Blower Door
Testing and Demonstration

TEC®
The Energy Conservatory

FNH CONFERENCE

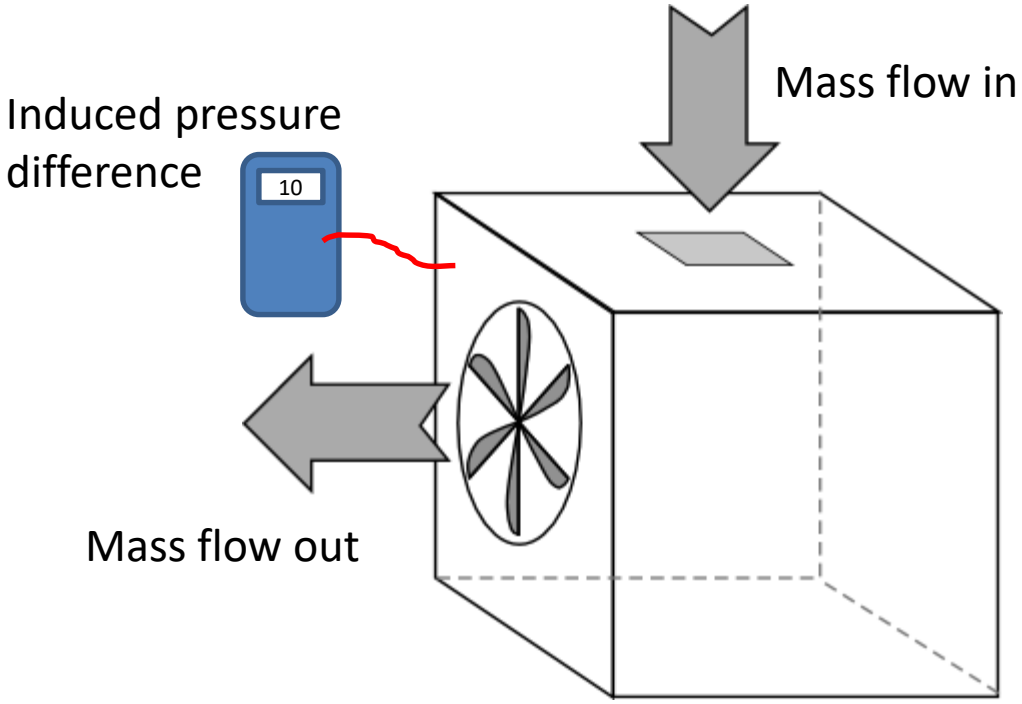
Paul Morin

Intro Questions

- How many are using blower doors?
- New or existing homes?
- Using infrared (IR Cameras)?
- Blower door guided air sealing?
- Measuring zonal pressures?
- What kind of problems are you seeing?

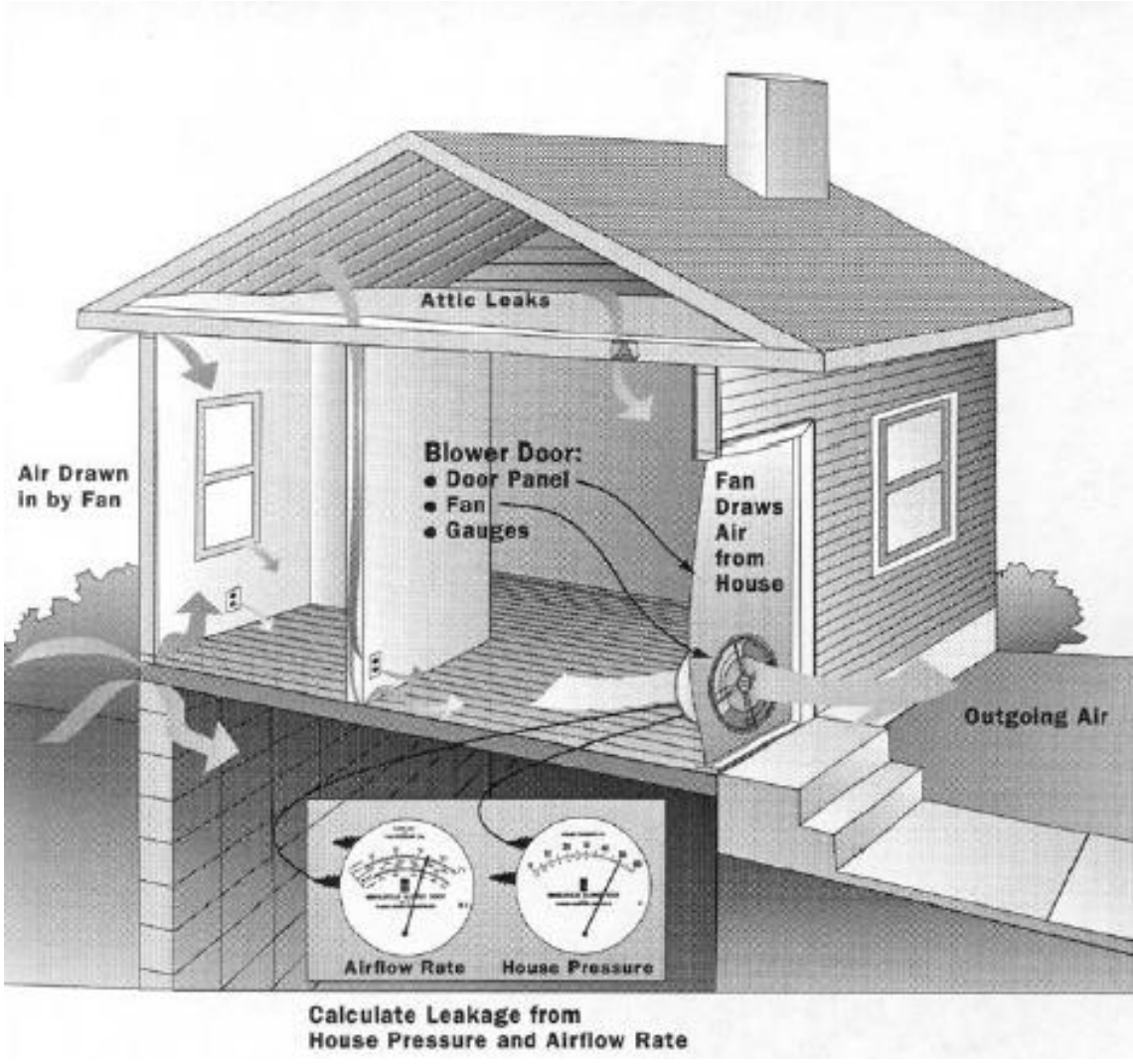
TEC®
The Energy Conservatory

Fan Pressurization Airtightness Test



TEC
The Energy Conservatory

What is a blower door



What is a blower door used for

- Document how leaky a house is
- Find the air leaks or duct leaks
- Document improvement after sealing leaks
- Determine if a home needs mechanical ventilation
- Help solve complex problems

