Auditor I

DAY SEVEN

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The blower door

- Blower doors measure air flow at a known pressure.
- Prior to the test the operator:
  1. Puts the house in wintertime condition.
  2. Opens all interior doors
  3. Shuts off any atmospheric combustion appliances.
- A blower door can:
  1. Locate leaks.
  2. Determine sq. in of hole in the tested surface.
- Comparing pre & post wx BD test results can:

The blower door

- The rings are to restrict air flow in small, tight houses.
- On the other end, if you can't reach 50Pa pressure, use the "can't reach 50" chart to project a CFM^{50} figure.
- CFM^{50} results range from 300 to 10,000+. The number is generally dependent on house size.
- The average #'s are steadily decreasing as air sealing installers improve technique and inherently tighter methods/products are employed.

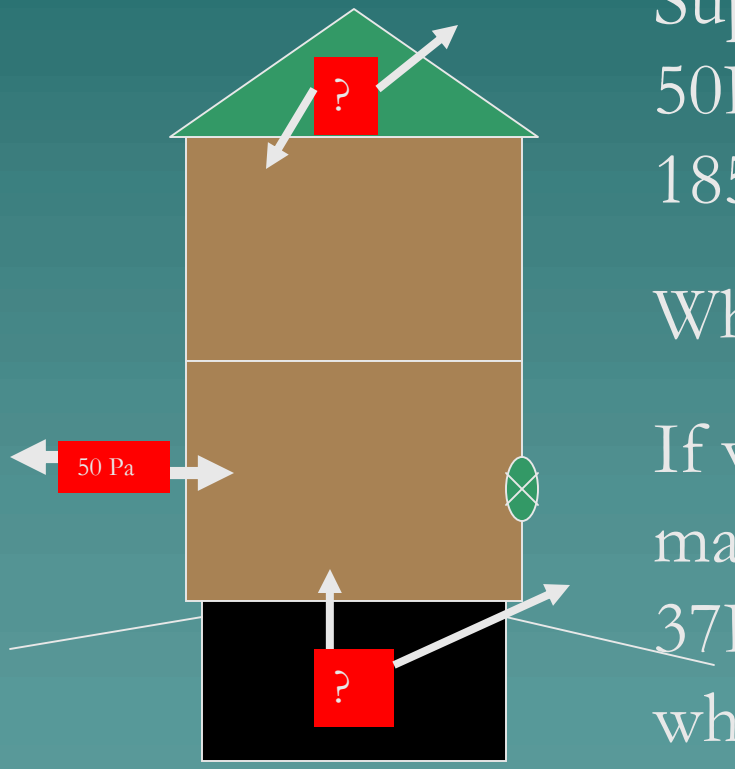
The Blower Door !

Used to:

- Find holes
- Quantify holes
  - Relative size
- Determine “connectedness”
- Pressure diagnostics

With Infrared

Pressure

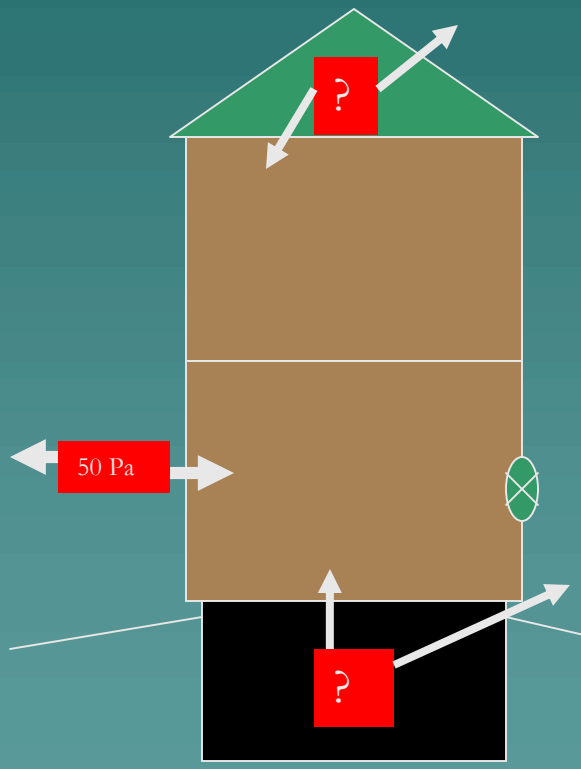


Suppose we bring a house to 50PA with the blower door & get 1850 CFM[50].

