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BUILDING 20
ENCLOSURE 23
CONFERENCE

Tales From the Clipboard

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Office: 866-582-4320
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**BUILDING
ENCLOSURE** 20
CONFERENCE 23

Tales From The Clipboard

Learning Objectives

This is an excerpt from some of the discovered failings from nearly 20 years of energy audits, air barrier inspections, and pressure testing.



1. Basic pressure flows: high pressures flow towards low pressures in relation to condensation issues.
2. Why liquid applied membranes need to be applied at design temperatures.
3. What happens if an air and thermal barrier is poorly defined in steel stud construction.
4. Describe basics of a large building blower door test and what could happen if not prepared.



Can you tell where the drop ceiling is?

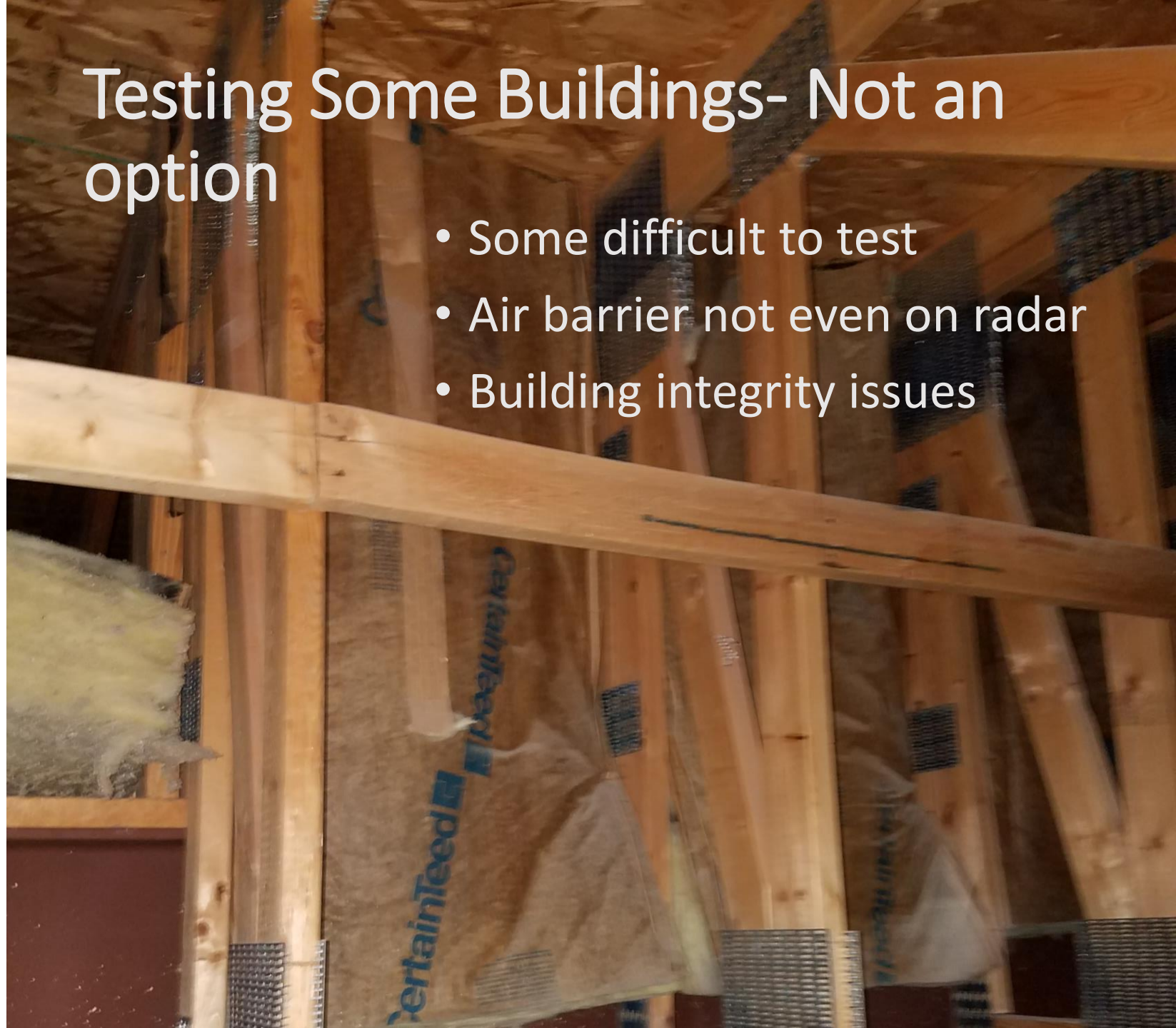


They covered the spalling brick with a sign



Testing Some Buildings- Not an option

- Some difficult to test
- Air barrier not even on radar
- Building integrity issues



Need Thermal AND Air Barrier

- Similar style construction. Attempts to fix ice dam issues.
- Without continuity- FAIL