TEC®
The Energy Conservatory

Finding leaks

- Smoke puffer

The Energy Conservatory

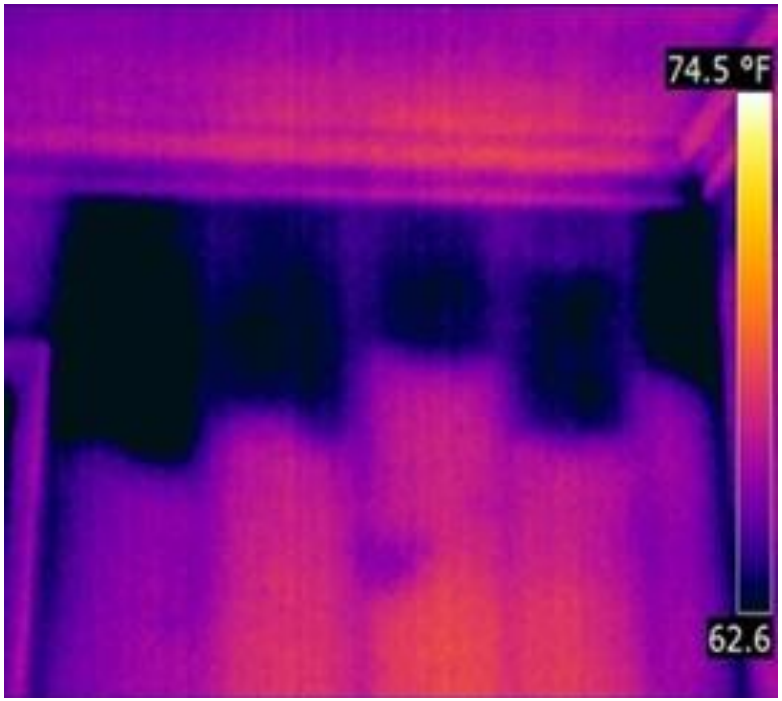
IR Camera

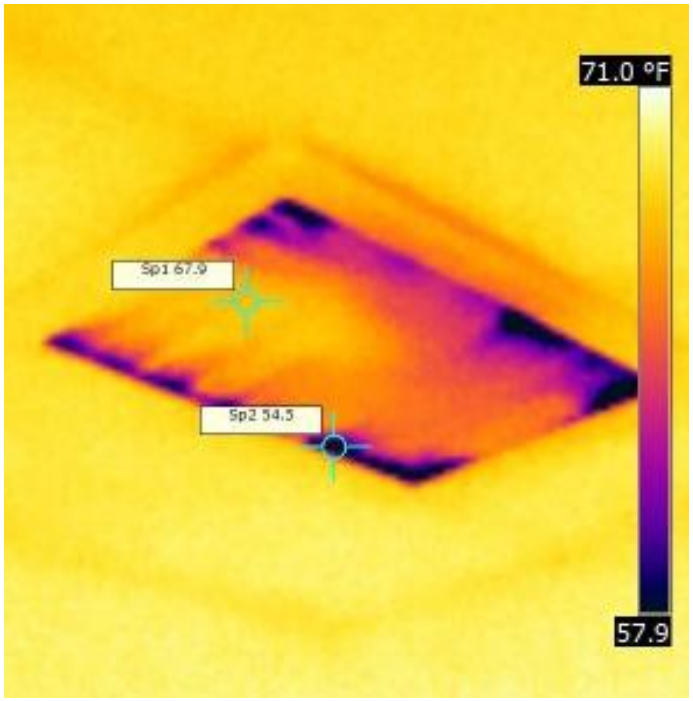
» Find missing insulation or air leaks

TEC
The Energy Conservatory

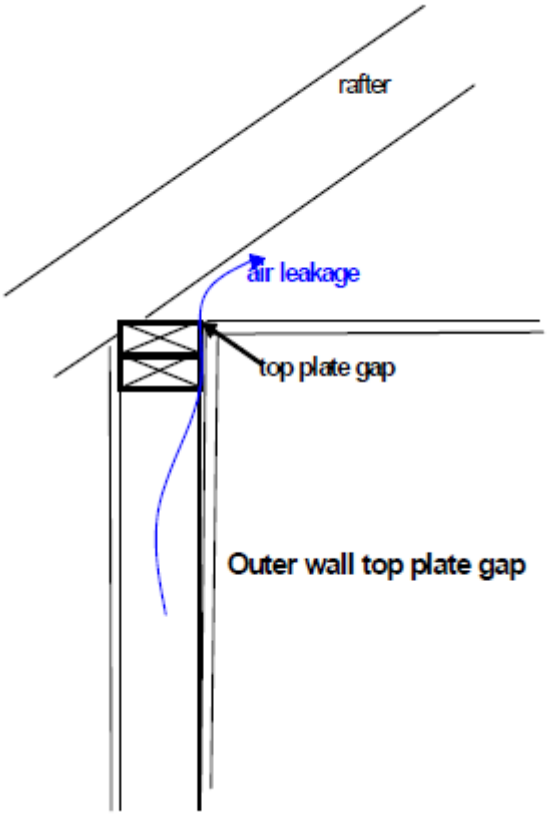
IR camera

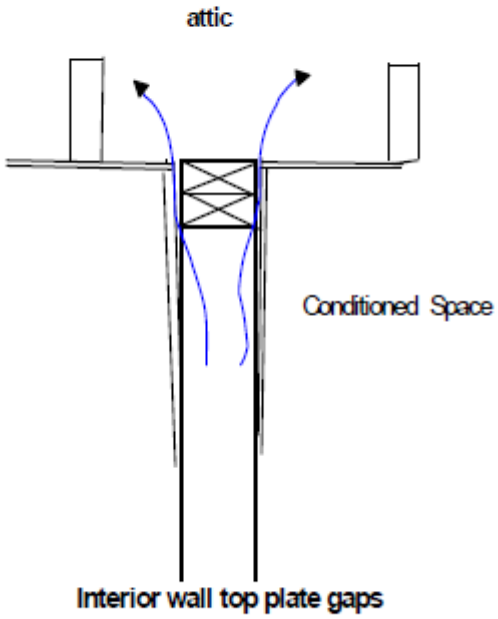
- From inside the house, 10ºF (5.5ºC) ΔT
- From attic while house is pressurized