What else can we learn?

If we stick a probe hooked to a manometer into the attic & read 37PA in reference to the house, what does that mean?

Pressure



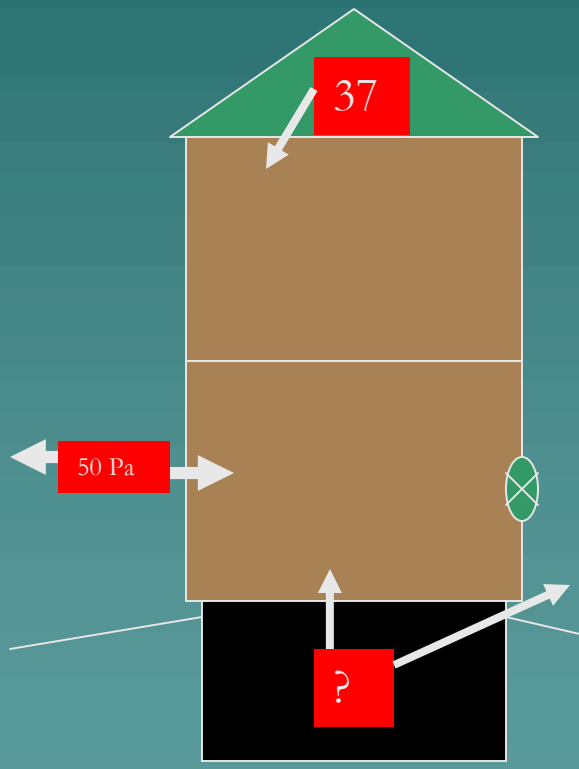
If we stick a probe into the attic & read 37PA, when the house is at 50PA, what does that mean?

Obviously the pressure between the attic and the outside must be 13PA

(50PA – 37PA= 13PA)

SO WHAT?

Pressure



For starters, because the pressure between the house and attic is not 50PA we know the ceiling & the roof both have holes through them.

EACH SURFACE IS RESISTING ITS SHARE OF THE PRESSURE.

Next, knowing the higher the pressure, the smaller the hole, we know the total area of the holes in the higher pressure (more resistant) surface is smaller than the total area of the holes in the lower pressure (less resistant) surface.

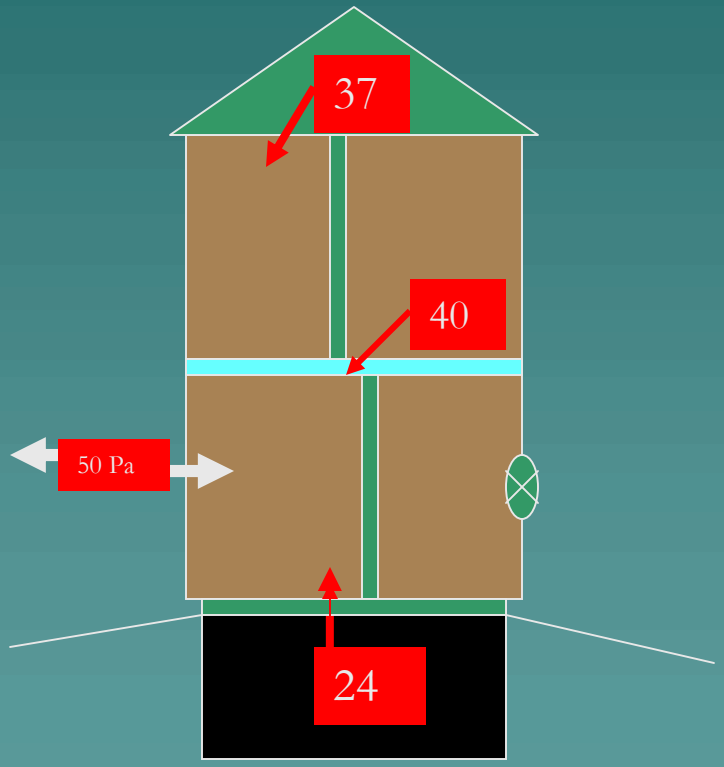
IS THERE A QUANTIFIABLE RELATIONSHIP ?