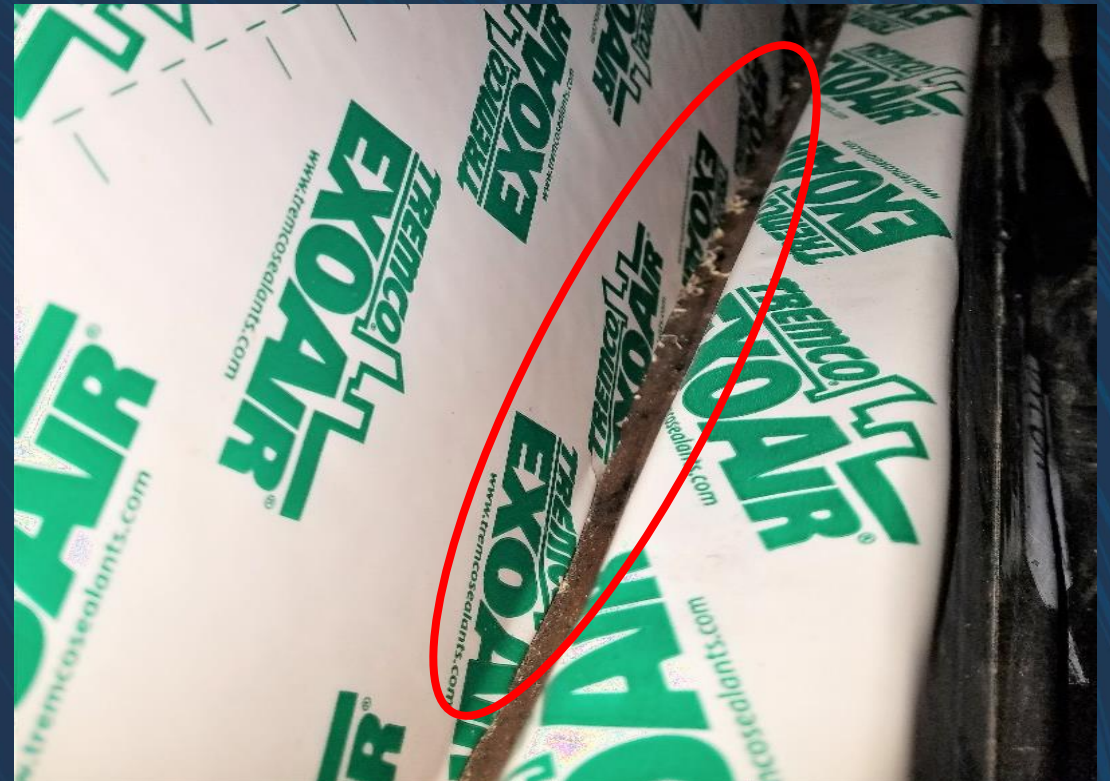


Air Barrier

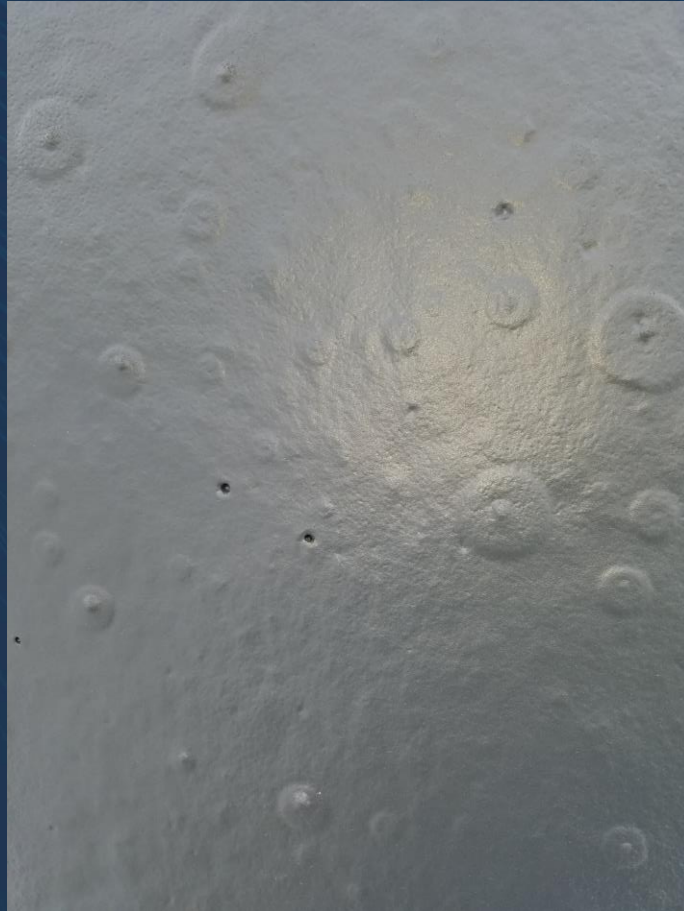
- Planned
- Detailed
- Proper layering
- Interim inspections
- Collaborative efforts
- TEAM from day one