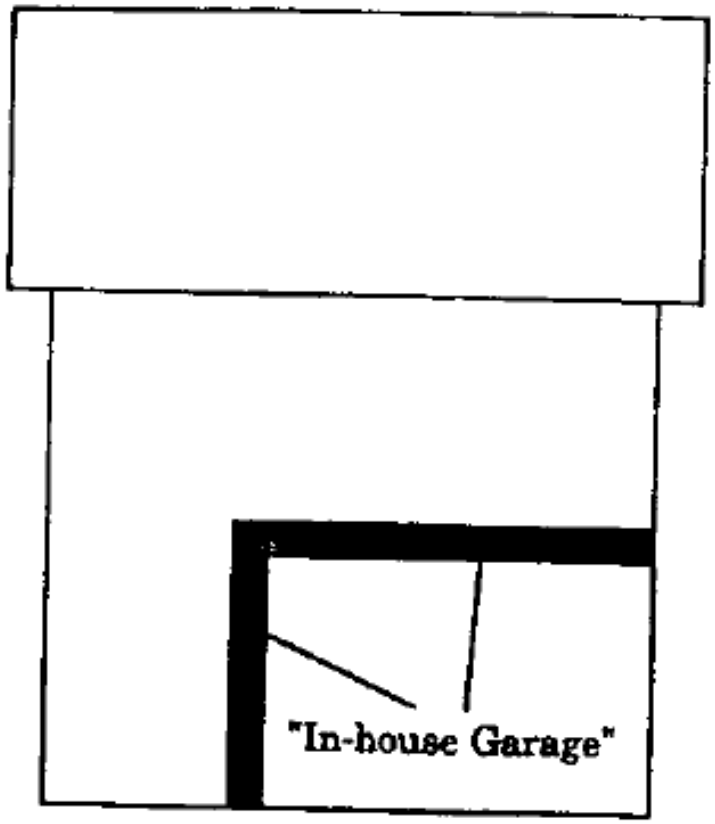
Critical junction points





The Energy Conservatory

Critical junction points



TEC®
The Energy Conservatory

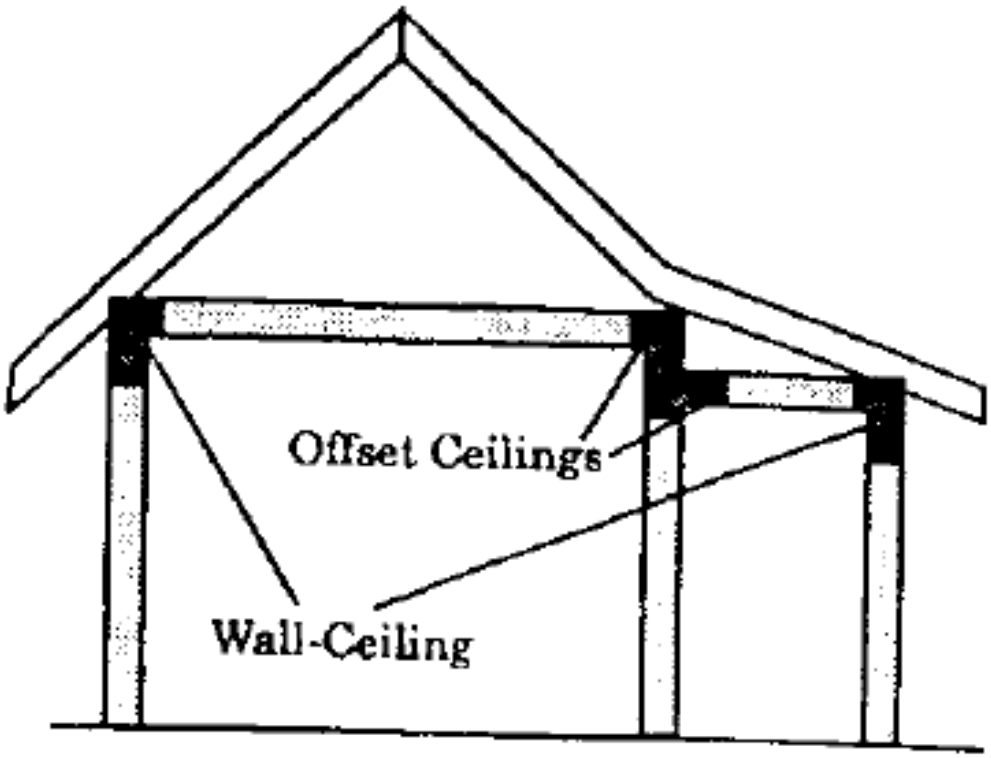
Seal between house and garage

The Energy Conservatory

Ductwork or plumbing through a garage

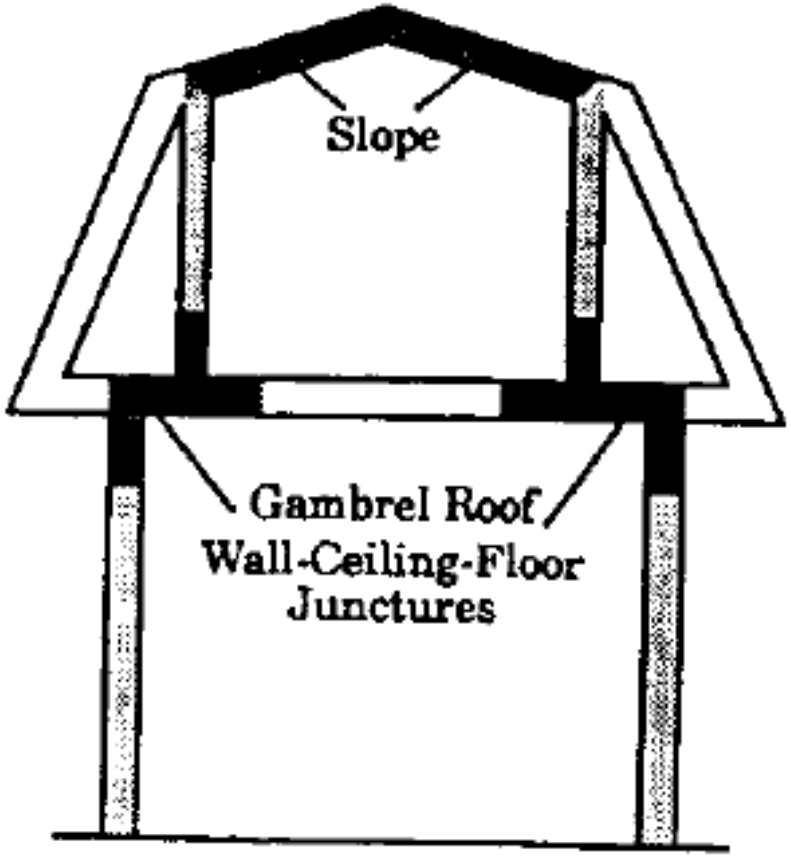
The Energy Conservatory

Critical junction points



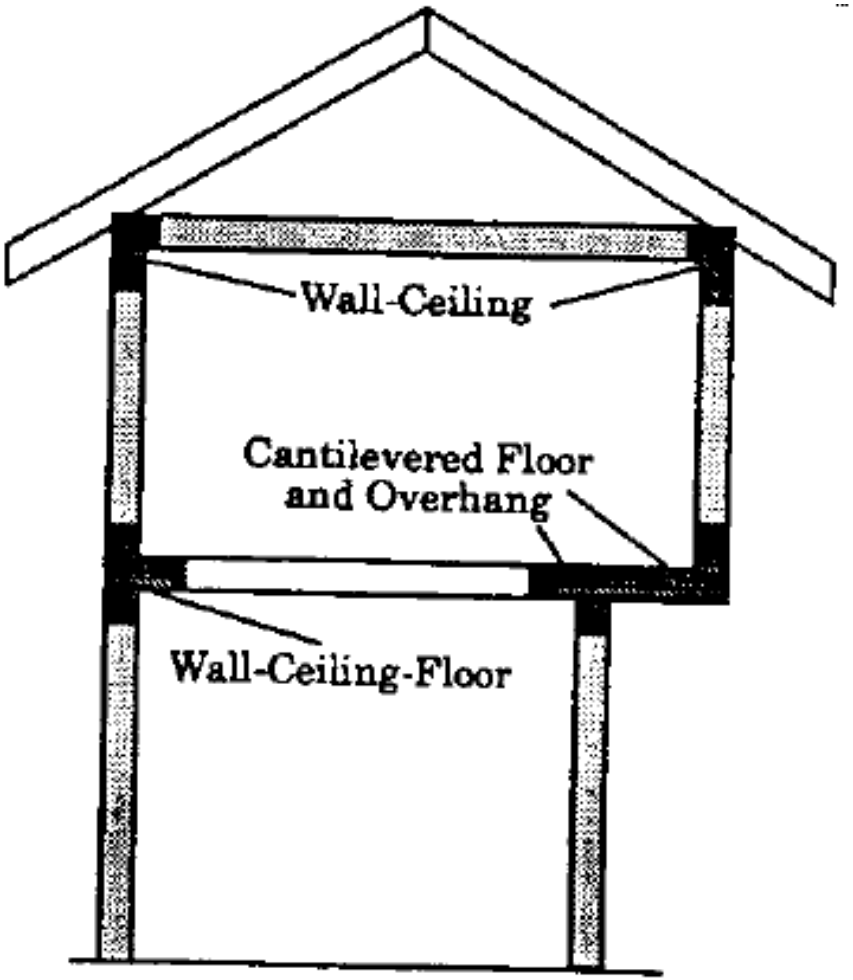
TEC®
The Energy Conservatory

Critical junction points



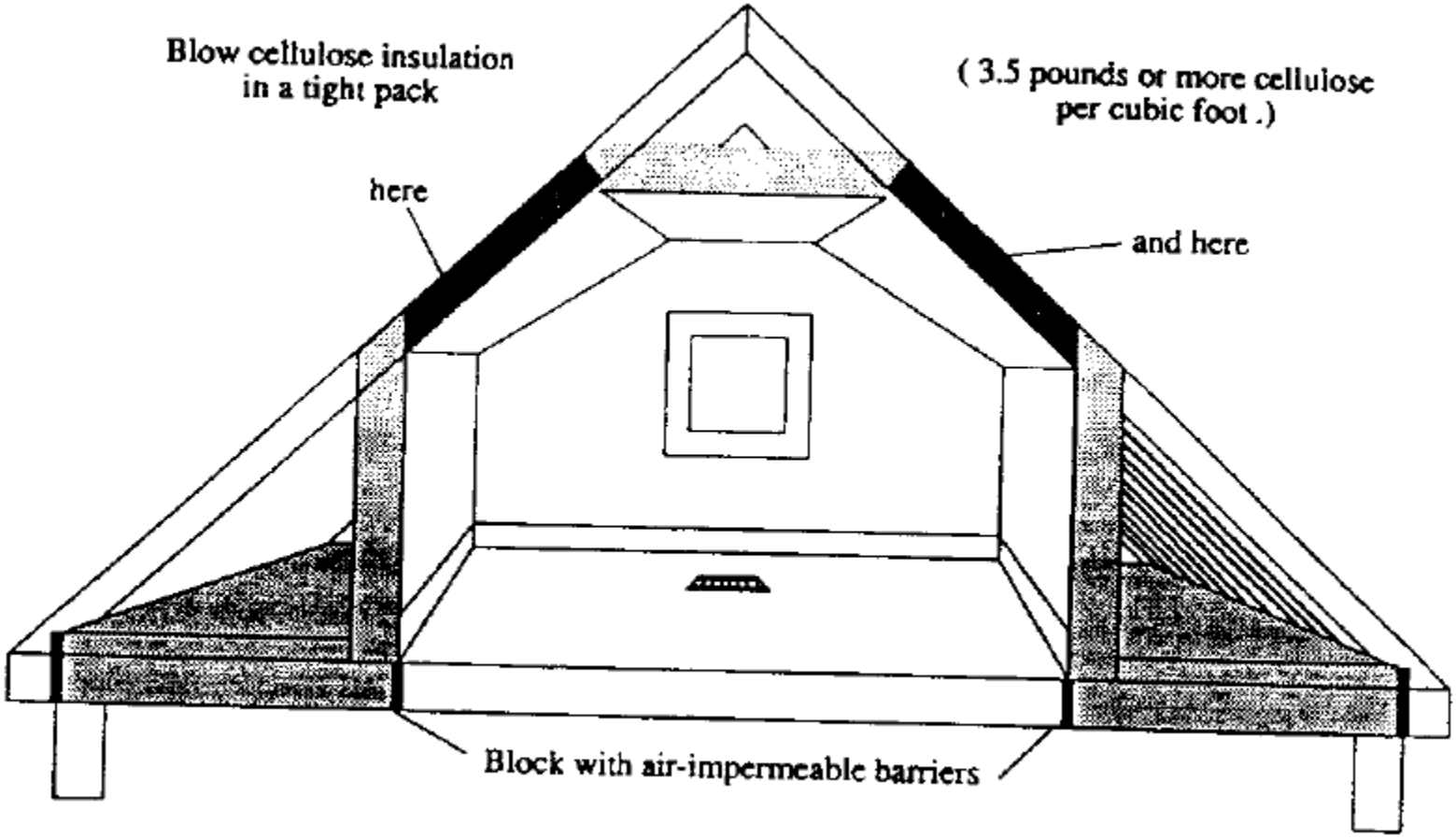
TEC
The Energy Conservatory

Critical junction points

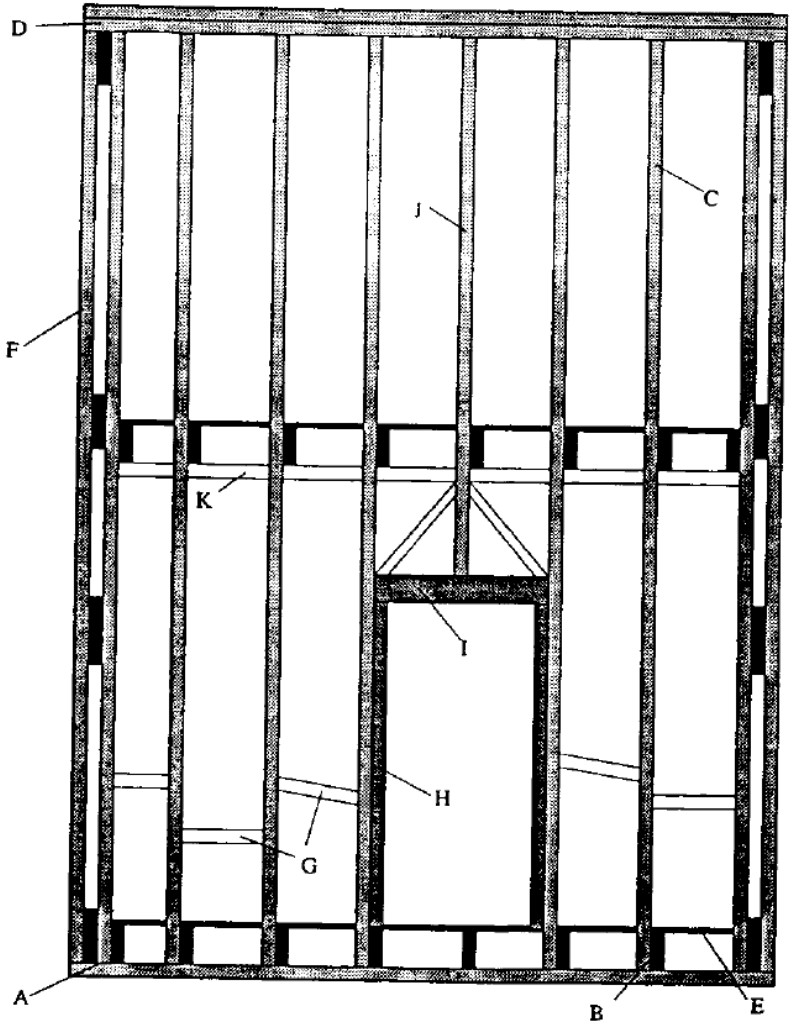


The Energy Conservatory

