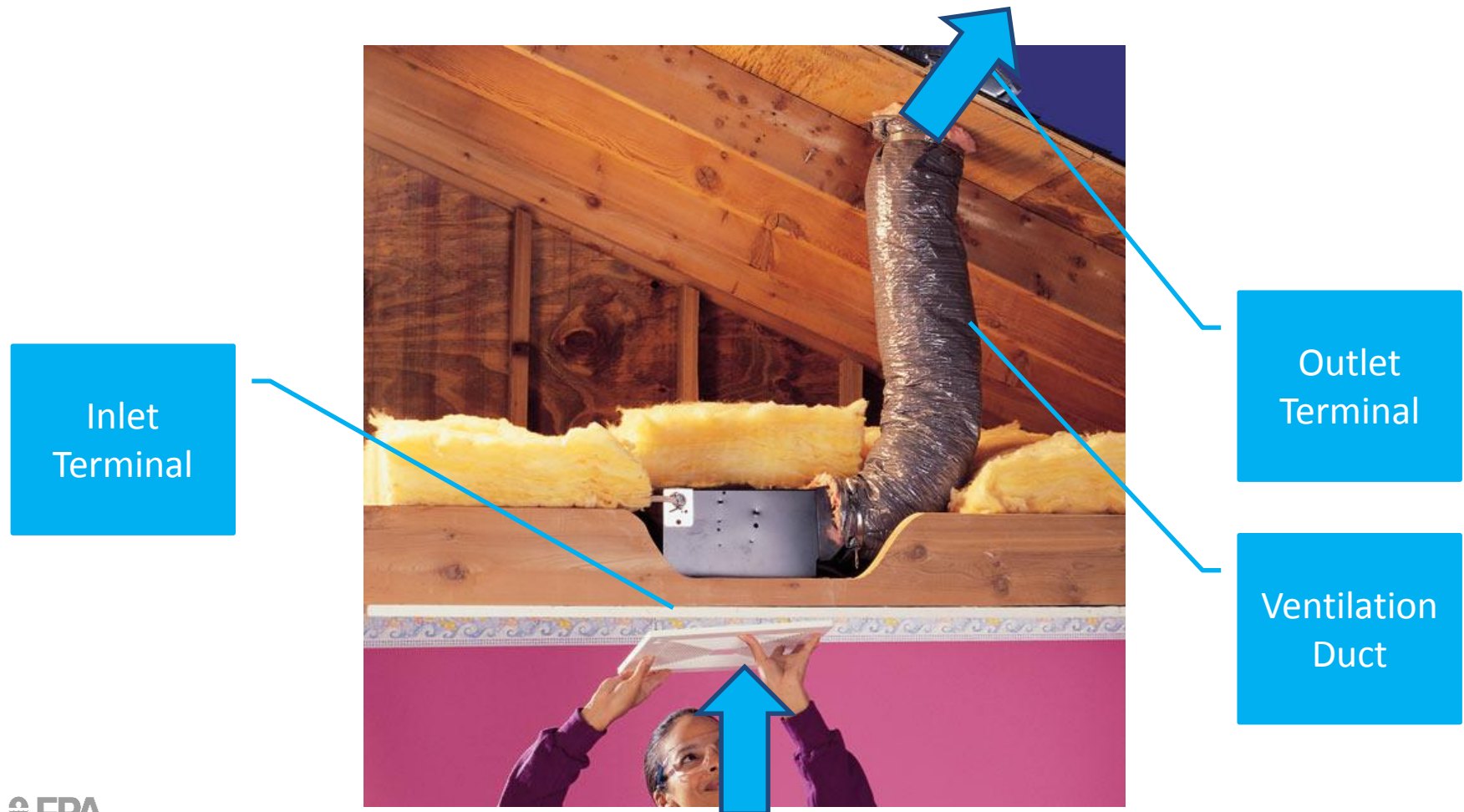
- “Standard For Testing Air Leakage Of Building Enclosures, Air Leakage Of Heating And Cooling Air Distribution Systems, And Airflow Of Mechanical Ventilation Systems”.
- STALBEALHCADSAMVS, for short.
- Brings together diagnostic tests related to building air flow:
 - Envelope leakage
 - Duct leakage
 - Mechanical ventilation