Peal and Stick Not Continuous

Allowing air (and eventually water) to migrate past missing lap joint



Liquid Applied Too Cold

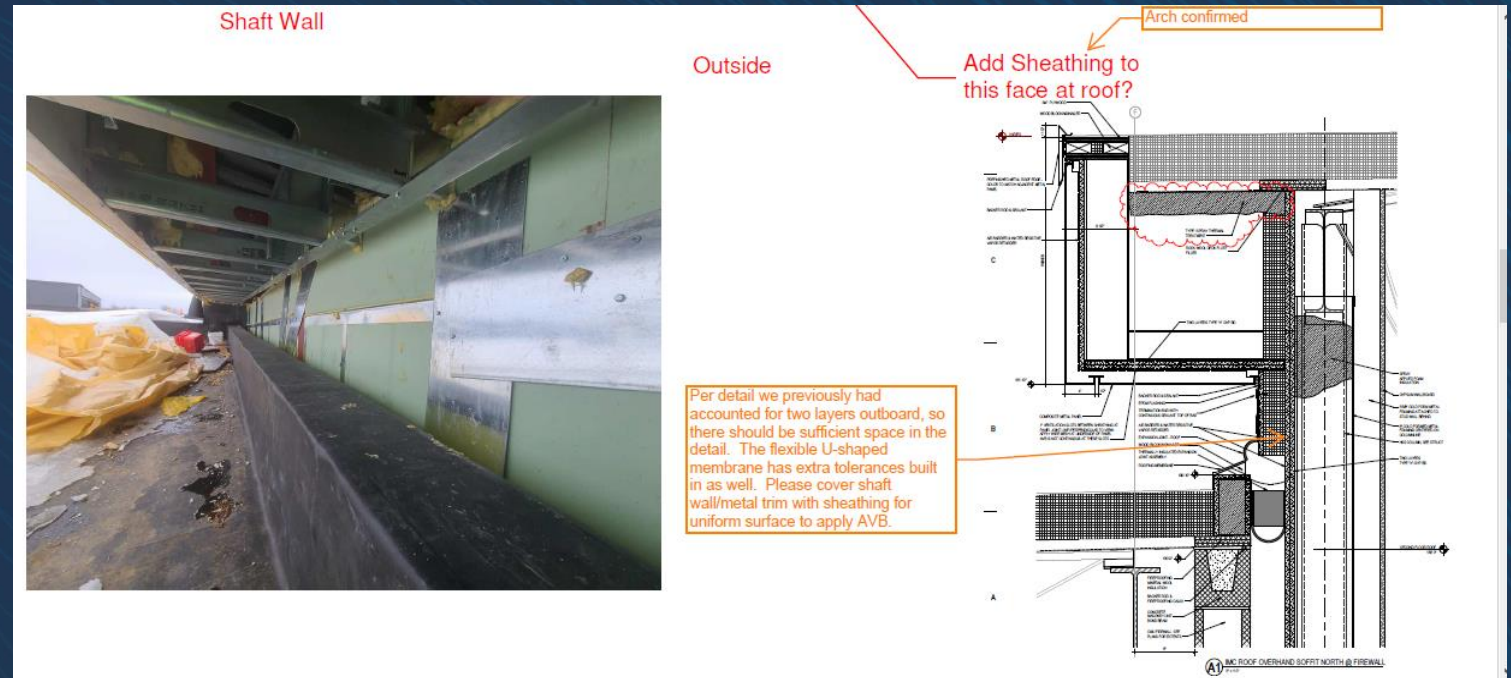


Before and After 3rd Coat- Liquid Applied

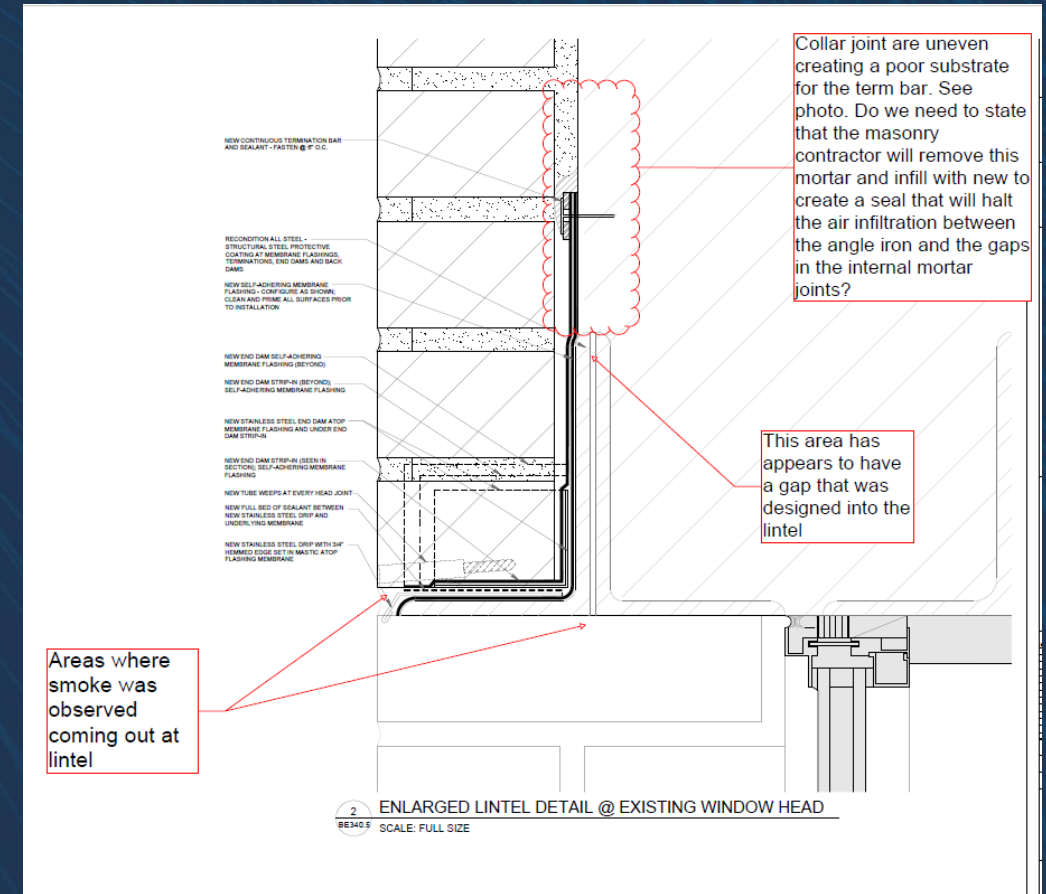


Is It In The Details?

- Much is in the details
- Not all is in the details
- Very often inspection leads to further details drawn to clarify issues
- Details can often be drawn perpendicular to air barrier problem, not clear how to complete by installer



Common Errors- Its in the Details



Windows not being sealed where frame meets wall. Seal the lintel from the inside during construct.

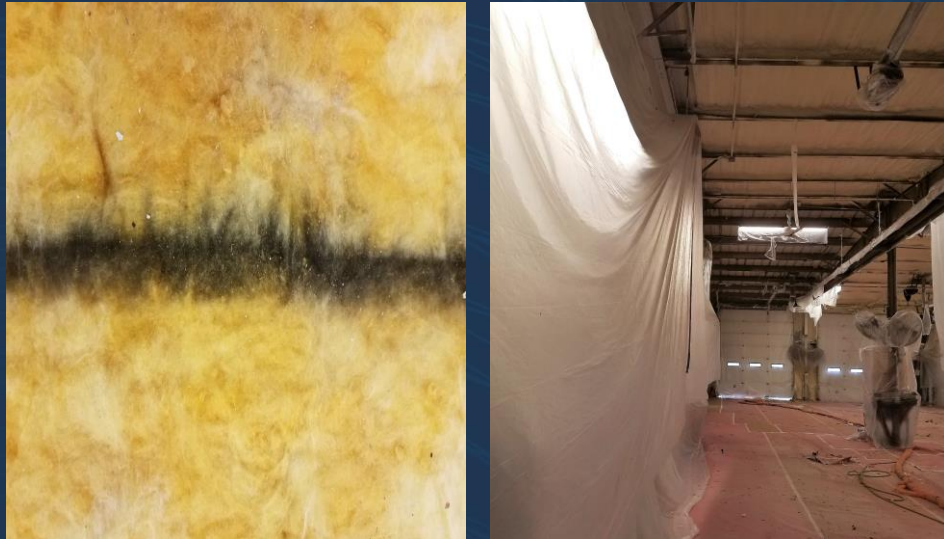
Commercial spaces often between buildings- note
steel studs have **gap** in stud too