Critical junction points

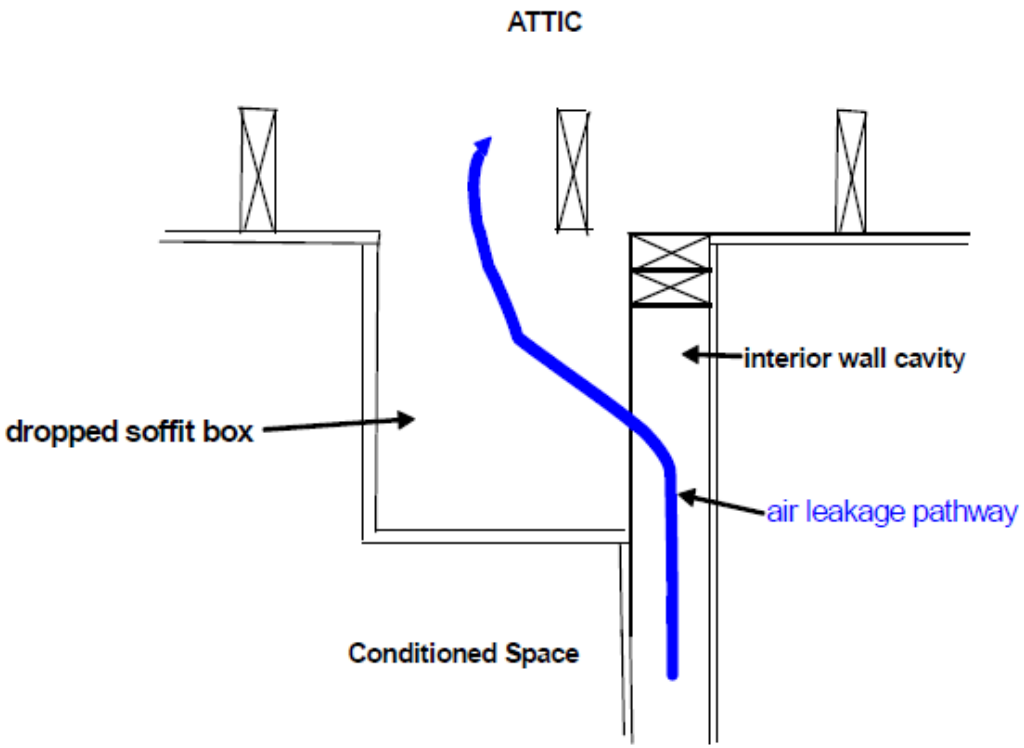


Critical junction points



TEC
The Energy Conservatory

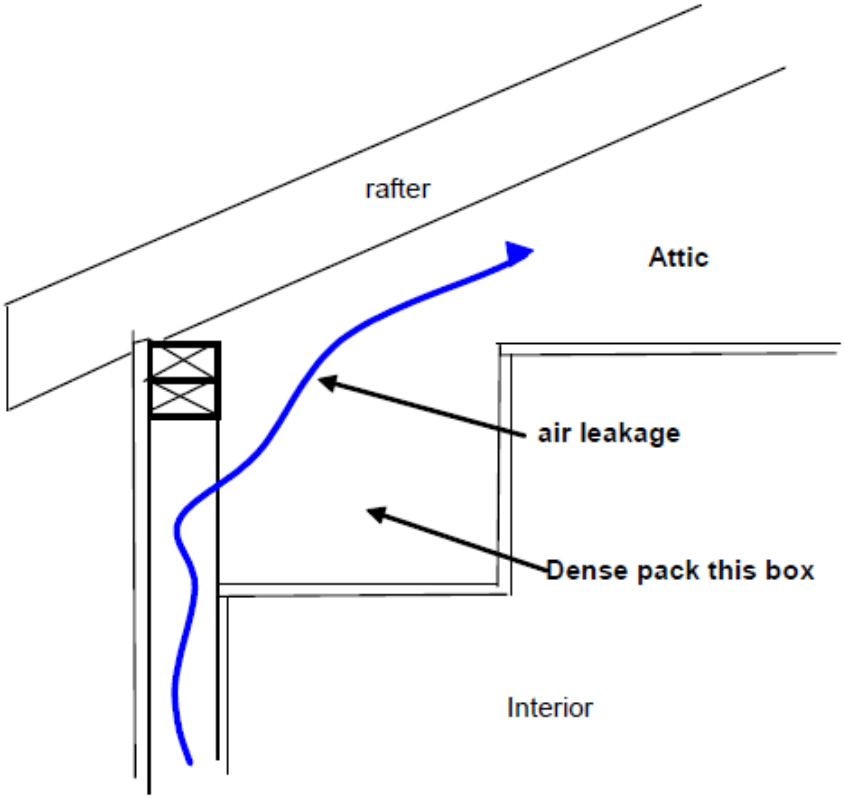
Critical junction points



Interior wall dropped soffit

TEC
The Energy Conservatory

Critical junction points



Exterior wall dropped soffit

The Energy Conservatory

Critical junction points

The Energy Conservatory

Critical junction points

The Energy Conservatory

Critical junction points

TEC®
The Energy Conservatory

Critical junction points

TEC®
The Energy Conservatory

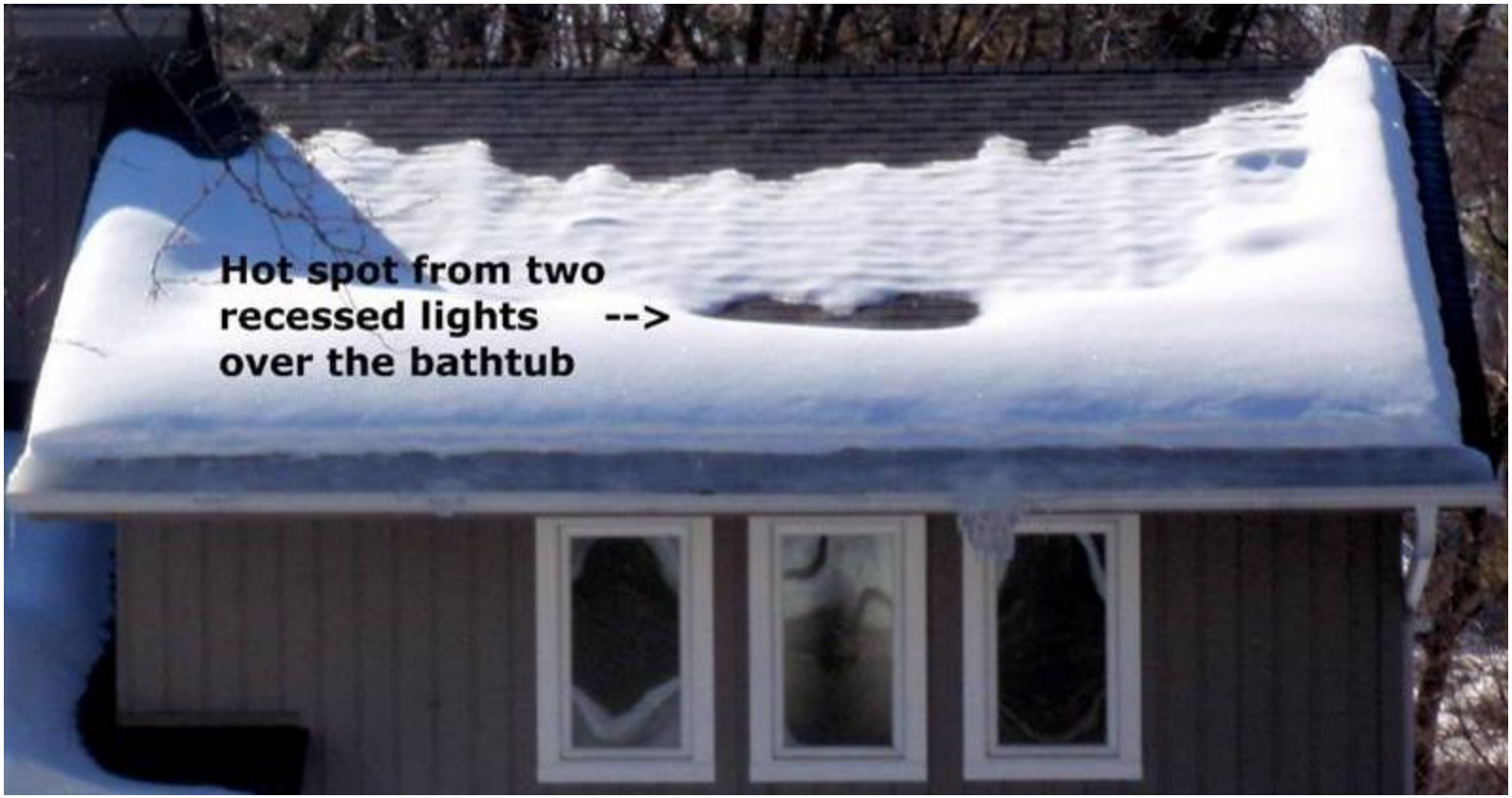
Snow melt patterns

The Energy Conservatory

Snow melt patterns