RESNET Standard 380

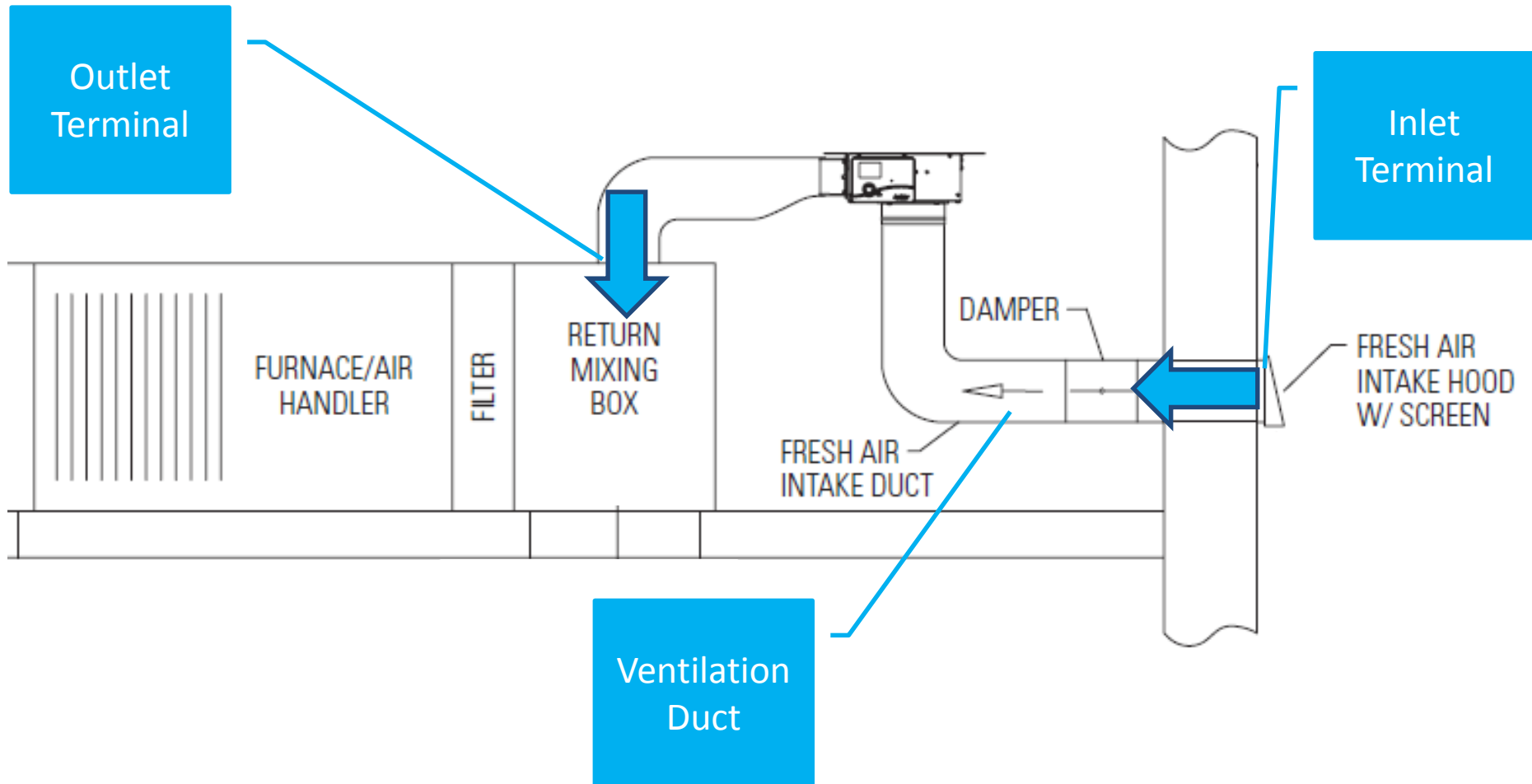
- Ventilation airflow can be measured at three places:



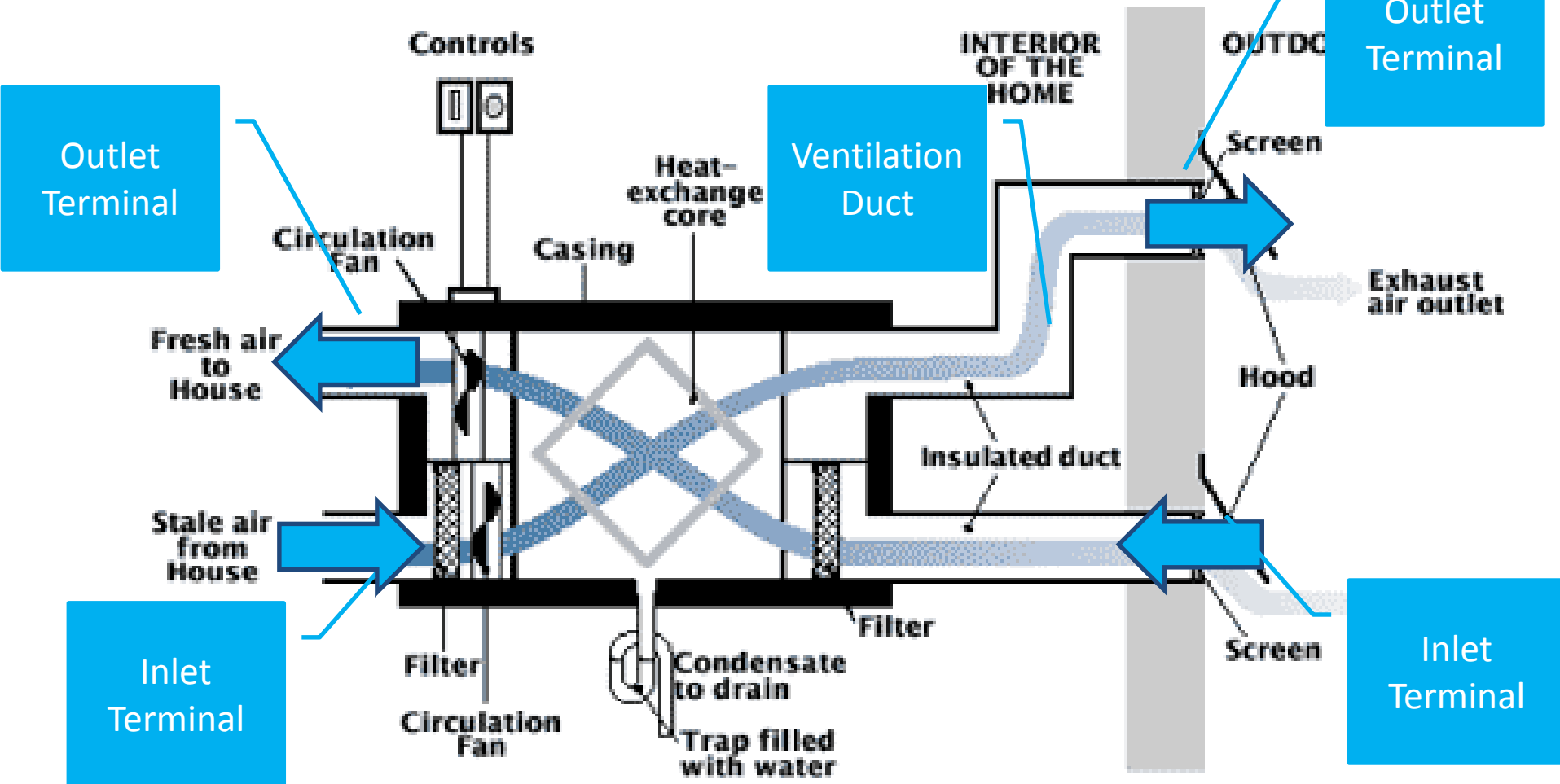
RESNET Standard 380: Measurement locations for exhaust fan