Demising Walls
Seal the double wall

Visual Queues Often Tell Us Where to Look



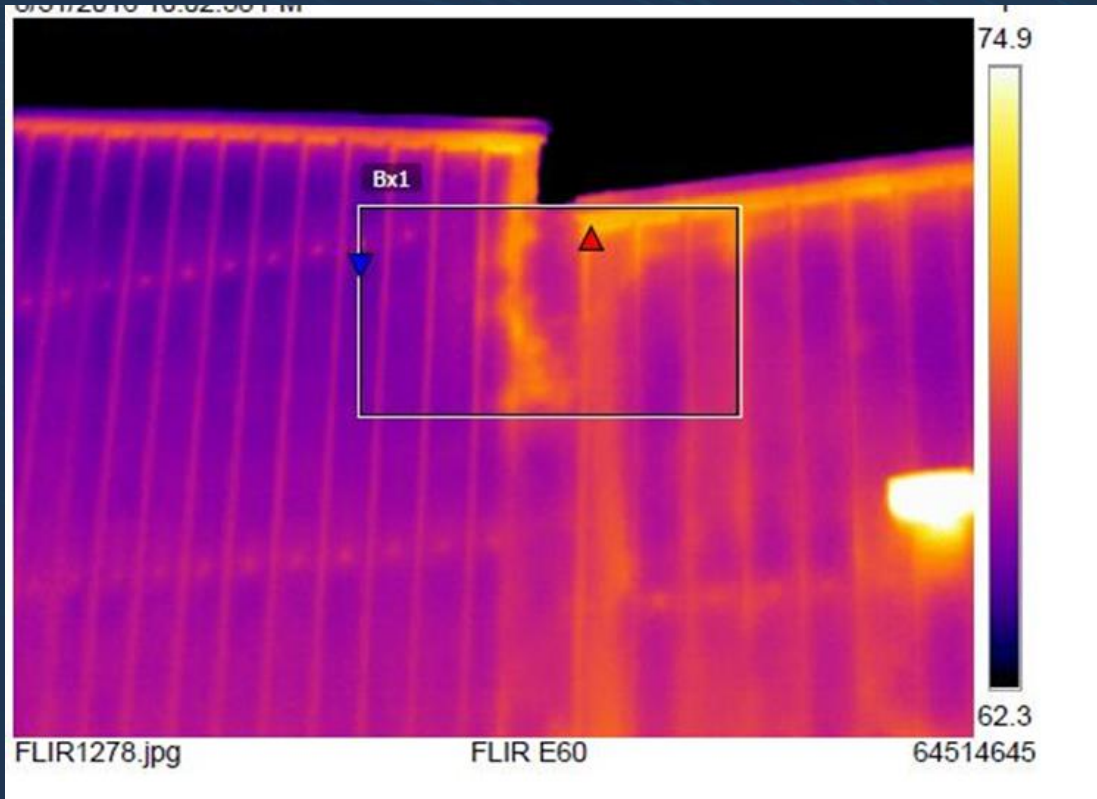


Air Moves Through “Filter-glass”

- Air flows through fibrous insulations.
- Insulating and air sealing is needed.
- Seal seam of decking.
- Many builders still think fibrous insulation stops air flow.