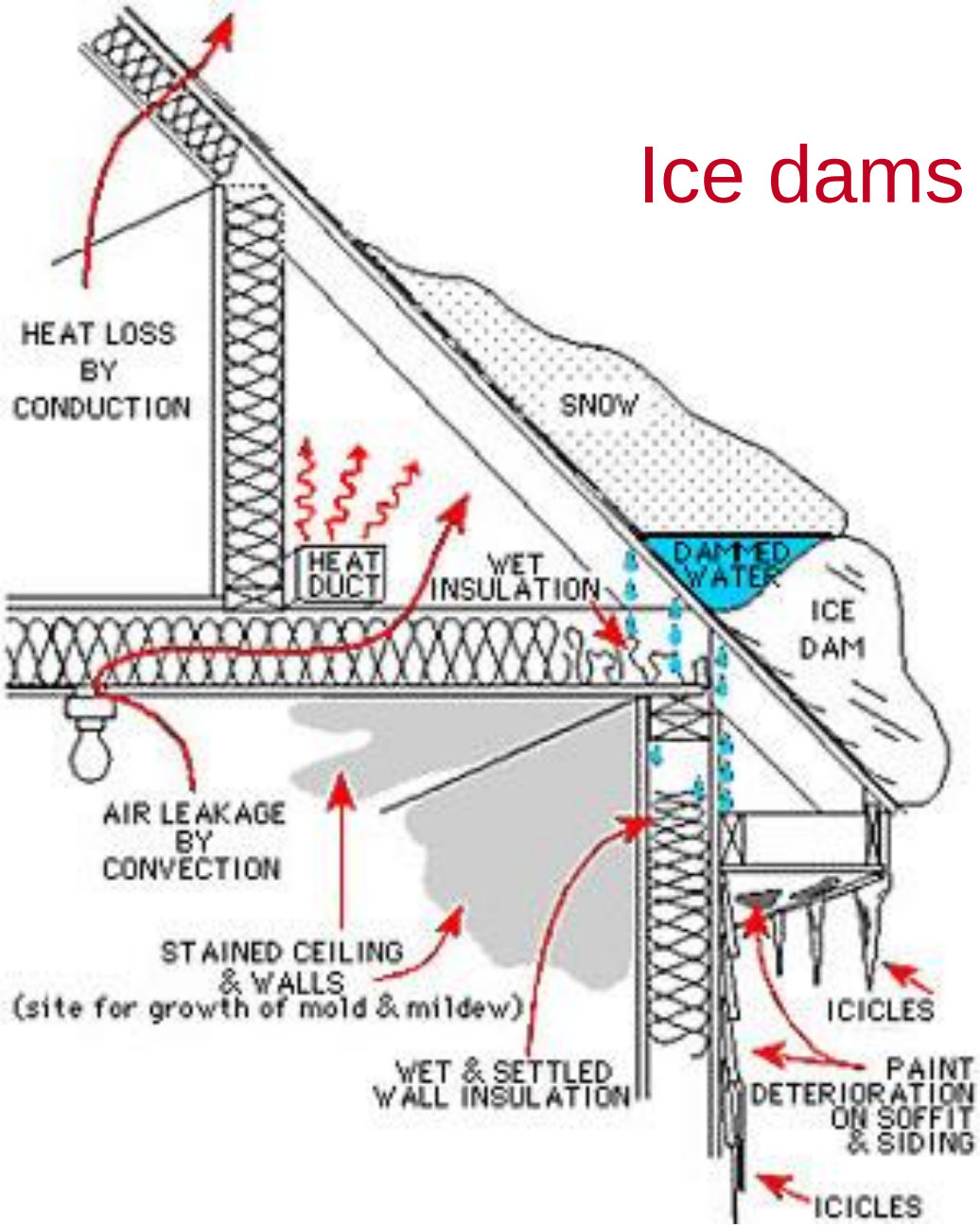
The Energy Conservatory

Snow melt patterns



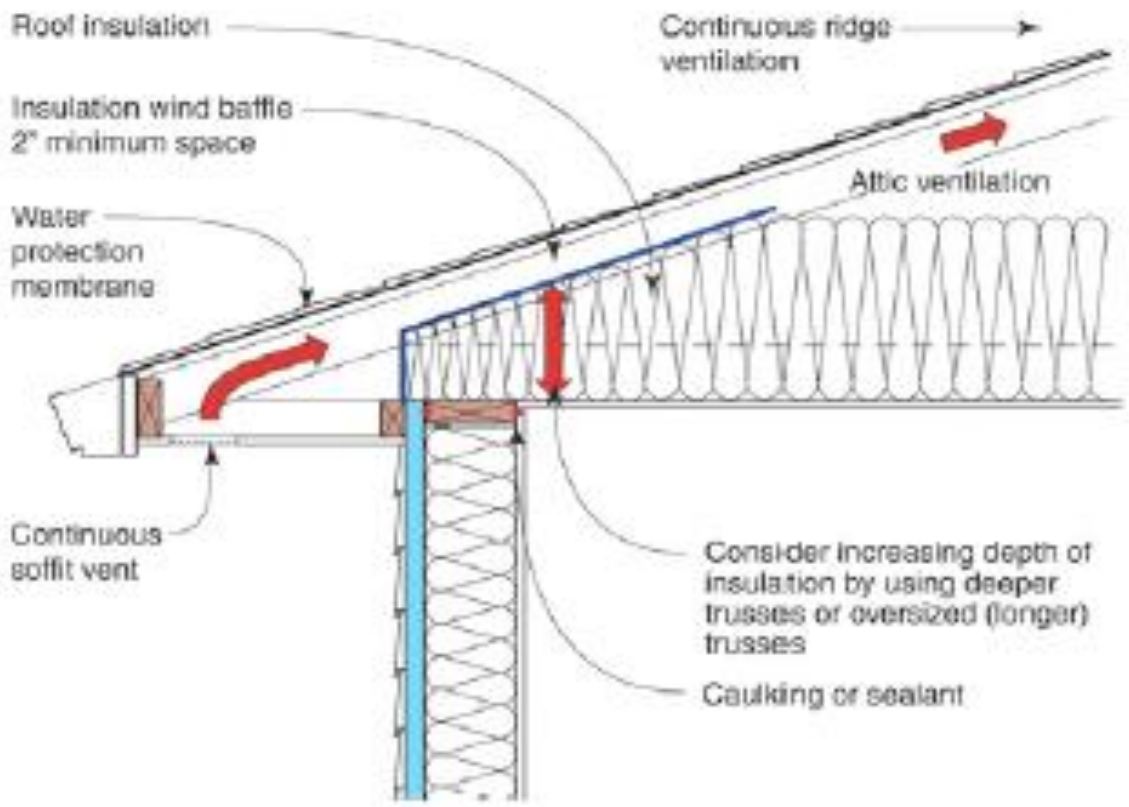
TEC®
The Energy Conservatory

Ice dams



TEC®
The Energy Conservatory

Attic venting



TEC
The Energy Conservatory

Attic condensation

The Energy Conservatory

Attic condensation

The Energy Conservatory

Attic condensation

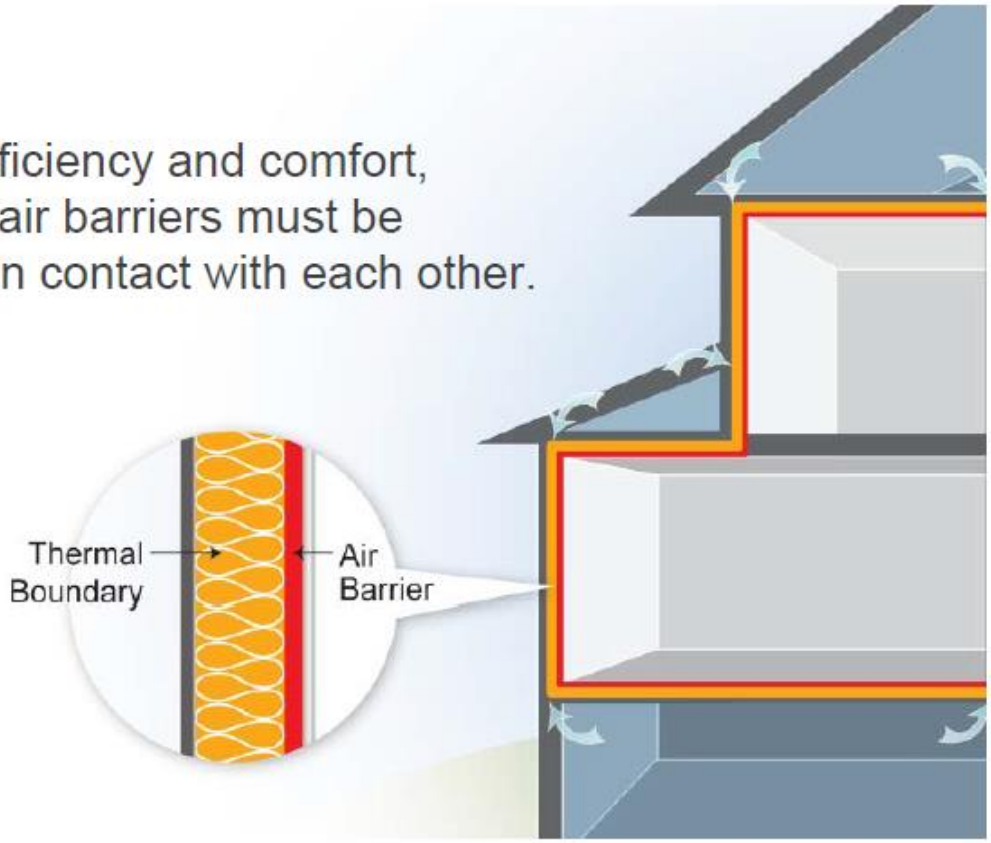
The Energy Conservatory

Attic condensation

The Energy Conservatory

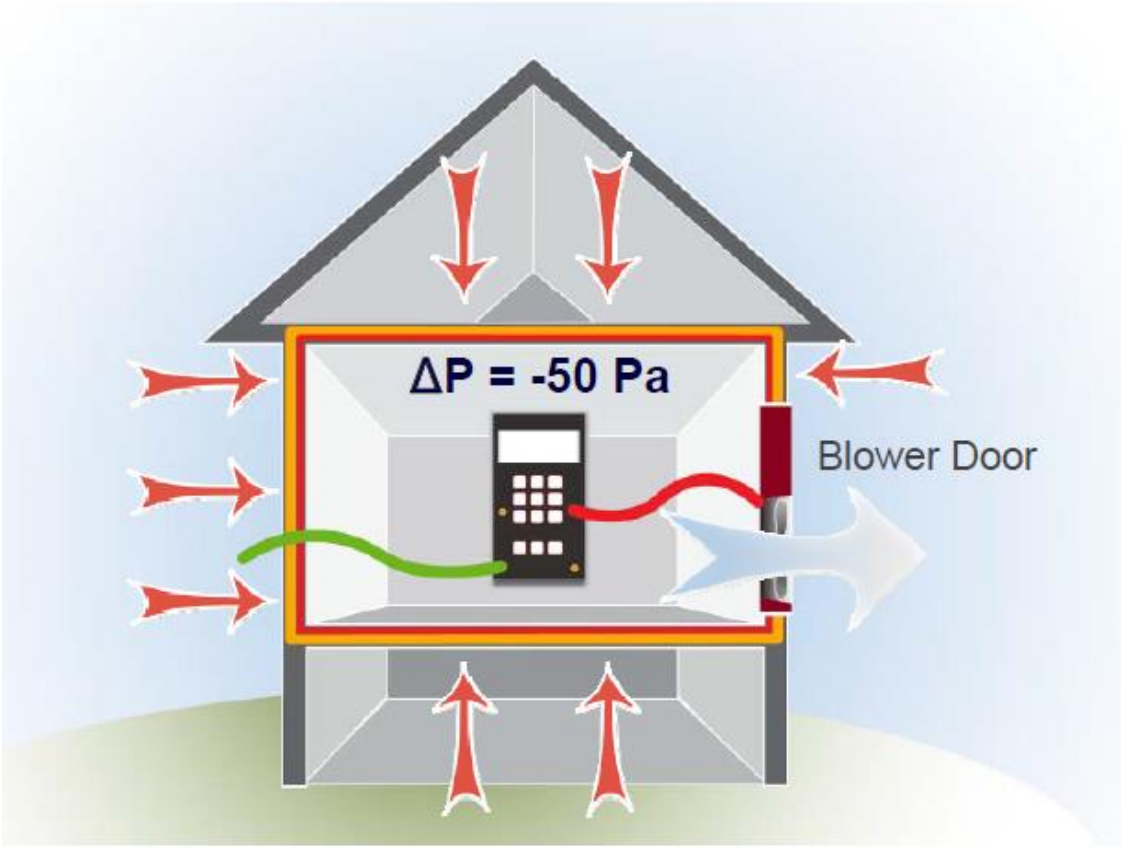
Thermal and Air Barriers

For maximum efficiency and comfort, the thermal and air barriers must be continuous and in contact with each other.