RESNET Standard 380: Measurement locations for return-side system

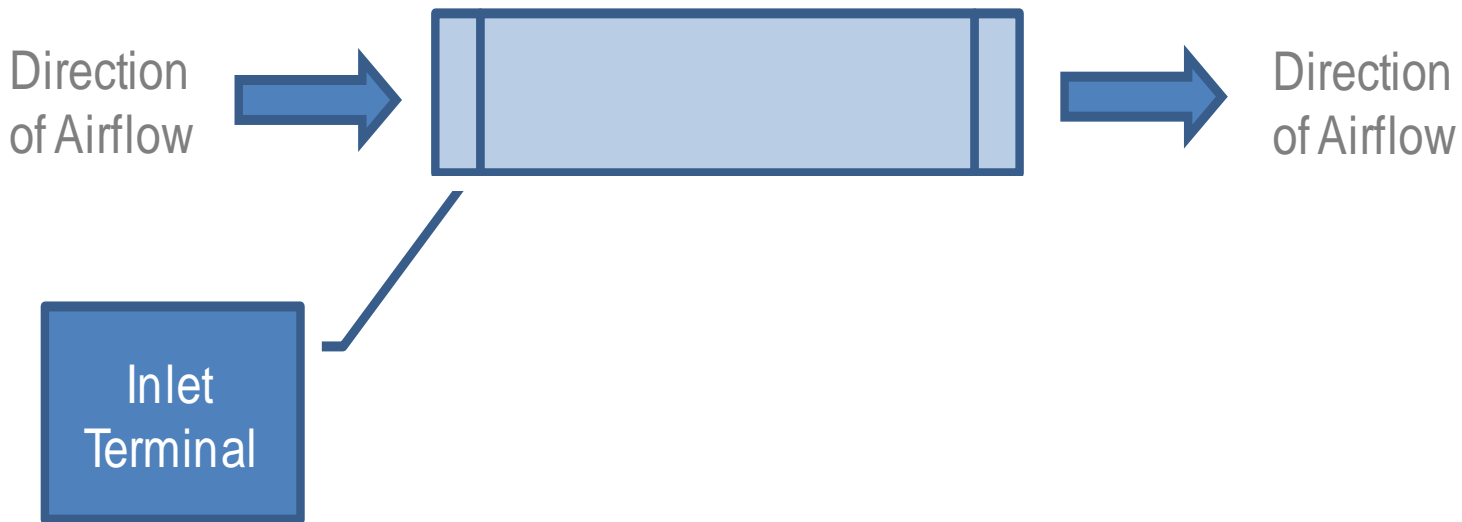


RESNET Standard 380: Measurement locations for balanced system



RESNET Standard 380: Test options at inlet terminal

- Ventilation airflow can be measured at three places:

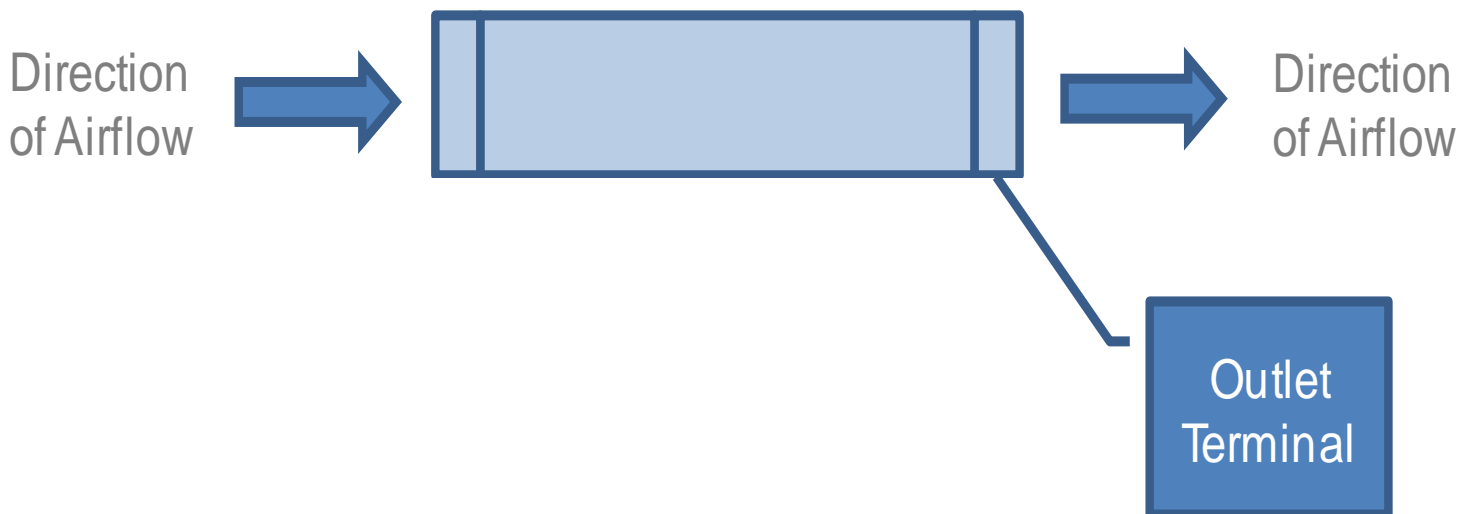


Options at Inlet Terminal:

1. Powered flow hood
2. Passive flow hood
3. Airflow resistance device

RESNET Standard 380: Test options at outlet terminal

- Ventilation airflow can be measured at three places:

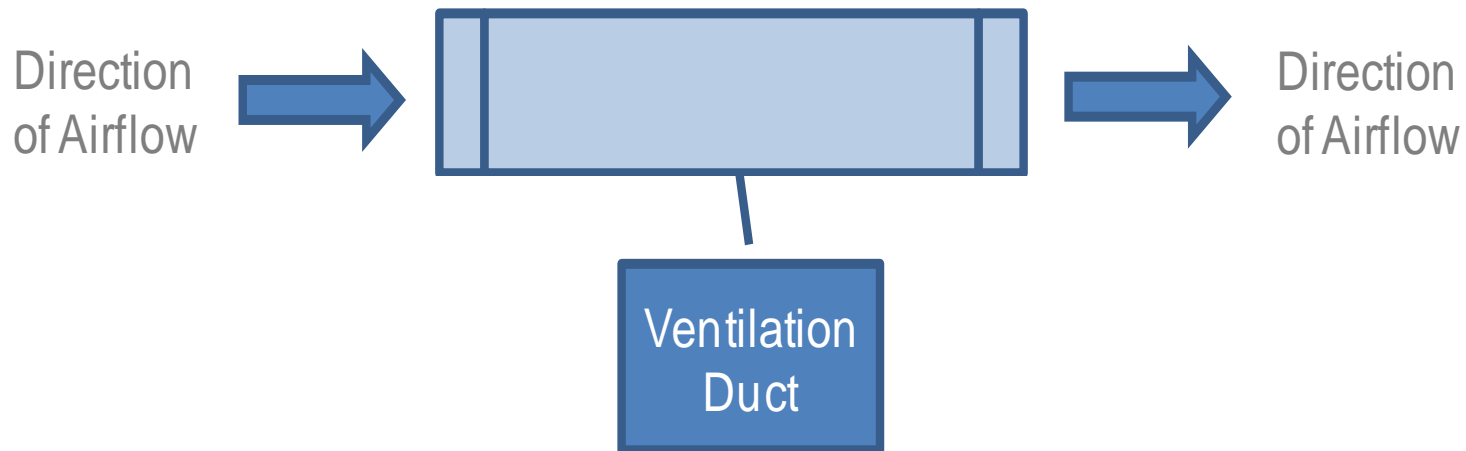


Options at Outlet Terminal:

1. Powered flow hood
2. Bag inflation device

RESNET Standard 380: Test options in ventilation duct

- Ventilation airflow can be measured at three places:



Options Mid-stream in Ventilation Duct:

1. Airflow test station
2. Integrated diagnostic tool



RESNET Standard 380: Test options for measuring airflow

DEMO!

RESNET Standard 380: Test options for measuring airflow

ENERGY STAR Certified Homes:
How to Measure Whole-House Ventilation Airflow

Video 3 of 4 – Outlet Terminal





ENERGY STAR Certified Homes

Web:

Main: www.energystar.gov/newhomespartners
Technical: www.energystar.gov/newhomesguidelines
Training: www.energystar.gov/newhomestraining
HVAC: www.energystar.gov/newhomesHVAC

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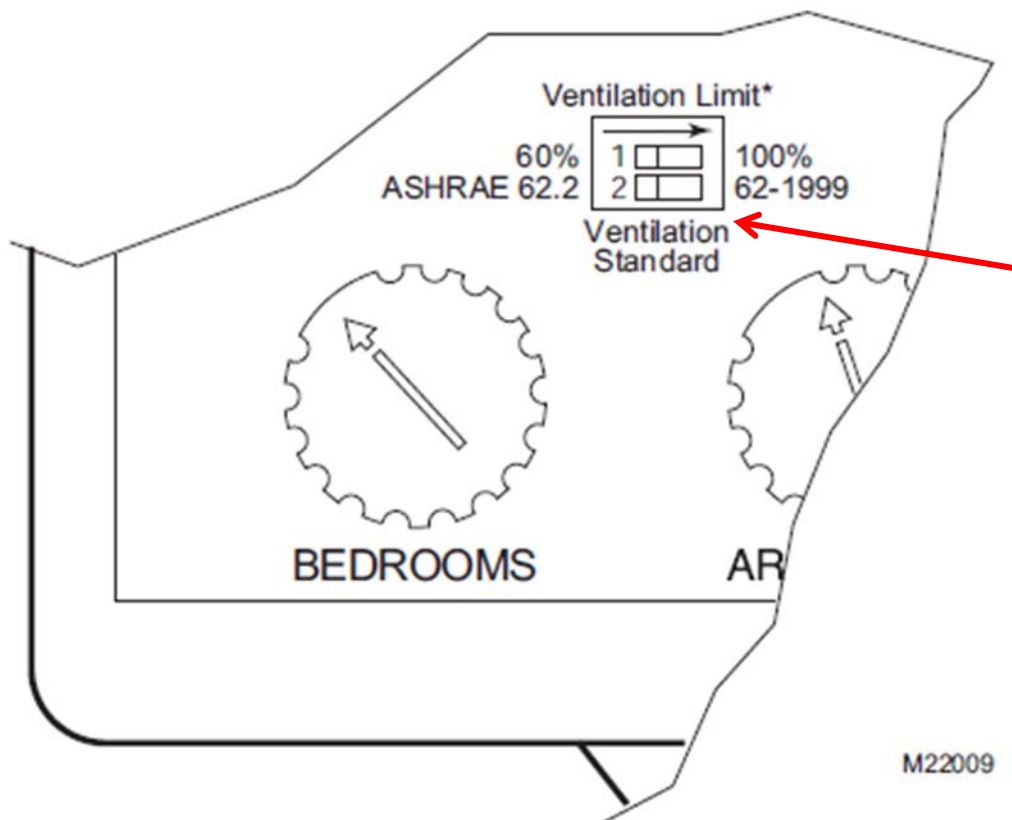
POPULAR CONTROLLER FOR SUPPLY SIDE VENTILATION

WHOLE HOUSE VENTILATION CONTROLLER DOES THE MATH!