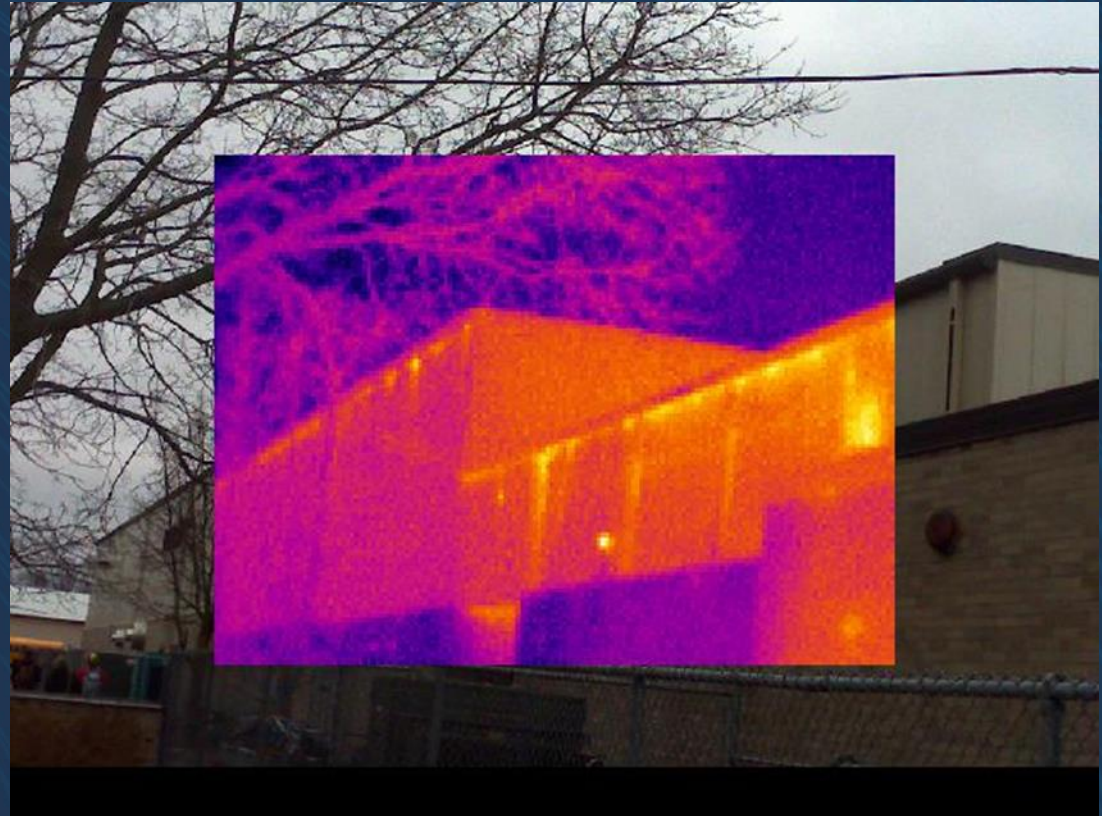
Additions



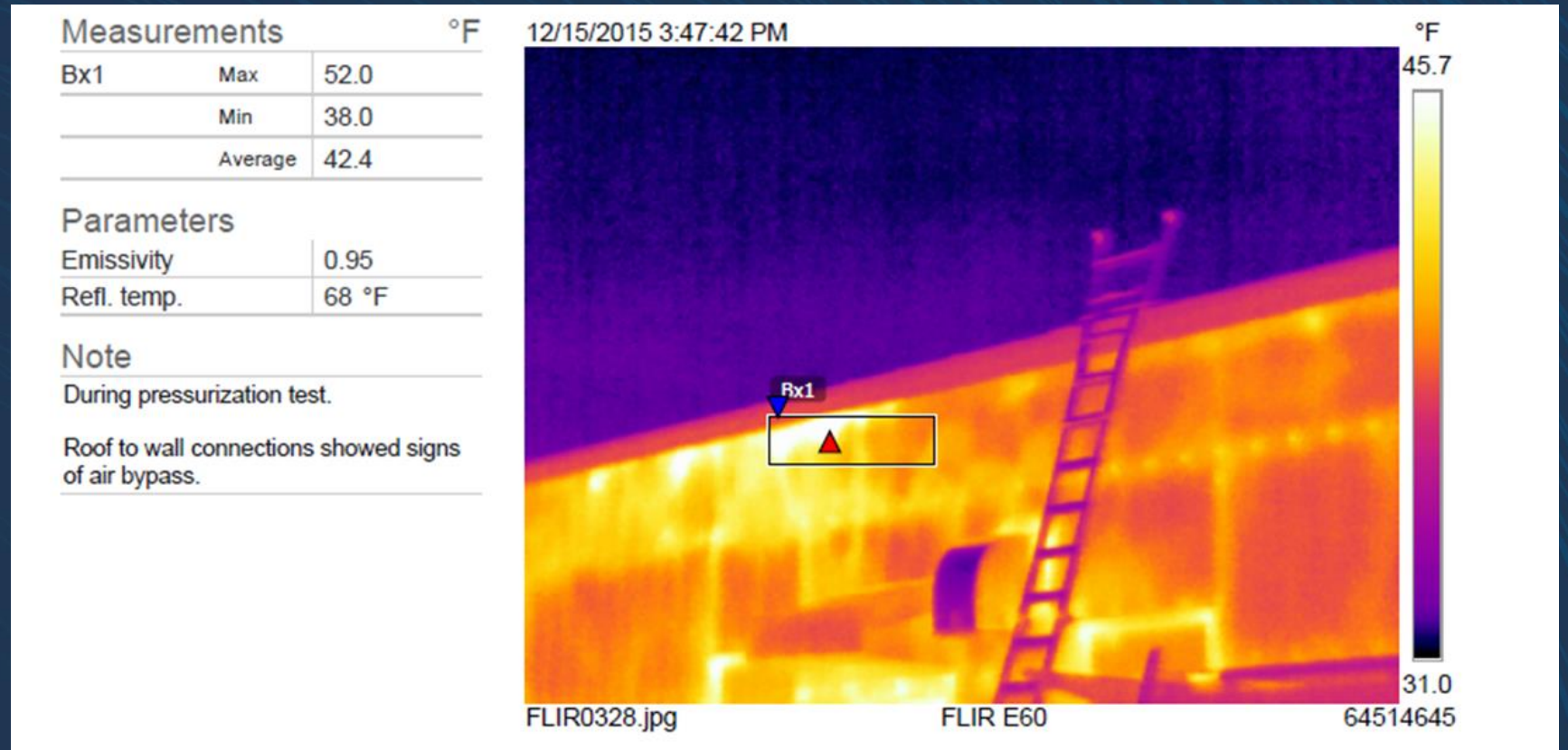
- Additions are often problem areas
- Where building sections meet
- Who's job is it to connect the new and old buildings

Roof to Wall Connections

- Often seals have to be put up before walls
- If it isn't called out in the plans, it won't get done



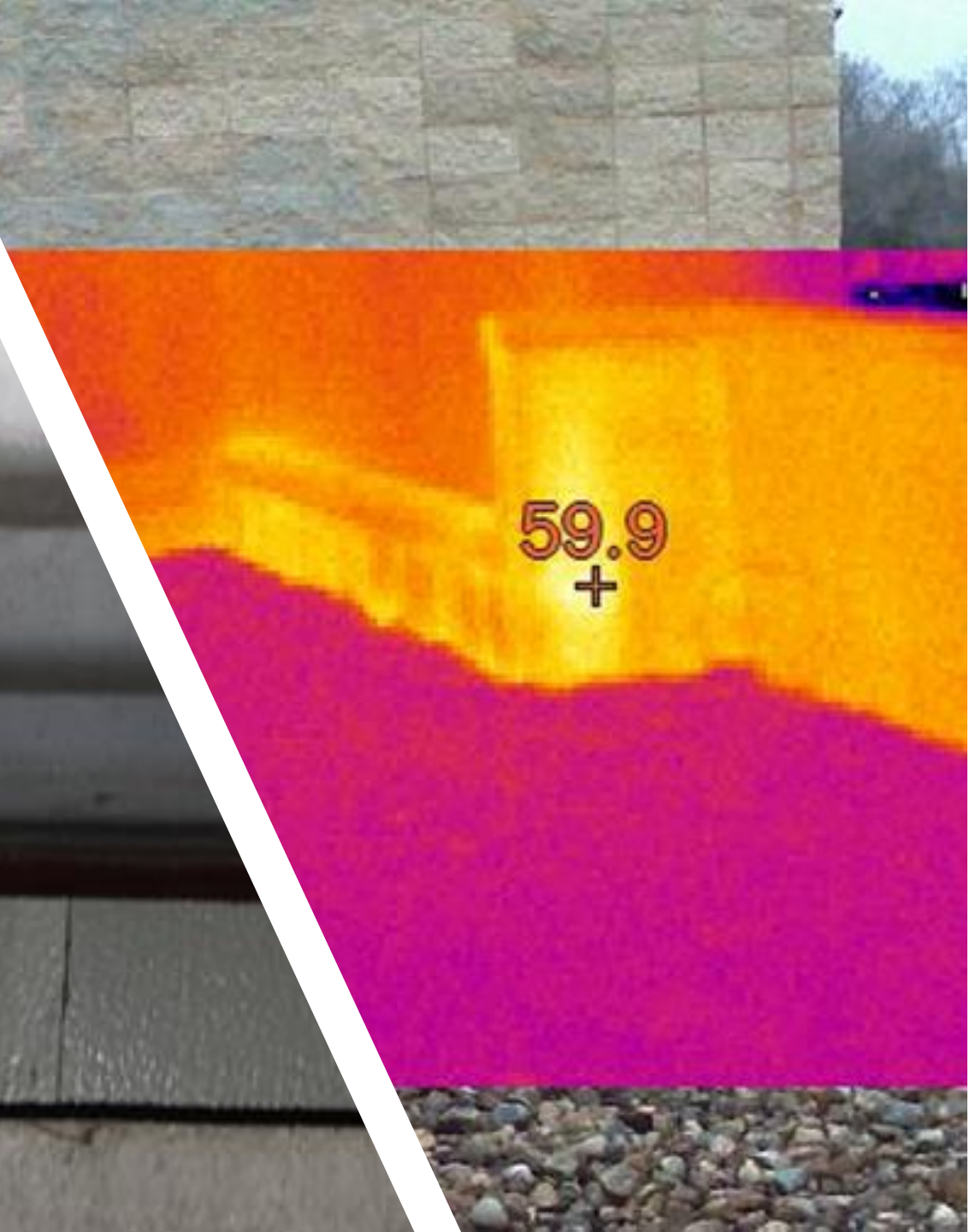
Roof to Wall Connections



Seal before the new roof goes on or it gets expensive real fast.