CHART

- On paper handout from O4S Training

What else can we learn?

Probing cavities.

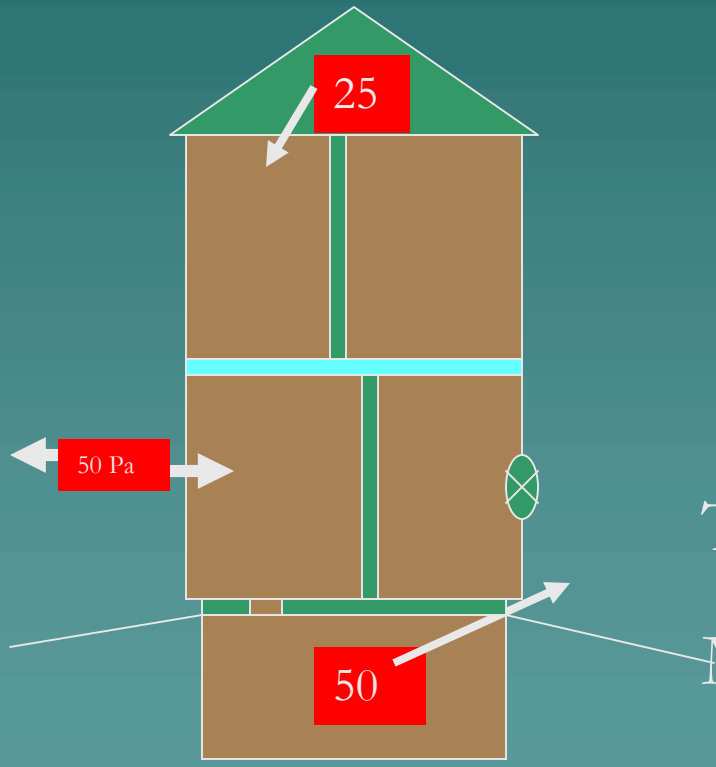


What if we stick a probe into the first floor ceiling cavity and read 40PA?

Let's put a probe into the cellar. What might 24 PA mean?

What else can we learn?

Probing cavities.



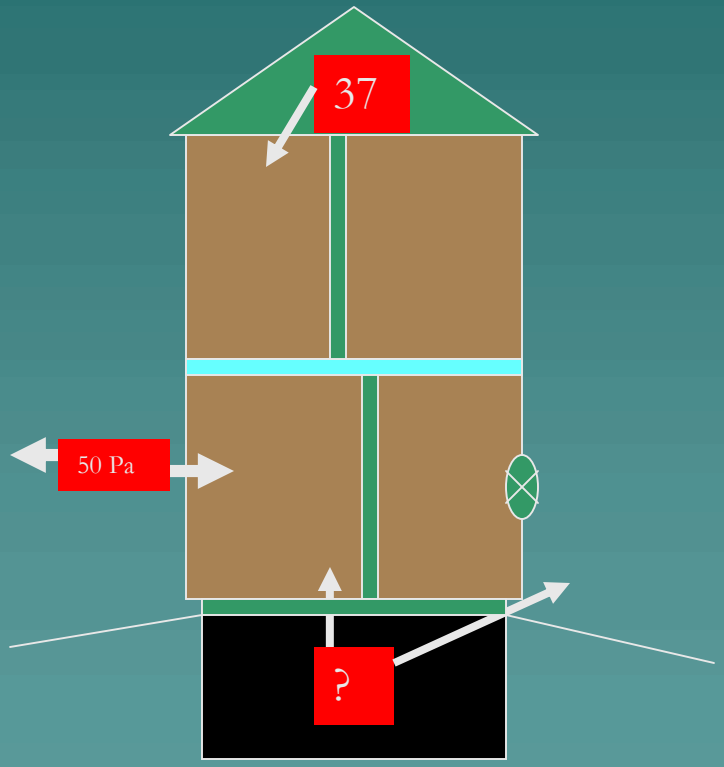
What if we put our probe back into the attic and, when we open the cellar door to the house, we find the 37PA has dropped to 25PA?