MANUFACTURERS UPDATING THESE CHOICES

SET VENTILATION STANDARD



To meet ASHRAE 62.2 the upper dip switch must be moved to the right and the lower dip switch to the left

M22009

NOTE WHAT THE CONTROLLER MAIN SETTINGS ACTUALLY DO

CHOOSE THE MODE



ON: The controller will operate the system as programmed

OVERRIDE: Will turn the system on regardless of programming

OFF: Will not turn ventilation system on, will not open damper, it will turn on a remote exhaust fan

FINE TUNE YOUR FLOW SETTINGS

SET BEDROOM, AREA AND MEASURED FLOW RATE ON THE THREE BOTTOM DIALS



CHECKING FOR COMPLIANCE

COMPLIANCE INDICATOR LIGHTS



- Flashing Green light indicates compliance with chosen standard



- Flashing Red indicates non-compliance with chosen standard

EXHAUST SYSTEM APPROACH

PROGRAMMABLE EXHAUST FANS

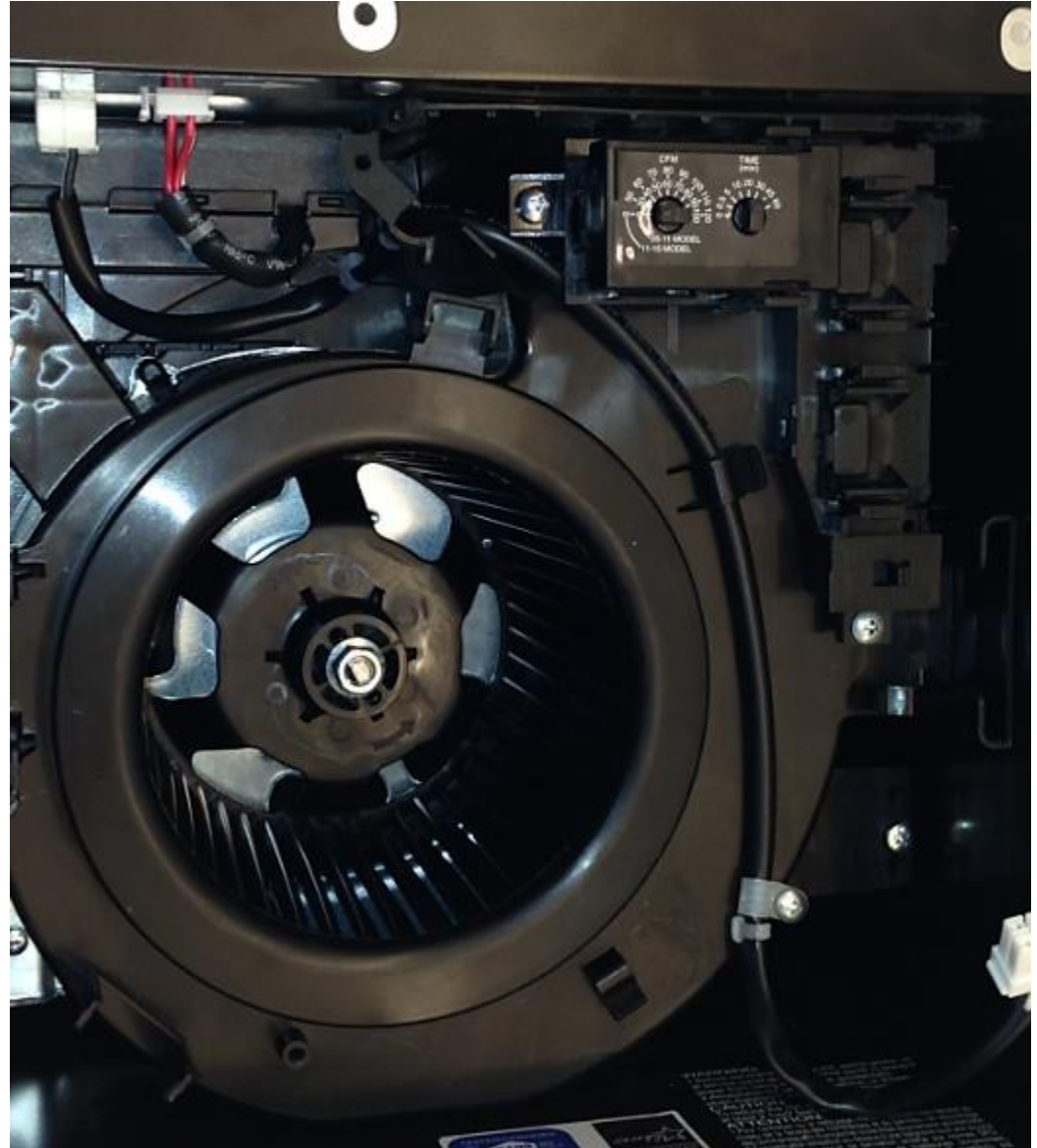
- **Strong ECM fans**
- **Efficient motors, less than 10 watts**
- **Designed to run continually**
- **Quiet, less than one sone**



