

RESNET ANNUAL CONFERENCE
FEB. 27 – MARCH 1, 2006



ENERGY STAR Qualified Homes:
Thermal Bypass
Checklist

THERMAL BYPASS CHECKLIST

INSULATION VALUE KILLERS



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- ***Gaps***
- ***Voids***
- ***Compression***

***Insulation
Installation
Inspection***

- ***Incomplete Air Barrier***
- ***Misalignment with Air Barrier***
- ***Wind Intrusion***

***Thermal
Bypass
Checklist***

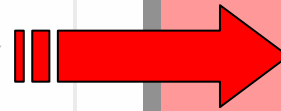
THERMAL BYPASS CHECKLIST:

WHY AIR BARRIER WITH INSULATION



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Resists Heat Flow

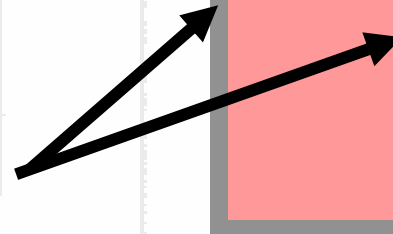


Air Flow



...need Air Barrier

*any solid material that blocks air flow
including sealing at edges and seams*



ENERGY STAR QUALIFIED HOMES: NEW SPEC



***HERS Index:
85 in South;
80 in North,
or equivalent
package...***

***ENERGY STAR Qualified
Lighting, Fans, or
Appliances***

***IECC Insulation
Properly Installed***

Continuous Air Barrier

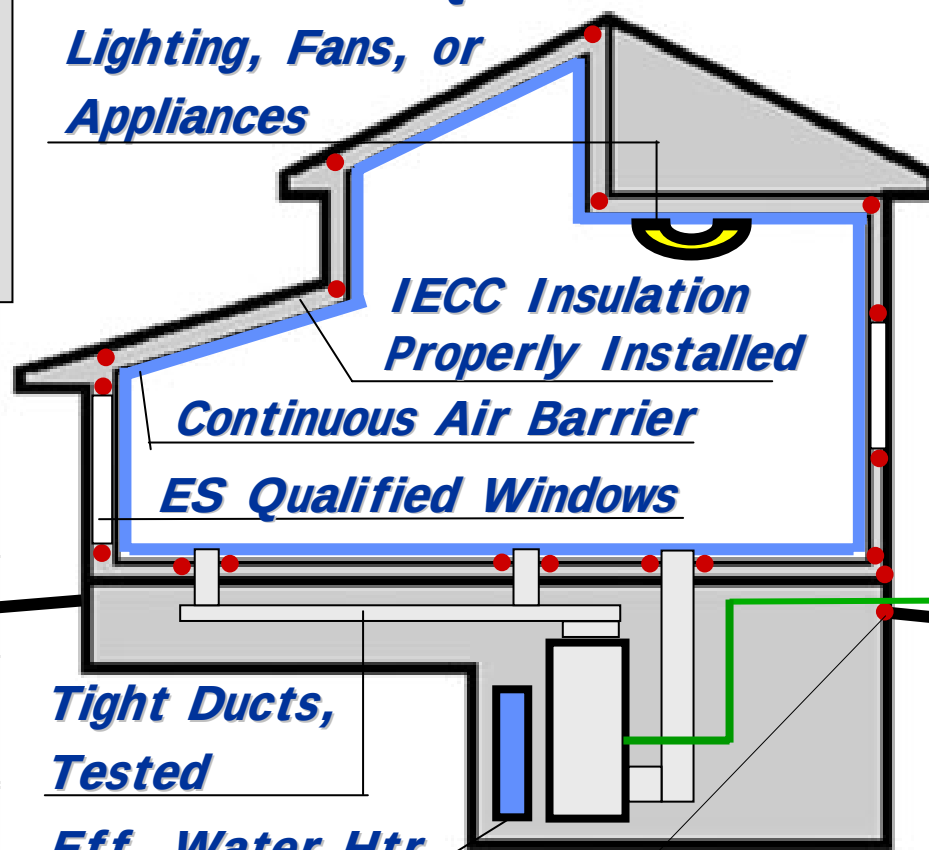
ES Qualified Windows

***Right-Sized
ES Equip.***

***Tight Ducts,
Tested***

Eff. Water Htr.