The house CFM^{50} will change, too.

More about that later!

Pressure

Probing cavities.



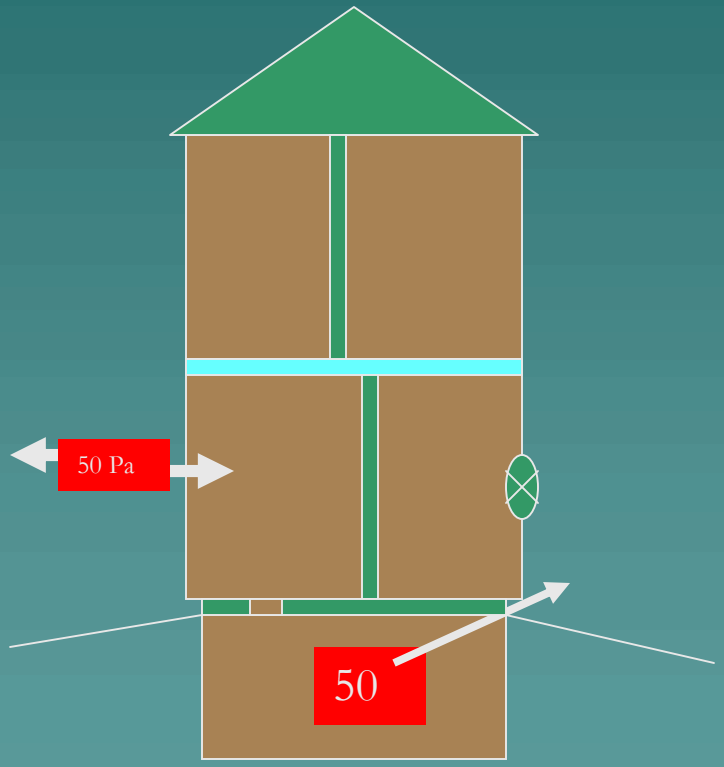
Remember, so far we haven't quantified the holes: we have relative size and some degree of connectedness.

NOTHING ELSE !

What if we want to know how big the holes in each surface are?

What else can we learn?

We have another piece of information:

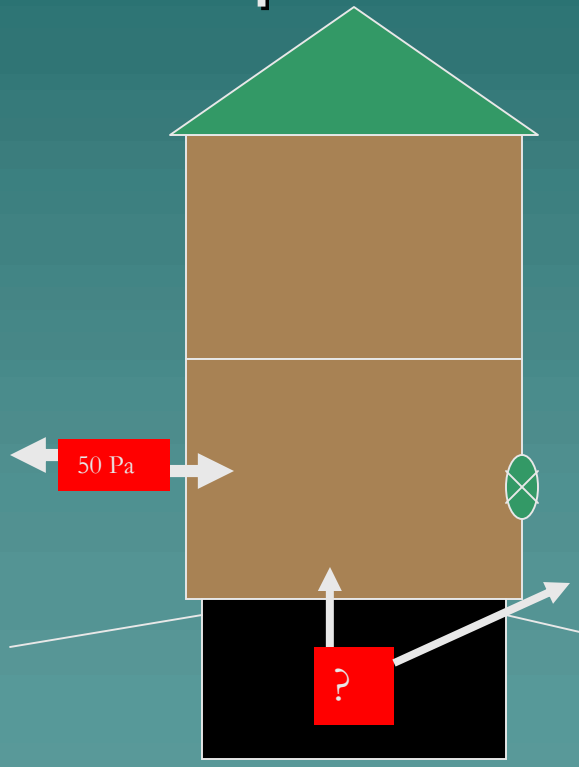


With the cellar door open, the house CFM^{50} goes to 2200.

What does that mean?

Pressure Diagnostics

Zonal pressure

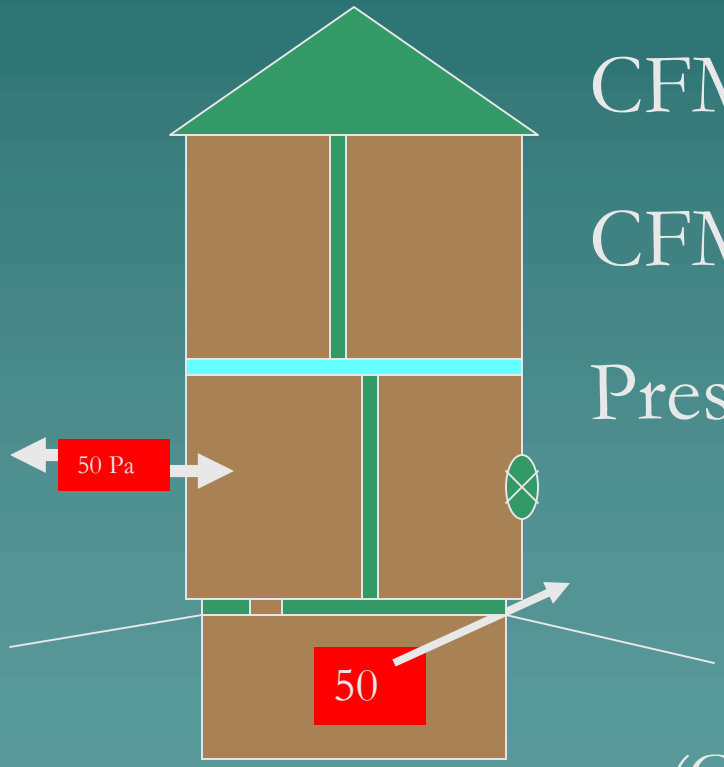


The 50 PA over the envelope – like the ΔT - is gradually reduced or partly contained by each layer of wall or ceiling between inside & outside.

If the pressure can be changed over one layer, creating a CFM^{50} and pressure across each surface for each configuration, we can determine the size of the hole in each layer as well as the amount of air moving over the total path at 50 PA!

Here's how

This is what we know:



CFM^{50} (cellar door closed)=1850

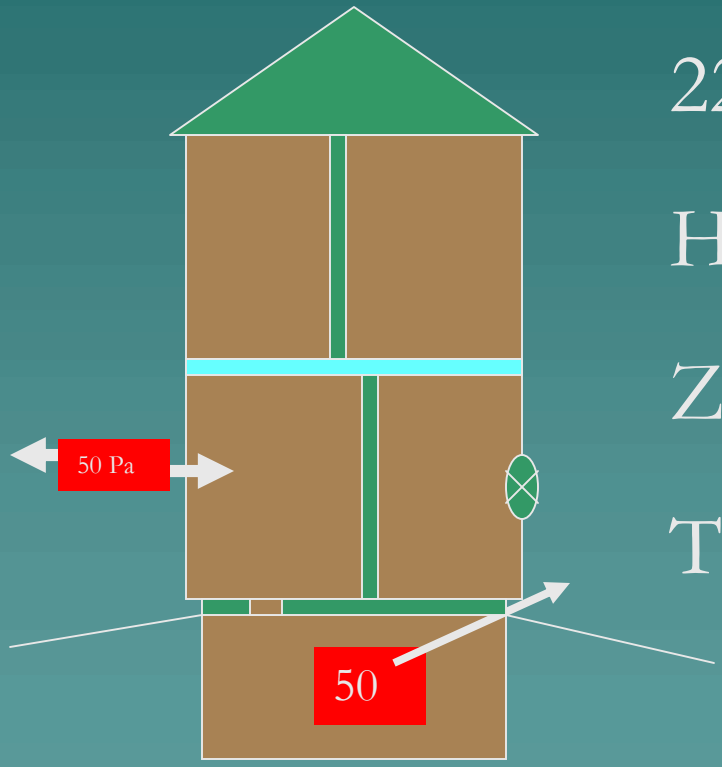
CFM^{50} (cellar door open) = 2200.