SETTINGS FOR WHOLE HOUSE VS SPOT VENTILATION

CFM SELECTION

TIME RUN SELECTION



ALTERNATIVE CONTROLS FOR EXHAUST

FAN CONTROLLERS

- **Adjustable airflow**
 - 40 to 100% of fan capacity in
 - 16 increments
- **Built in timer**
 - Set desired minutes per hour run time
 - 5 minute increments
- **Boost**
 - Fan runs for 20 minutes on full



HRV COMMISSIONING

THE 7 STEP PROCESS:

1. Make sure the unit is properly installed and functioning

- Controller wired correctly
- Booster switches working
- Supply and exhaust wall hoods on the right direction
- Filters installed
- Factory tape removed
- Supplies are supplies and exhausts are exhausts
- Air is flowing from all diffuser grilles
- Ducts are sealed
- Balancing dampers are installed
- Determine level of commissioning already done by HVAC contractor

HRV COMMISSIONING



HRV COMMISSIONING



HRV COMMISSIONING



HRV COMMISSIONING

2. Read the manual, mainly to:

- Gather specifics on commissioning and helpful features
- Learn out how to use the controller
 - Changing mode and speeds
- Apply what you learned in the manual and you should be able to commission any HRV.
- Zehnder commissioning is very specific and generally included with equipment purchase.

3. Roughly adjust diffuser grilles to your best guess

4. Turn the unit on high speed, turn off exhaust devices and fully open the balancing dampers

HRV COMMISSIONING

SUITABLE EQUIPMENT

- Must measure down to at least 10 CFM, preferably lower
- Needs to be compact to reach tight places where HRV grilles are often placed
- Examples include the Alnor RVA 801, Alnor RVA 501 and Testo 417

PRODUCT	USEFUL RANGE	MANUFACTURER RATED ACCURACY	SUITABLE?
TSI Alnor RVA801 or RVA501 Vane Anemometer, with air cones sold separately	0–150 CFM	1%	Yes
Testo 417 Vane Anemometer, with flow funnel kit sold separately	5–150 CFM	1.5%	Yes
Alnor® LoFlo® Capture Hood 6200D	20–300 CFM	5%	Maybe
The Energy Conservatory FlowBlaster® capture hood attachment	10–300 CFM	2 CFM	Yes



HRV COMMISSIONING

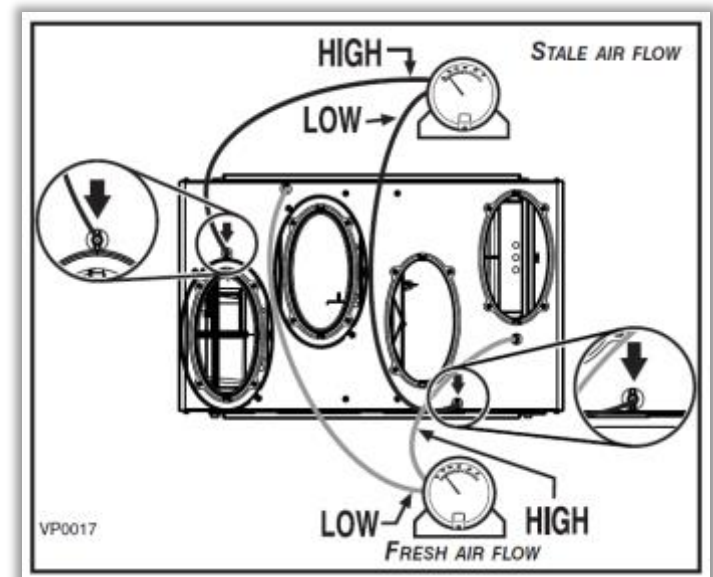
SUITABLE EQUIPMENT



HRV COMMISSIONING

5. Balance the supply and exhaust airstream volumes

- Use balancing pressure taps if provided
- Alternatively, measure the flow at each diffuser grille and compare the total supply to the total exhaust flow
- Adjust balancing dampers to get total supply and exhaust within 10%
 - Lifebreath 195 ECM needs field balancing dampers installed
 - Venmar AVS E15 ECM HRV has internal balancing dampers



HRV COMMISSIONING

6. Put the HRV at the speed it will most likely run on a normal basis

- Adjust diffuser grilles to balance air flows in each zone to reach target ranges and whole-house rates
- Adjust HRV speed if needed
- This may take some trial and error, testing each grille multiple times