Build it Tight, Tested



WHY BUILD ENERGY EFFICIENT? ENERGY STAR FOR HOMES SPEC



***HERS Index:
85 in South;
80 in North,
or equivalent
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Lighting, Fans, or
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Continuous Air Barrier

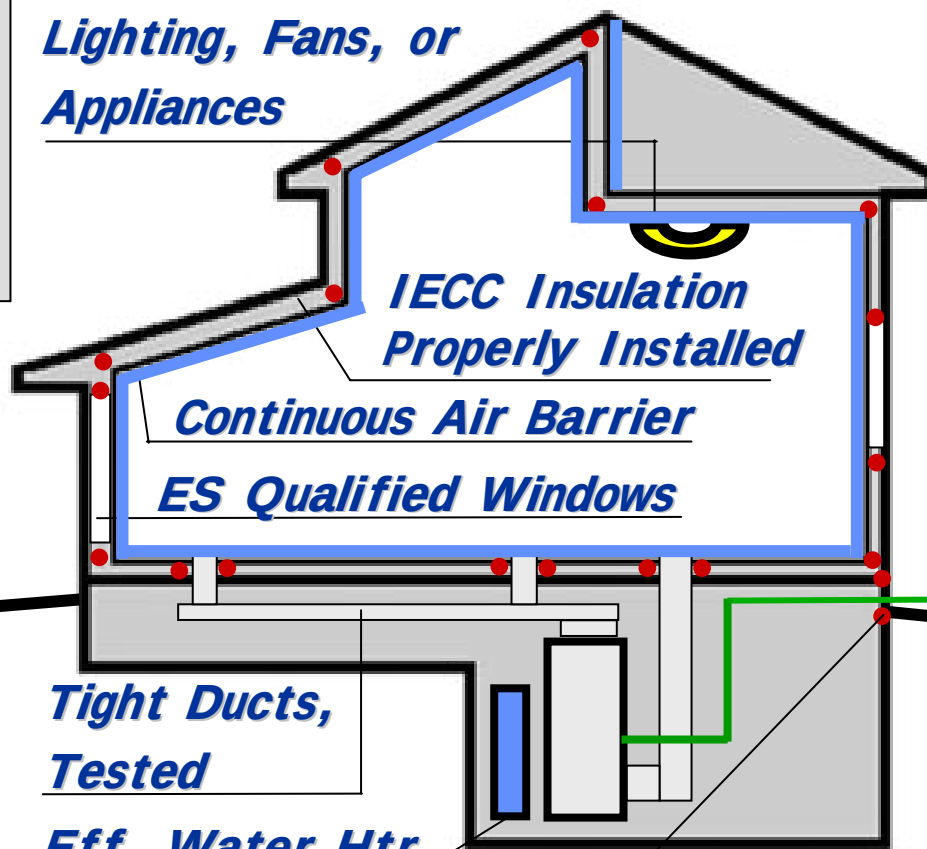
ES Qualified Windows

***Right-Sized
ES Equip.***

***Tight Ducts,
Tested***

Eff. Water Htr.

Build it Tight, Tested



THERMAL BYPASS CHECKLIST: KEY POINT NO. 1



Precedence must be give to:

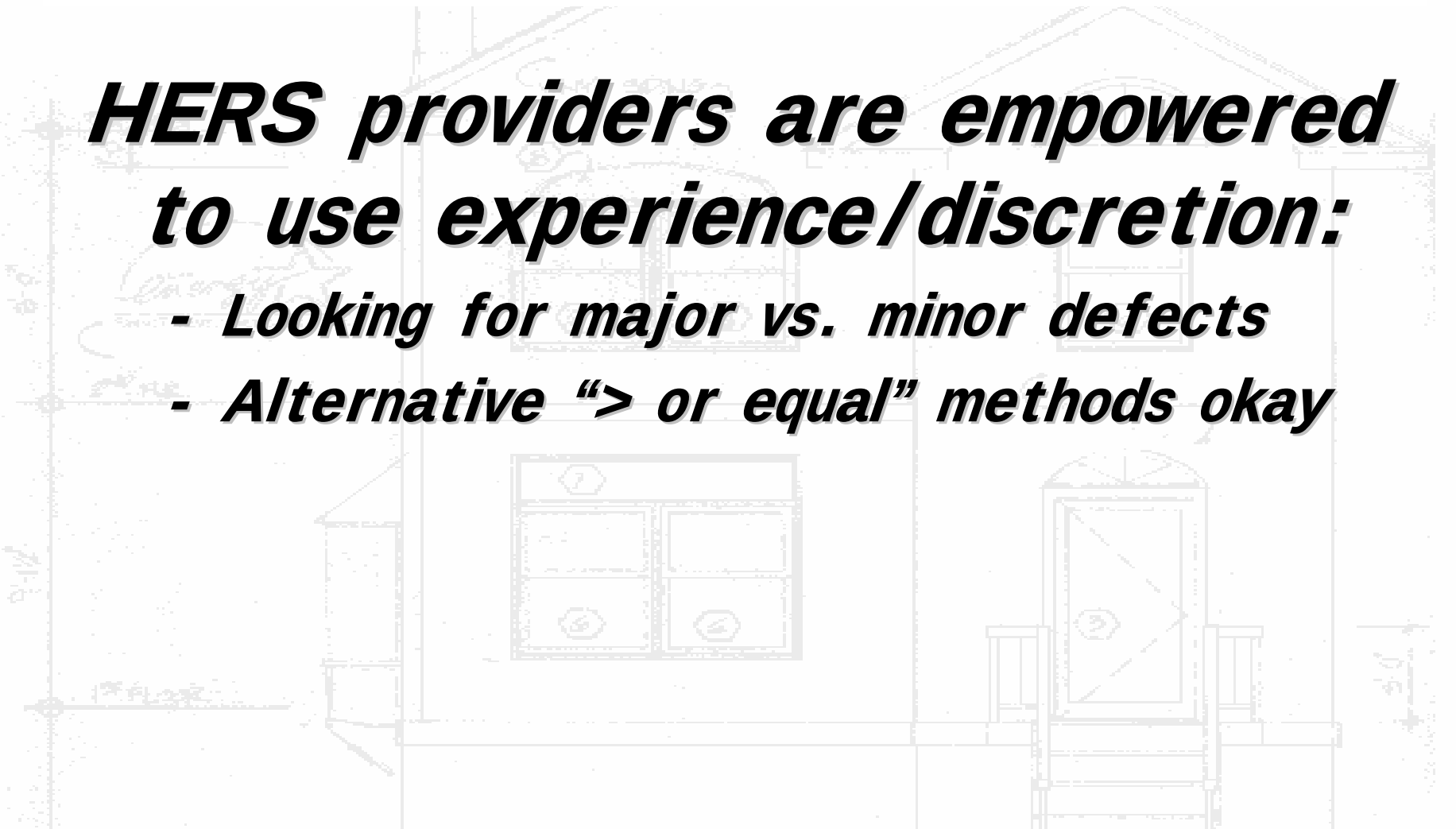
- State/Local/Region codes take precedence***
- Regional ENERGY STAR programs***

THERMAL BYPASS CHECKLIST:
KEY POINT NO. 2



***HERS providers are empowered
to use experience/discretion:***

- Looking for major vs. minor defects***
- Alternative "> or equal" methods okay***