Pressure across floor (H/Z)= 26PA

(Go to chart)

What else can we learn?

Subtract the door closed CFM^{50} from the door open CFM^{50}.



2200 – 1850 = 350 CFM^{50}

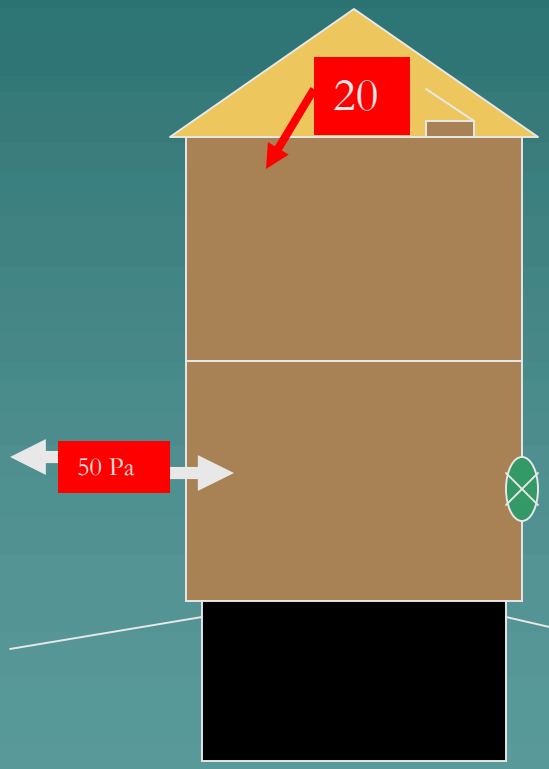
H/Z 350 x 3.04 = 106.4 sq”

Z/O 350 x 2.64 = 864.0 sq”

T/P 350 x 1.64 = 574 CFM^{50}

Pressure Diagnostics

How about the attic?



1850CFM^{50} – House to attic pressure = 37PA

Open attic hatch enough to create at least 6PA change

Bring the blower door back to 50PA.

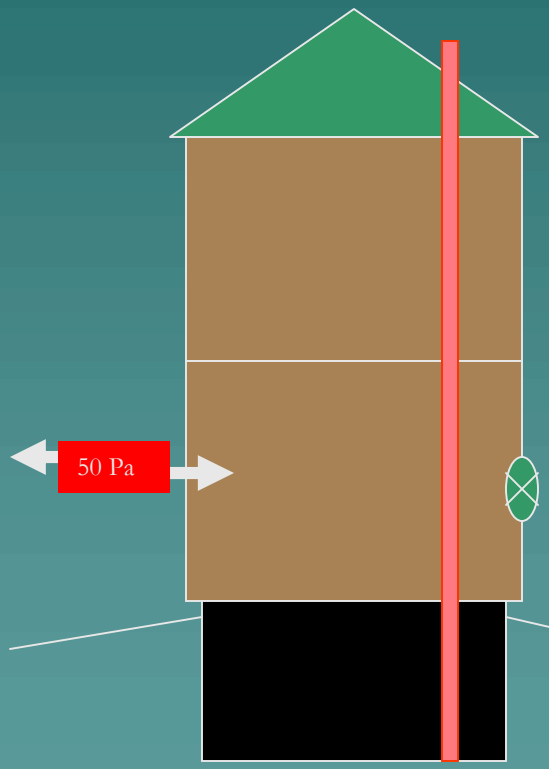
CFM^{50} is now 2500

House to attic pressure is now 20PA

(Go to chart)

Pressure Diagnostics

How about the attic?