Parapets

- Need to be broken and detailed
- If corrugated decking is used, use proper sealants



Vestibules

- Are they inside or outside (usually inside)
- Often very poorly defined
- Often treated as unconditioned spaces
- Nearby spaces often uneven heat

The Weird



- Soffit directly connected to ceiling plenum
- Entire building heating on connected plenum system

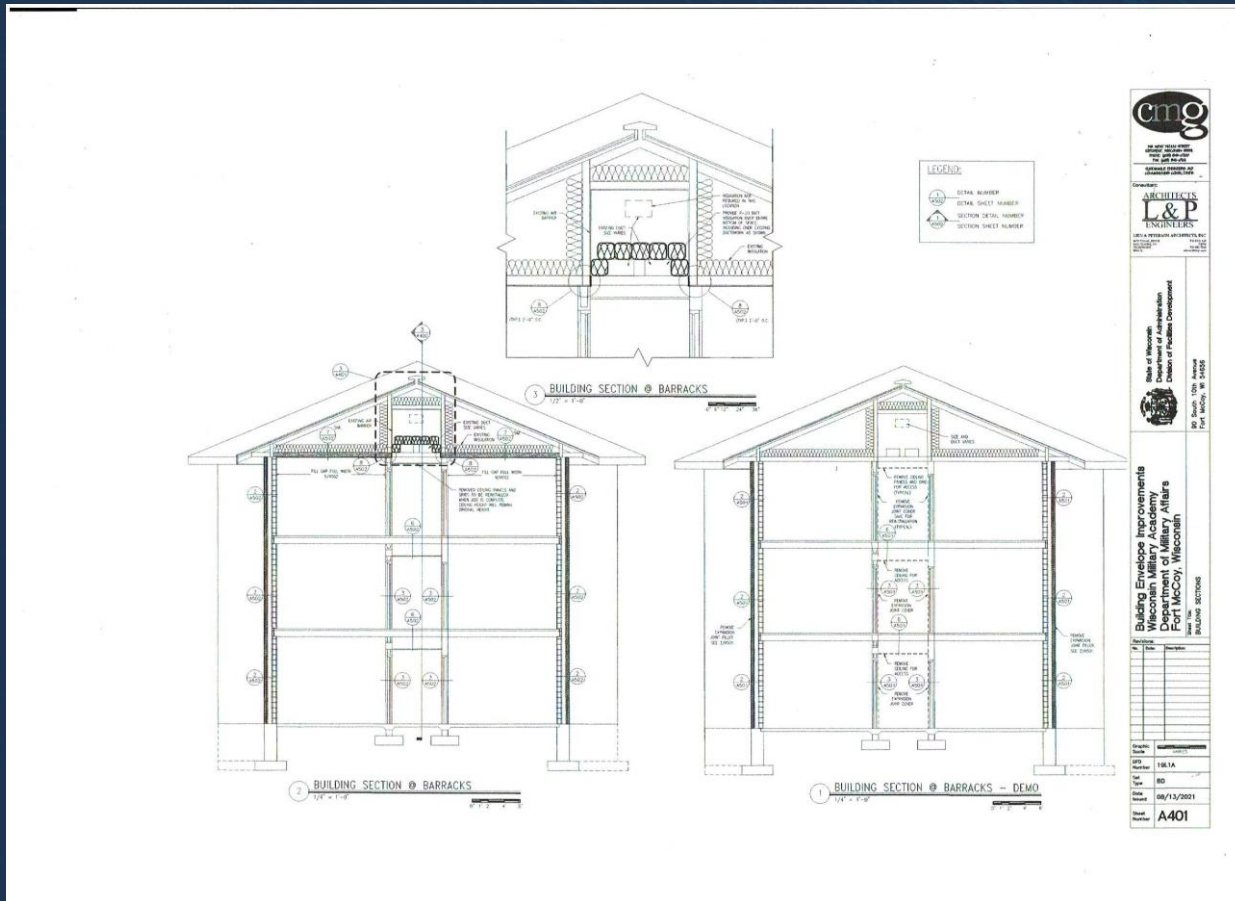


Making a bad air barrier worse

Maintenance staff hacking holes in air barrier to make repairs & making more pipes freeze

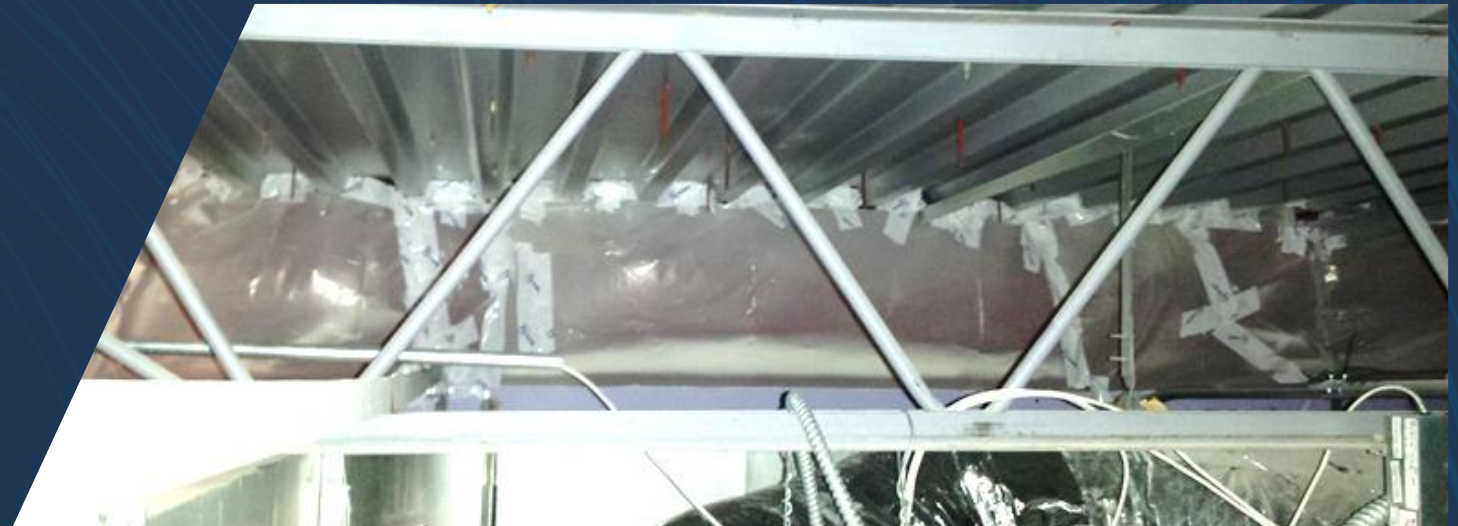


Air barrier repair WI Military Academy repairing a bad design: non-traditional



This will not work. EVER!

- Tape will fail
- Hard to detail properly
- Lack of consistency



Need For Testing

- Lots of insulation, poor air sealing details caused ice in attic
- Good intentions do not equal good results
- Guidance and a mock test could've saved this before insulation install
- Is this SF, MF, Commercial?
.....exactly. *The building science principles are the same.*



Or You Get This



Or This! Yes, that's all mold!