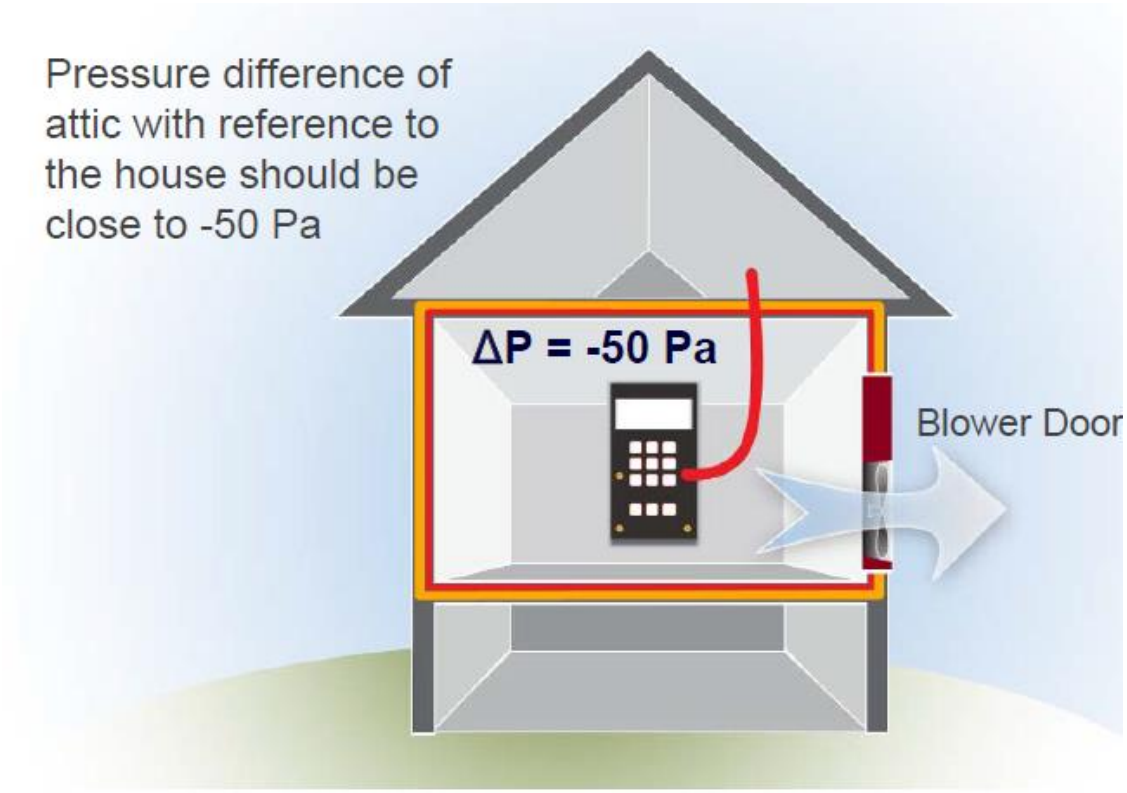
TEC®
The Energy Conservatory

Blower door test



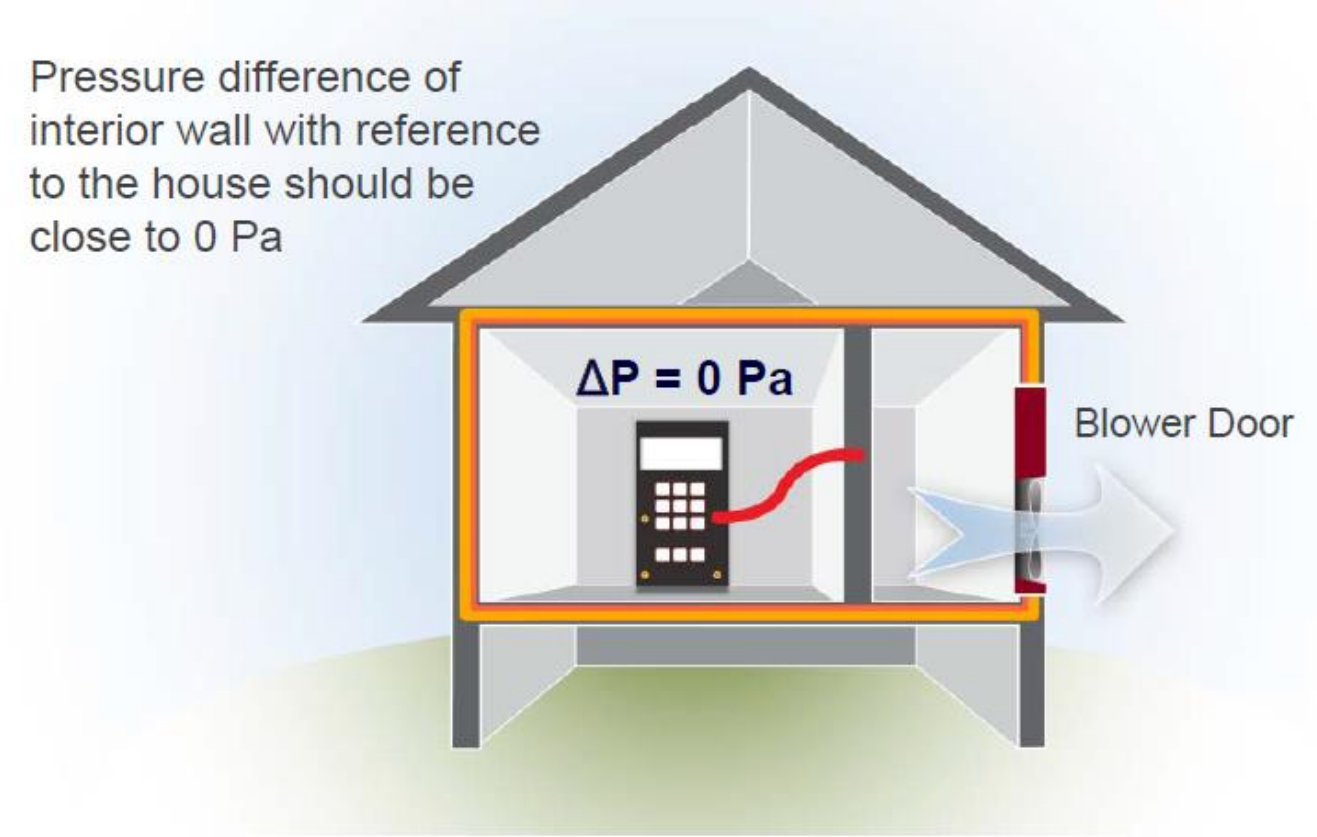
TEC®
The Energy Conservatory

Zone Pressure Diagnostics



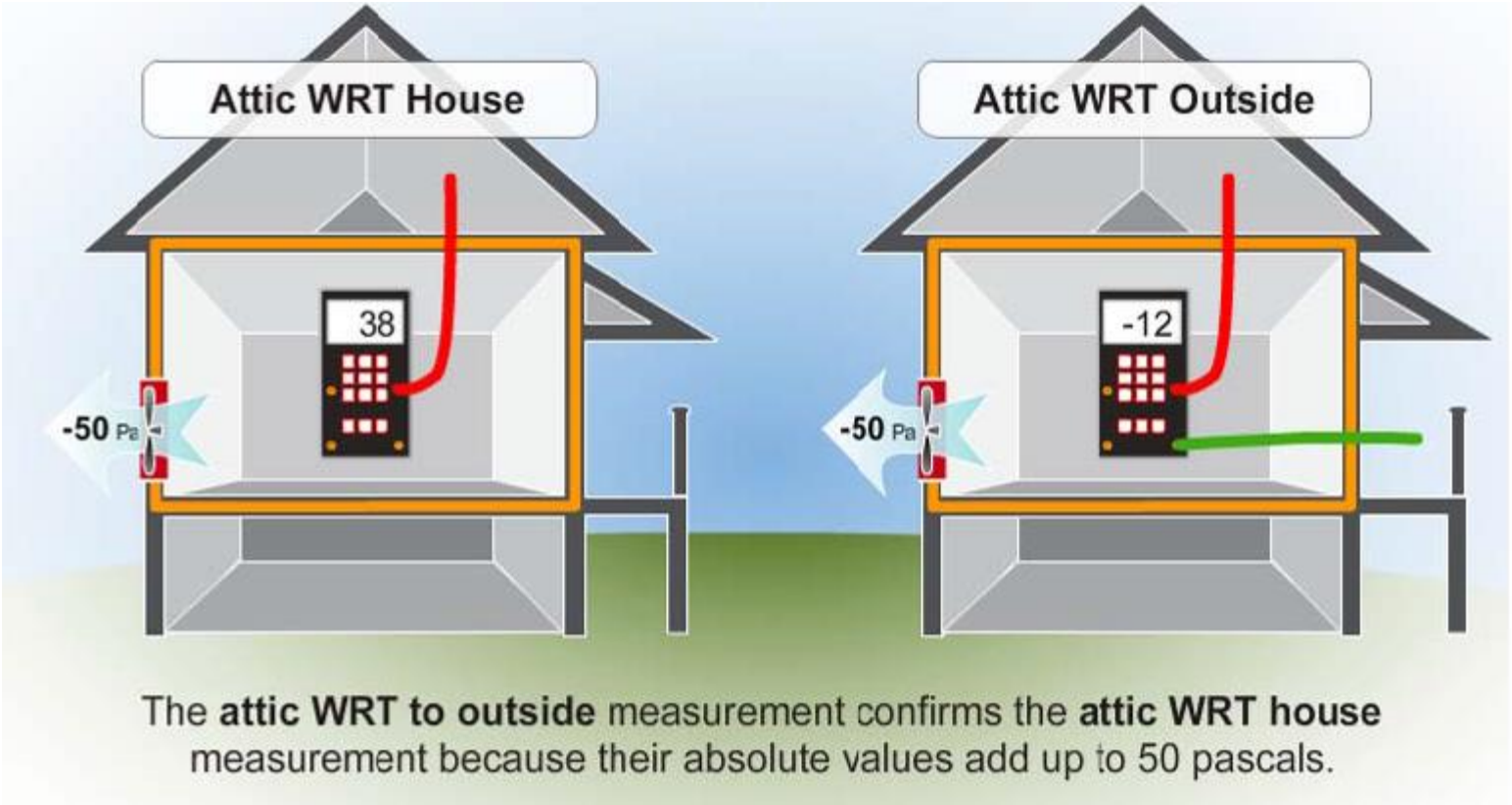
TEC
The Energy Conservatory

Zone Pressure Diagnostics



TEC®
The Energy Conservatory

Verifying Zonals



TEC
The Energy Conservatory

Outside zones and inside zones

Unheated zones **OUTSIDE** the house should be closer to **50 pascals.**

Outside Zones (Unheated)

- Attics
- Garage
- Porches (sometimes)
- Crawlspace (sometimes)

Heated zones **INSIDE** the house should be closer to **0 pascals**.

Inside Zones (Heated)

- Interior walls
- Floors between stories
- Porches (sometimes)
- Crawlspace (sometimes)
- Basement

TEC®
The Energy Conservatory

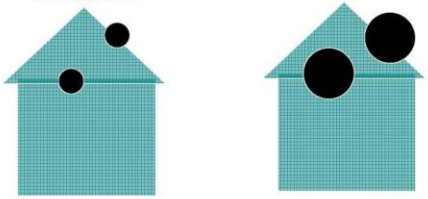
Zone Pressure Diagnostics

- Measure attic or attached garage pressure with house at 50 Pa
- This tells you a relative hole size
- Need to open a hatch or door and retest to learn CFM between house and attic

Pressures and Leakage

Attic Zonal Reading of 25pa

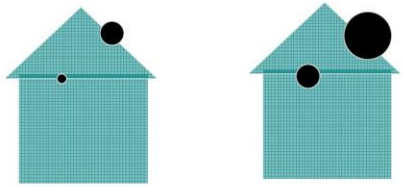
Means hole between Attic and House is Same size as Hole Between Attic and Outdoors



Pressures and Leakage

Attic Zonal Reading of 48pa

Means hole between Attic and House is 1/8th size of Hole Between Attic and Outdoor



11

Ratios of Pressures to Leakage

Zone Pressures			Relative Size of Leaks	
Zone-House	Zone-Out		Zone-House	Zone-Out
12	38		2	1
25	25		1	1
37	13		½	1
41	9		1/3	1
45	5		¼	1
48	2		1/8	1
49	1		1/13	1