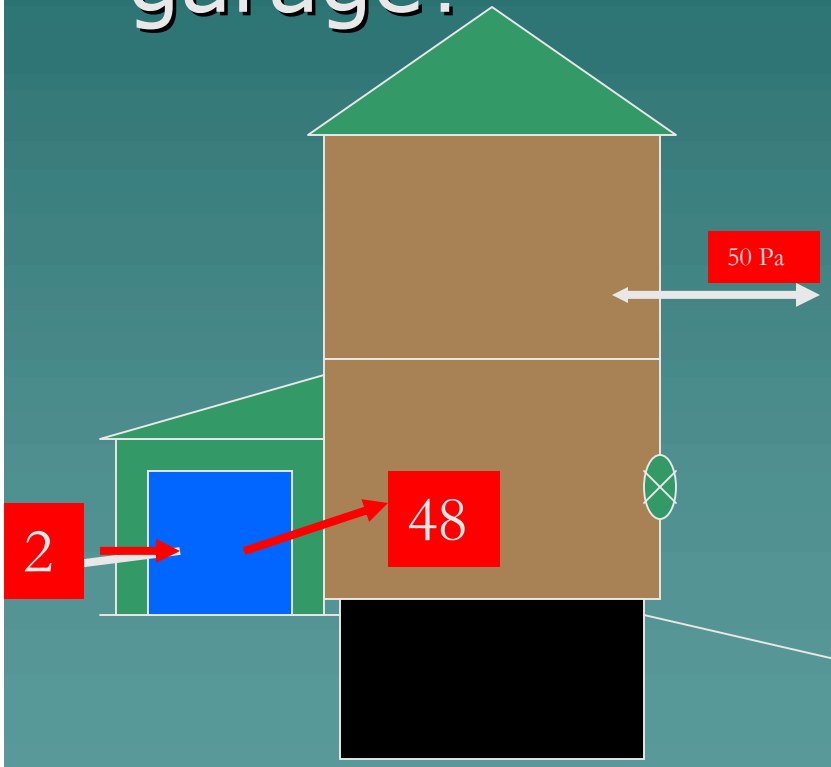
Subtract first CFM^{50} from second (2500-1850 = 650 CFM^{50})

Follow Row 37 under H/Z to column 20H/Z to find multiplier which = 1.38. 650 x 1.38 = 897

Of the 1850 CFM^{50}, 897 is attributable to the attic & whatever it is connected to.

Pressure Diagnostics

How about a garage?