7. Document flow rates for future reference

Measured Room Airflows						
Room	Asst Speed 3 (continuous)		Commissioned Speed 4 (continuous)		Commissioned Speed 5 Boost	
	Supply	Exhaust	Supply	Exhaust	Supply	Exhaust
Master bath		20		24		27
Kitchen		15		18		20
Bunk bath		17		20		23
Side (North)		17		20		22
Driveway (South)		17		20		22
South bedrm	17		19		21	
North bedrm	16		18		20	
Bunk room	15		19		23	
Living room	21		25		26	
Master bedrm	20		24		29	
Total Measured Flow	89	86	105	102	119	114

Instructed homeowner to leave in "VENT" mode @ speed 3 for downstairs occupancy only. Change to speed 4 with large groups and occupants upstairs.

HV & ERVs

Whole-House Mechanical Ventilation System Documentation

Name _____
Address _____ No. 90-241
City _____ State _____ Zip _____

Model # _____
Manufacturer _____
Installation Date _____

Type of whole-house ventilation system? ☐ HRV ☒ Balanced (with intake) ☐ ERV ☒ Balanced (without intake)

Location(s) - of fresh air intake _____
Location of exhaust fan _____
Is HRV or ERV installed? Is it ducted into the home's main duct system (HRV or ERV must exhaust from house) and supply to each of central heating system and shall not be exhausted via central furnace fan? Yes ☒ No ☐

Has manufacturer pressure balancing procedure been followed? Yes ☒ No ☐

HRV or ERV equipment model/model #: _____
If intermittent, record:
Cycle time _____ % in during cycle time: _____
Control type: ☐ Honeywell V8120 ☐ Honeywell S40
☐ Honeywell Vista Pro ☒ Other: J. E. Brown
Location: ☐ Air Cycler ☐ Controls located on fan
☐ Remote fan controller ☒ Other: handry

Has control strategy been communicated to owner/occupant? Yes ☐ No ☒

Airflow Balancing Section (Optional)			
Room	Supply CFM	Room	Exhaust CFM
Bedroom 1/B		Master Bath	20
master B		bath	36
Bedroom 2/B		Bath	22
Dormitory 19			
Total:	74	Total:	77

HRV COMMISSIONING

McCALL, IDAHO

- 2,419 sq. ft., single-story
- 3 bedrooms
- 4 full baths
- Range exhaust vented to the exterior
- Spot fan in laundry and powder room
- ASHRAE 62.2 2010 continuous ventilation rate = 62 CFM
- Lifebreath 195 ECM, vent mode

Location	Type	Target Ranges	Speed 3	Speed 4
Master bedroom	Supply	20–25	20	24
Bedroom 1	Supply	15–20	17	19
Bedroom 2	Supply	15–20	16	19
Bunkroom	Supply	15–20	15	18
Living	Supply	20–25	21	25
Total			89	105
Master bath (sole exhaust)	Exhaust	20	20	24
Bath 1 (sole exhaust)	Exhaust	20	17	20
Bath 2 (sole exhaust)	Exhaust	20	17	20
Bath 3 (sole exhaust)	Exhaust	20	17	20
Kitchen (with hood)	Exhaust	25–30	15	18
Total			86	102

Communicating with trades and builders

MEASURE CATEGORY: MECHANICAL SYSTEMS

Keys to Setting Ventilation Controls Correctly



Mechanical

To Start

1. Know what your controls can and cannot do for you.
2. Know what you need for whole-house ventilation (raw numbers or calculated rates).
3. Understand the process and order of inputs for your controls.
4. Make sure you are recording how the controls are set.
5. Create documentation for both Northwest ENERGY STAR® Homes and the homeowners.

This is one example series for a specific controller.

Step 1: Set ventilation standard



HONEYWELL
Whole-House
Ventilation Control

Step 2: Set number of bedrooms, house size



Step 3: Measure or determine CFM

AIRFLOW DELIVERY VS NEGATIVE STATIC PRESSURE AS MEASURED FOR RETURN DUCT OR PLENUM (IN WC)												
DUCT LENGTH	.06		.10		.16		.20		.26		.30	
	FLEX	PIPE	FLEX	PIPE	FLEX	PIPE	FLEX	PIPE	FLEX	PIPE	FLEX	PIPE
10 FT	80	85	85	90	105	110	120	125	135	140	150	160
20 FT	55	60	60	65	100	105	115	120	130	135	140	150
30 FT	50	55	75	80	95	100	110	115	125	130	130	140

To learn more, visit: http://www.energystar.gov/iaq/indoor_how/ventilation_products.html

REVISION DATE: 10/07/2013



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