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Common Errors

- Cantilevered Roofs or Floors



Common Architectural Problem Areas

Overhangs

Can be well connected to building at the horizontal

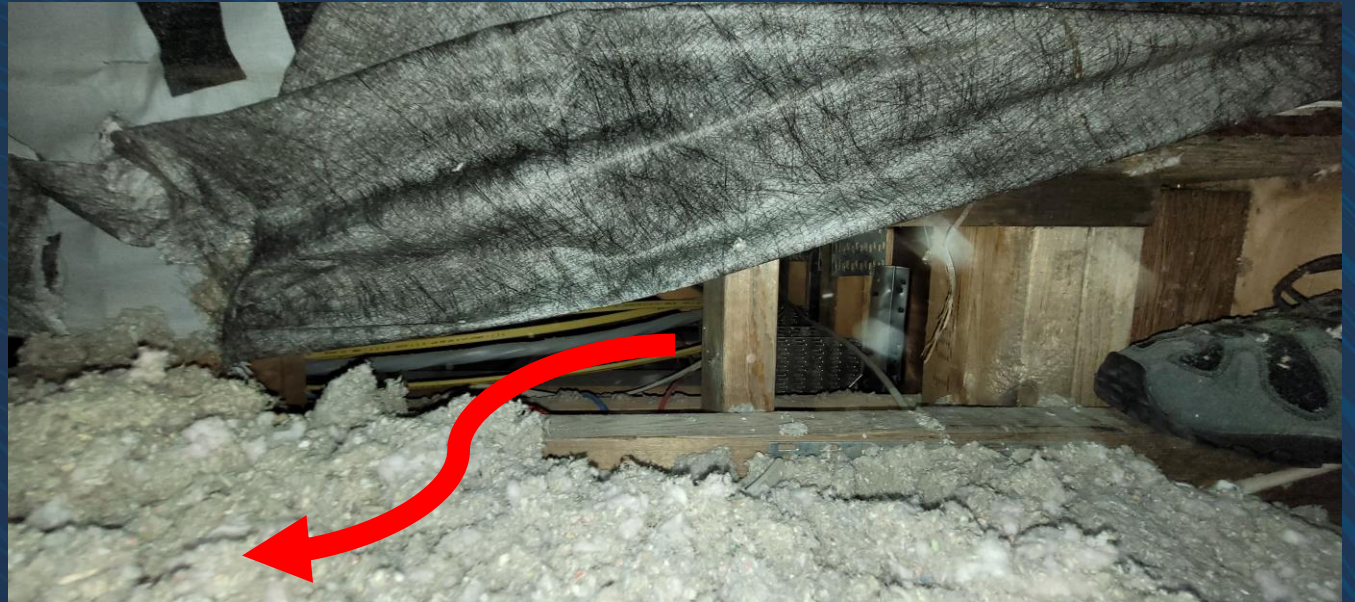


Columns

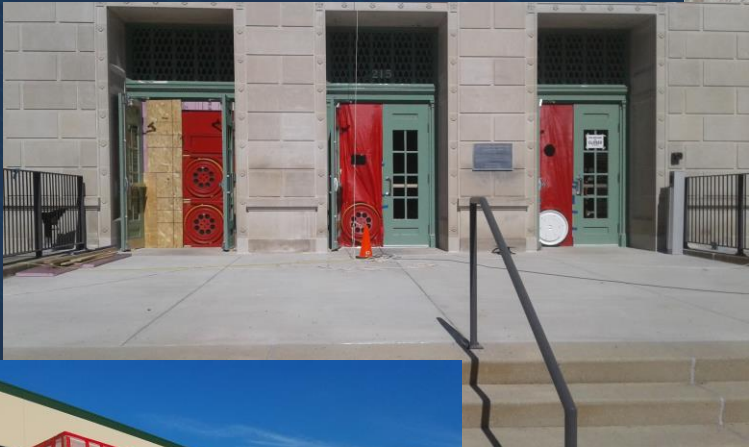
Can be well connected through the building at the vertical

Single Family Builder- builds big

- 75,000 SF Building
- 1,000s of lineal ft. of open floor to wall transition
- Sealed with spray foam



THE TEST



Plan and Prepare

- Make sure you can reach test goals or values that can be converted
- Location of equipment and staff
- Define desired pressure boundary
- Share test plan with client



How Many Fans are Needed for Test- BRING ENOUGH!

Fan Capacity (cfm)		high power	standard power	duct tester
50Pa		7500	6000	650
75Pa		7200	5700	650

Standard airflow requirements

Reference Standard	Airtightness Spec	required flow (cfm)	# fans required		DucTester
			high power	standard power	
USACE	.25 cfm/ft2 at 75Pa	123,175	18 fans	22 fans	
LEED ETS	1.25 in2 EflA/100 ft2	112,148	15 fans	20 fans	
ATTMA TSL1	10 m3/h/m2 at 50Pa	269,413	36 fans	45 fans	
PassivHaus	0.6 ACH50	23,662	4 fans	5 fans	No

<====

Standard airflow requirements:

This section has all of the major air leakage standard specs. Find out how many high power fans you will need to test your building to various air leakage standard requirements. Also find out how many standard power fans would be needed to test the same building. If you are testing to the Passivhaus standard, find out if a duct tester will suit your needs.