Sources: Michael Blasnik and Jim Fitzgerald

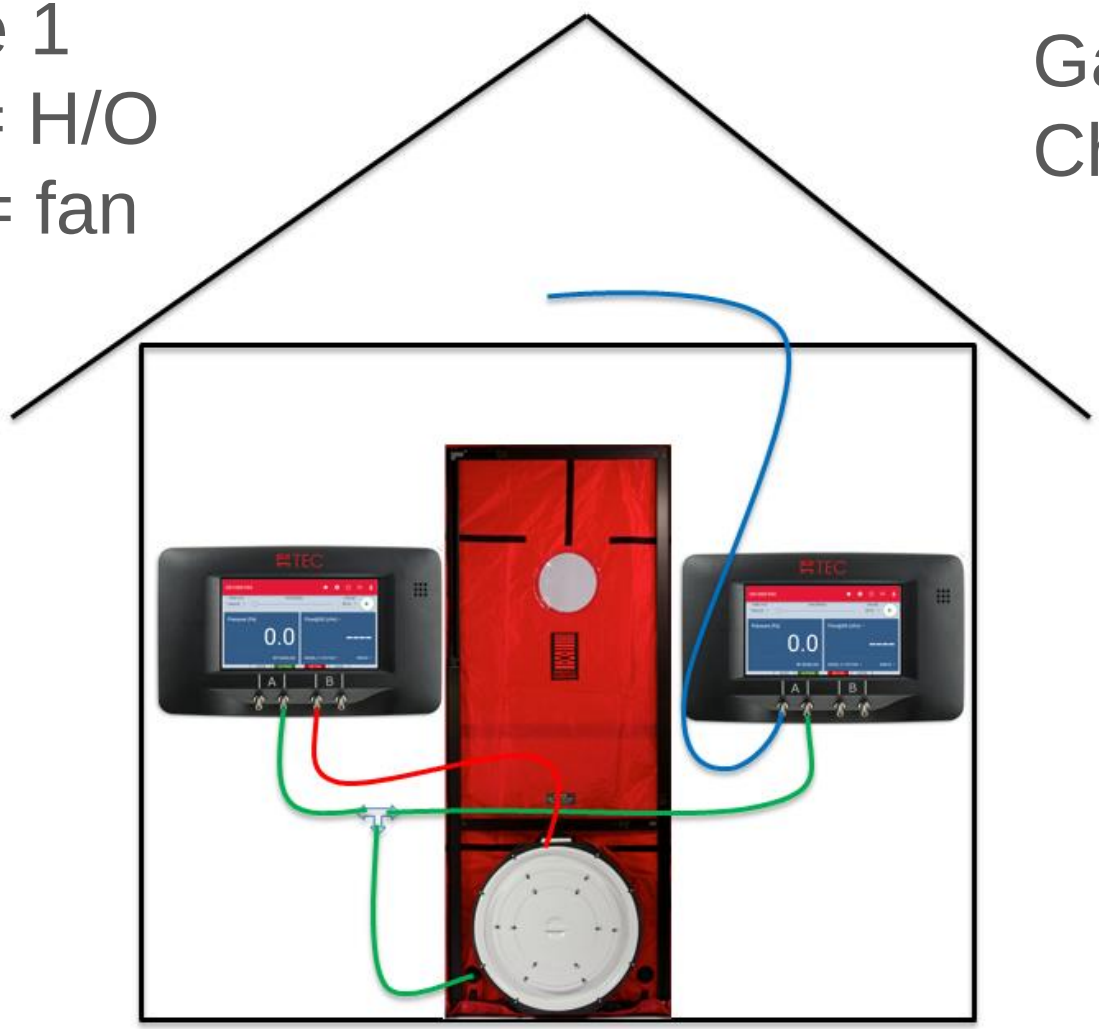
Types of zone testing

- Direct pressure measurement
  - Is zone more inside of more outside
  - Do pressure and thermal boundaries line up
- Advanced zone measurements
  - Record CFM50 and zonal reading
  - Open a hatch or door to that zone
  - Record the new CFM50 and zonal reading
  - Enter results into software