CFM^{50} = 1850

House/Garage = 48 PA

Garage to ext = 2 PA

Open door to garage

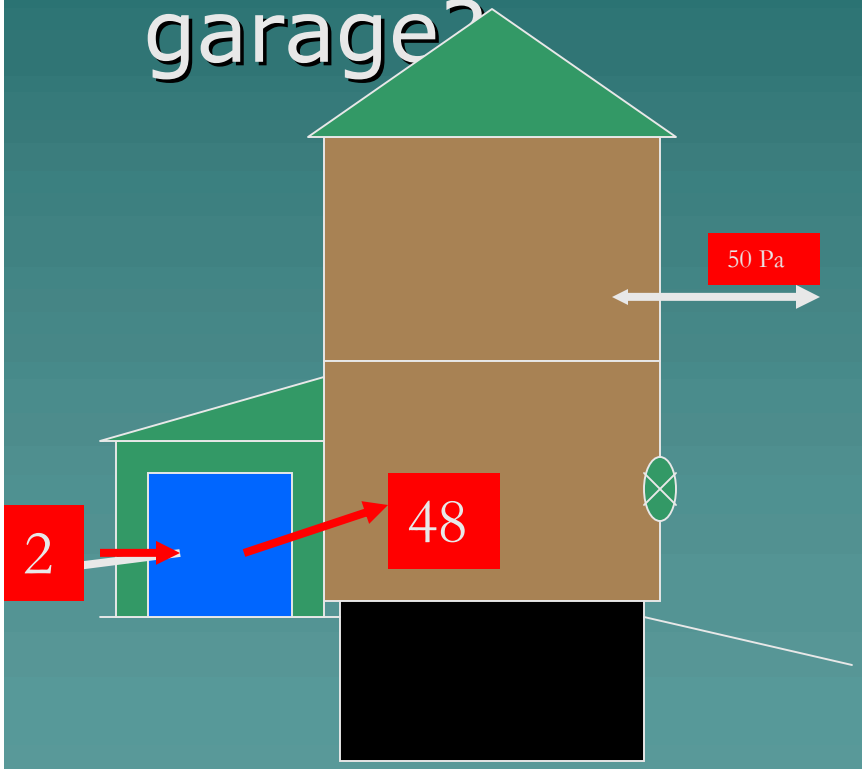
CFM^{50} now 2750

Difference = 900 CFM^{50}

(Go to chart)

Pressure Diagnostics

How about a garage?



Follow H/G 48 to right::

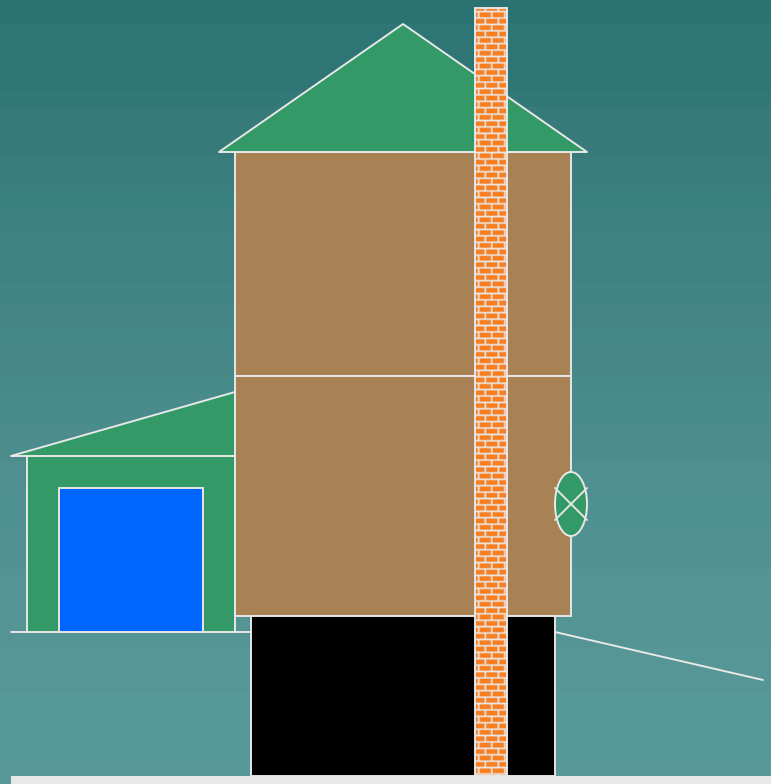
H/Z 900 x .14 = 12.6 sq”

Z/O 900 x 1.14 = 102.6 sq”

T/P = 900 x .14 = 126 CFM[5°]

Pressure Diagnostics

So what did we learn ?



Of 1850 CFM50:

Through attic: ≈ 900

Through basement ≈ 575

Through garage ≈ 125

Walls (remainder) ≈ 250

Where should we concentrate our air-sealing activities?