Generic requirements - Not specific to any standard

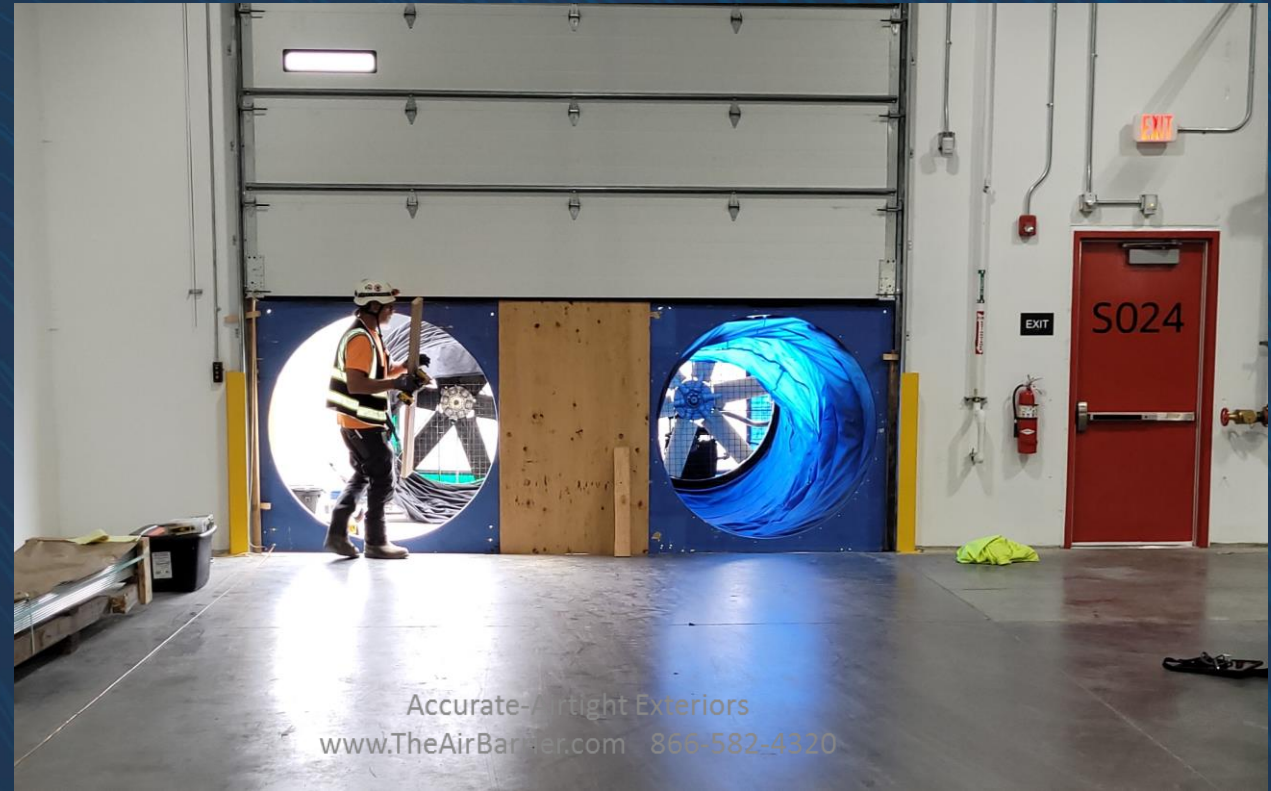
	Airtightness Spec	required flow (cfm)	# fans required	
			high power	standard power
ACH50	2.0 ACH50	78,874	11 fans	14 fans
Permeability @ 50 Pa	0.05 cfm/ft2	24,635	4 fans	5 fans
Permeability @ 75 Pa	0.40 cfm/ft2	197,080	28 fans	35 fans
Metric permeability @ 50 Pa	6.0 m3/h/m2	161,648	22 fans	27 fans

<====

Generic requirements:

This section allows you to decide what level of airtightness is acceptable. Find out how many high power fans you will need to test an enclosure to whatever level of tightness you want. Choose either ACH50 or permeability at 50 Pa or 75 Pa. Find out how many standard power fans you would need also.

Big Air



Big Air



A VIDEO
Yeah TV Mom!

TheAirBarrier.com

PART 1: The Setup



Pressure Testing

- Pressurization
 - Prefer 1st, with IR shows larger areas of concern
- Depressurization
 - Prefer 2nd, with IR shows pinpoint areas of concern
- Must retrieve clean data (R^2)
- Multiple exterior references
 - Ideally 4 sides and roof
 - Low wind
- Multiple interior references
 - Checks pressure consistency
- High temperature difference (IR)
- Establish communication channels with supporting staff, fans are loud

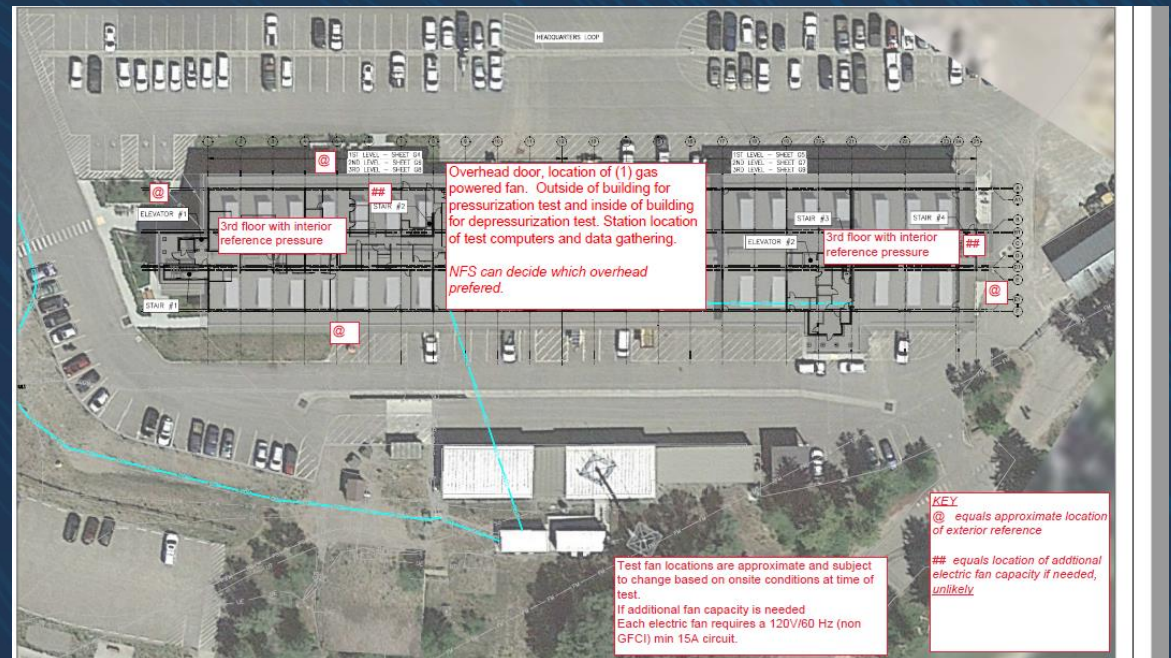
Pressure Testing

- Review tubing functionality (holes in tubing is not your friend)
- What's the calibration requirement
- Choose a standard- how precise of data do you need (pressure data vs finding areas to repair)



Create a Test Plan

- Decide where people and equipment will go
- Forced to think through project
- Informs customer of project ~ *most don't know*
- Description of schedule, personnel, building prep, etc.



Get Down with Blower Doors

YouTube

Search



James Brown Blower Door video

27,243 views • May 7, 2014

205 DISLIKE SHARE DOWNLOAD CLIP SAVE ...

<https://www.youtube.com/watch?v=Xsp3yCxoYOA&t=2s>

Bathrooms vented into attic

Let's get the moisture OUT of the attic, not into it.



Um.... OK.....



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