‘Add a Hole’ Procedure

Baseline both gauges

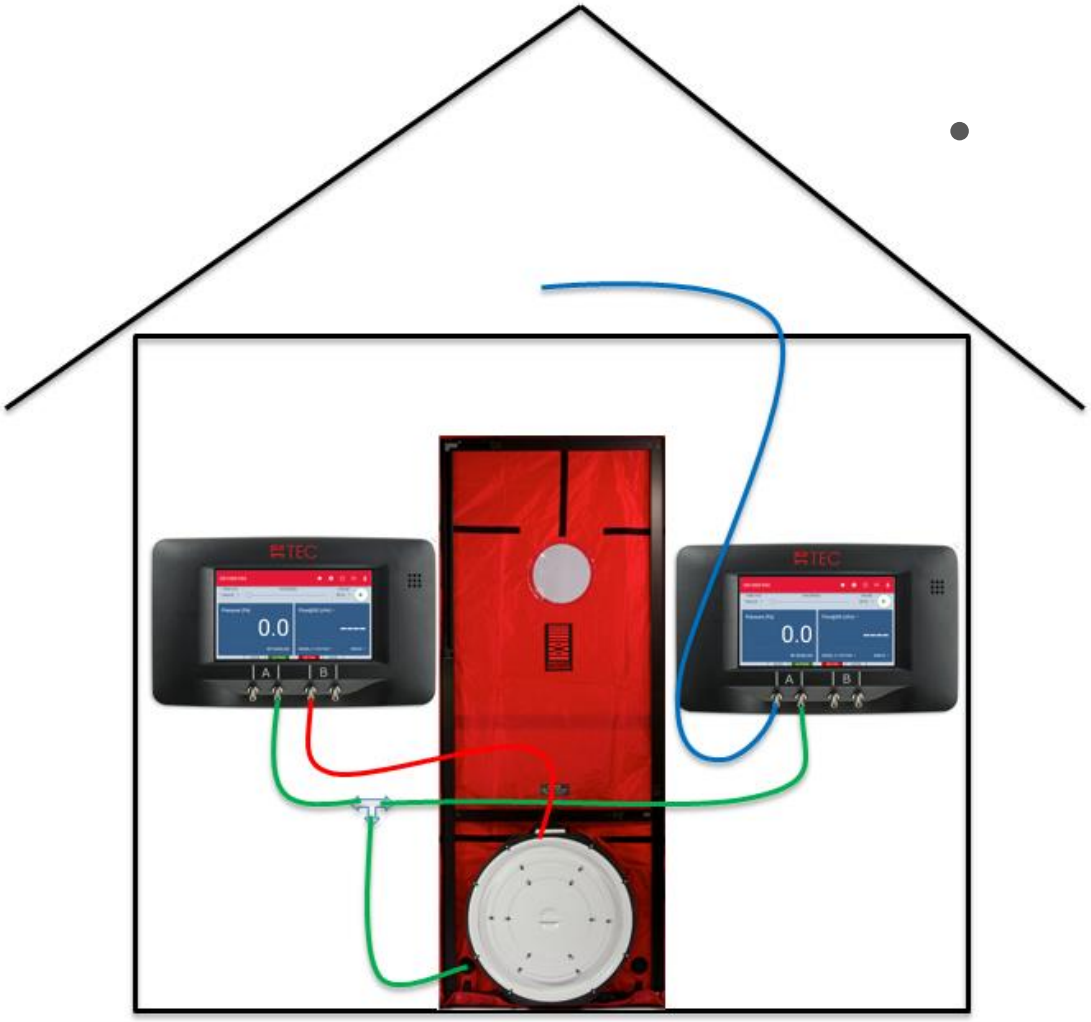
Gauge 1
Ch A = H/O
Ch B = fan



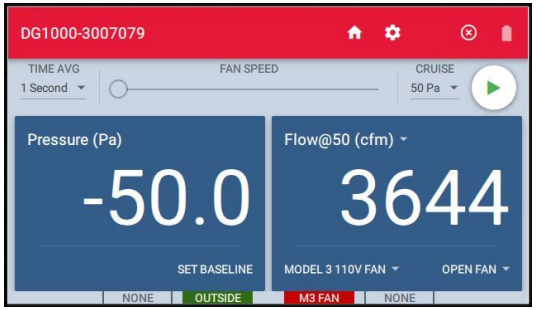
Gauge 2
Ch A = Z/O

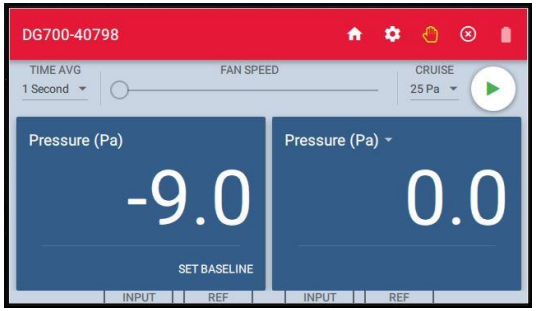
TEC
e Energy Conservatory

Bring house to 50 Pa

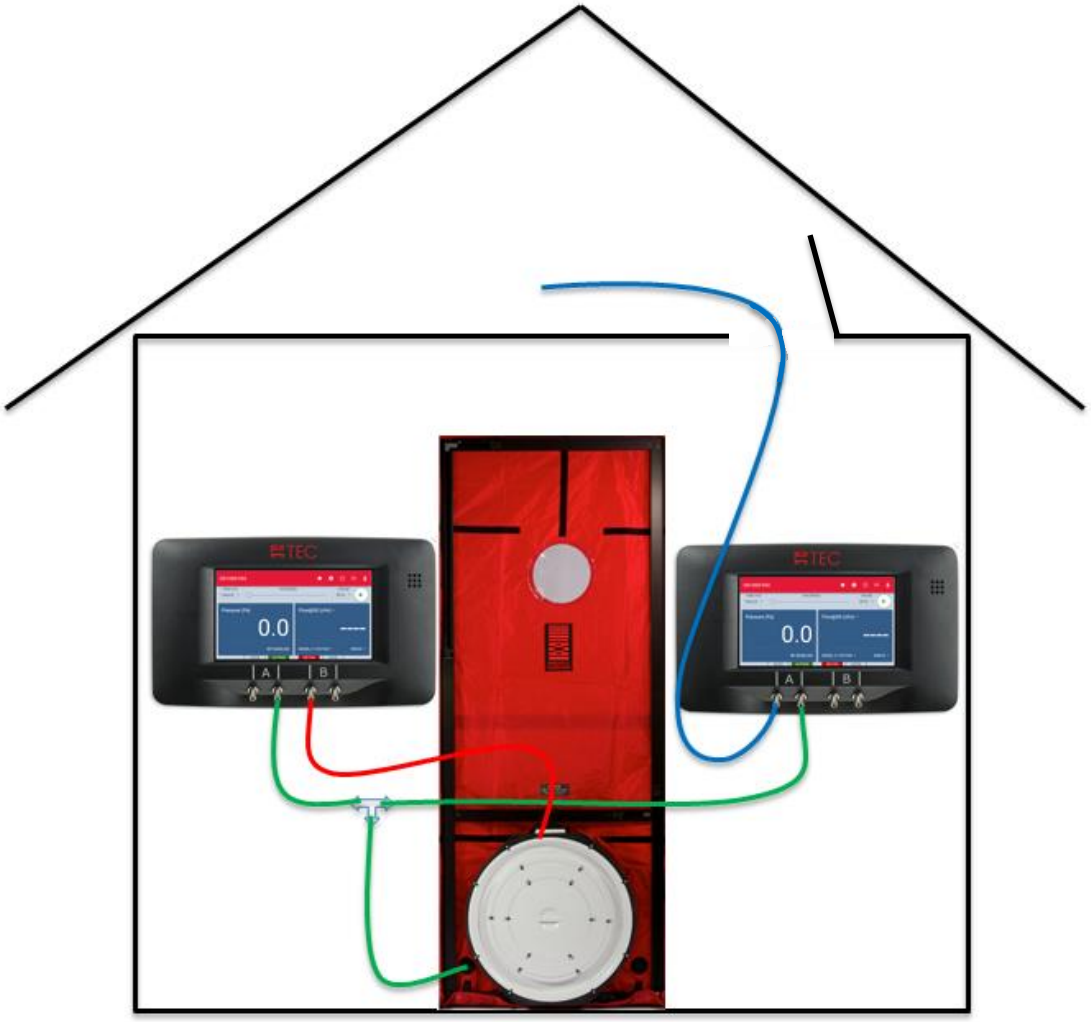


- Record results
  - CFM50
  - Zonal pressure



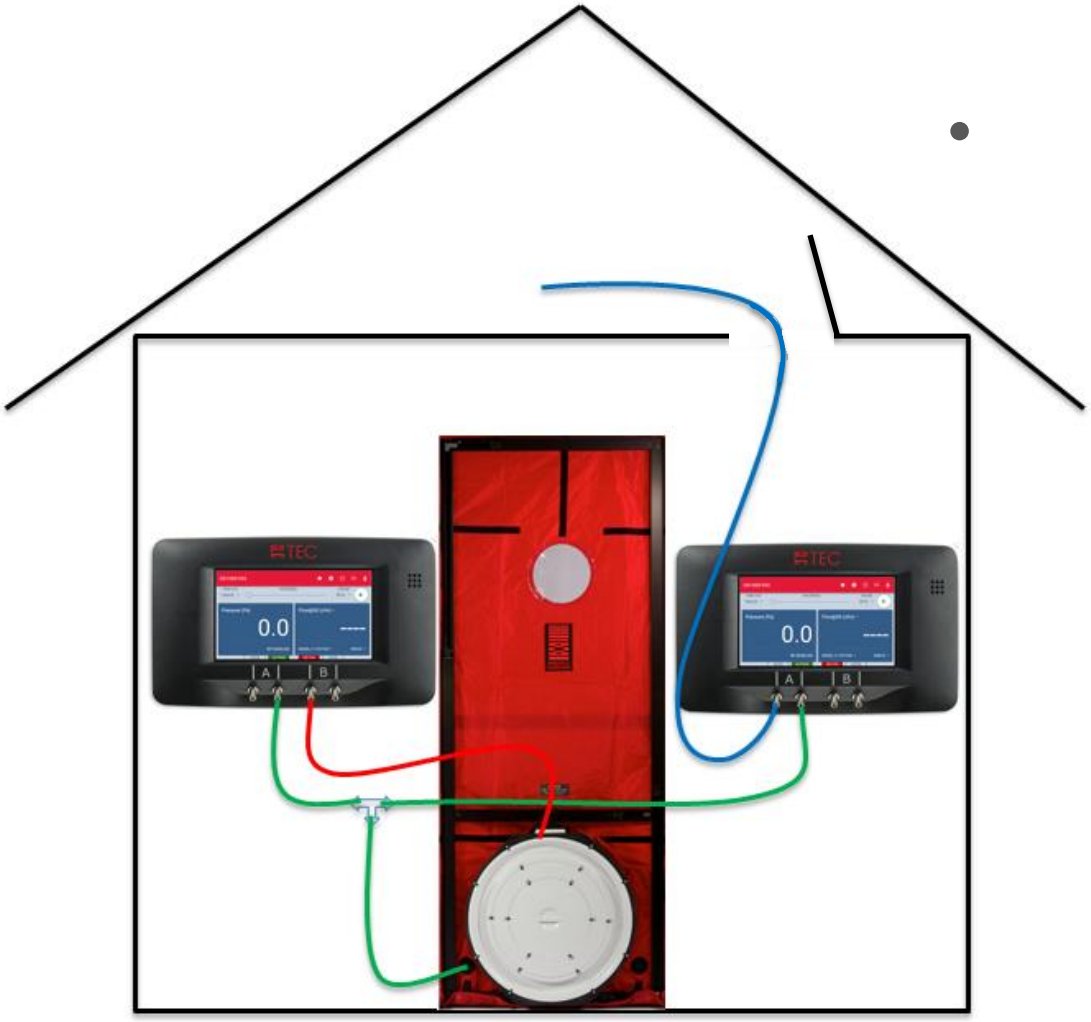


Open hatch and redo the baseline

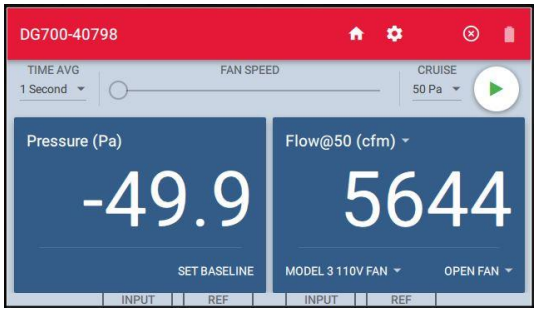


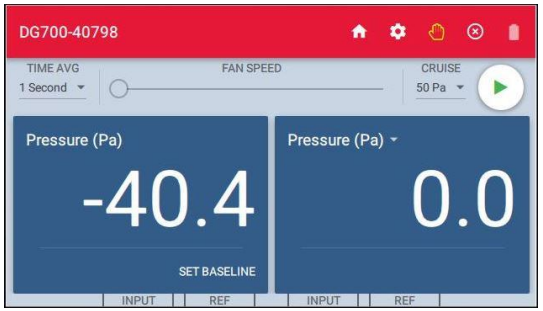
TEC®
The Energy Conservatory

Bring house to 50 with hatch open



- Record results
  - CFM50
  - Zonal pressure

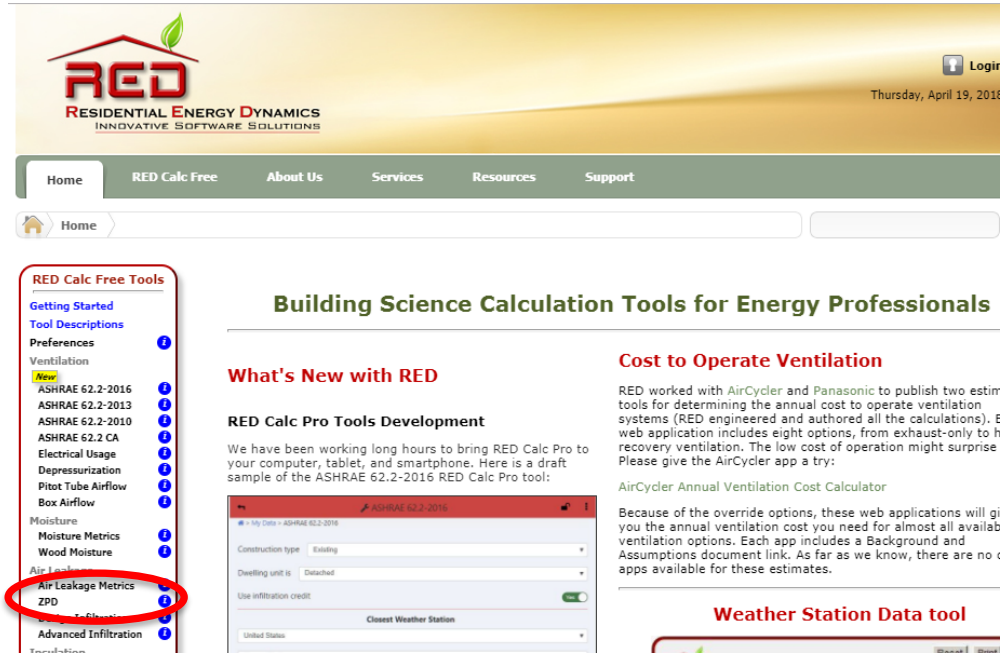




Enter Results into Software

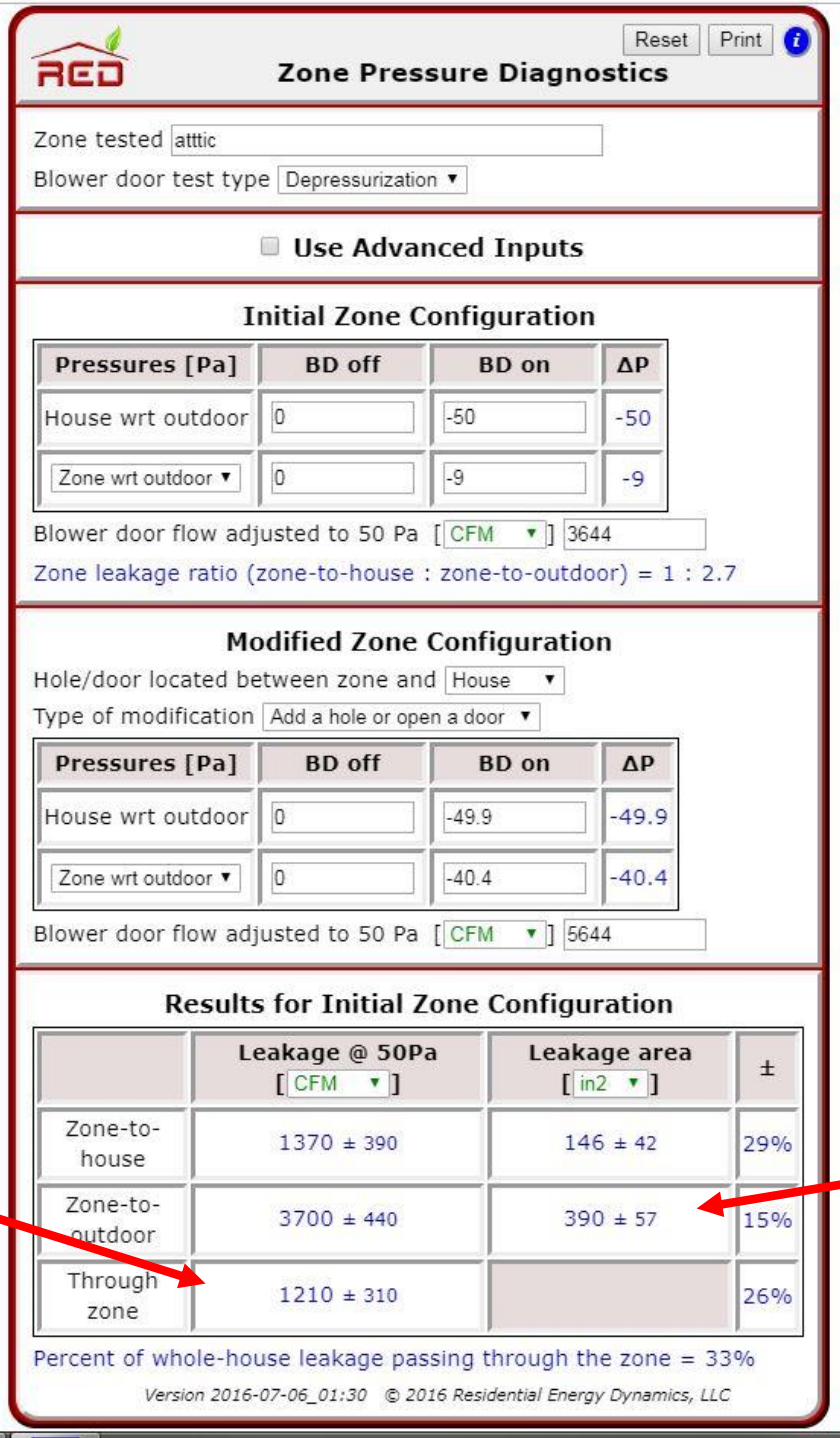
» Rick Karg's website – web based software

http://www.residentialenergydynamics.com



ZPD

The Energy Conservatory



Set to ‘Zone WRT Outside'

Both baseline adjusted

Reset base w/ hatch open
Both baseline adjusted

CFM reduction possible

in² of venting

The Energy Conservatory

Crawlspace or basement insulation

The Energy Conservatory

Blower door test demo

- Single point test at 50 Pascals
- Multipoint test following a test standard
- Use software or apps to do an automated test and generate a report

TEC Auto Test

TEC
The Energy Conservatory

Questions?

Paul Morin
pmorin@energyconservatory.com
612-254-2162

TEC®
The Energy Conservatory