THERMAL BYPASS CHECKLIST: KEY POINT NO. 3



Builders can verify up to four items:
- allows raters to avoid extra field trips

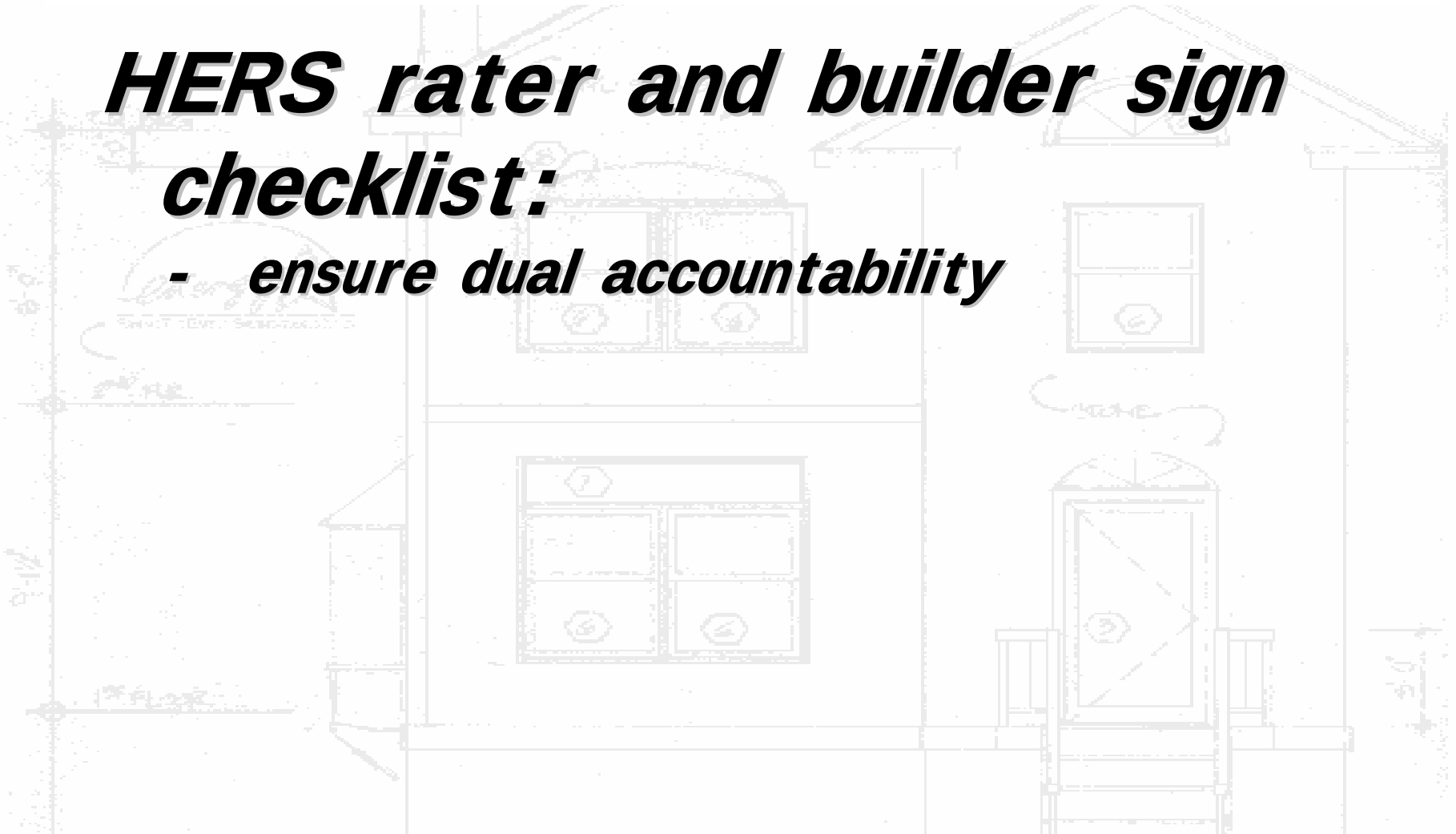


THERMAL BYPASS CHECKLIST: KEY POINT NO. 4



HERS rater and builder sign checklist:

- ensure dual accountability***



THERMAL BYPASS CHECKLIST:
KEY POINT NO. 5



Noncompliant items must be corrected to earn label

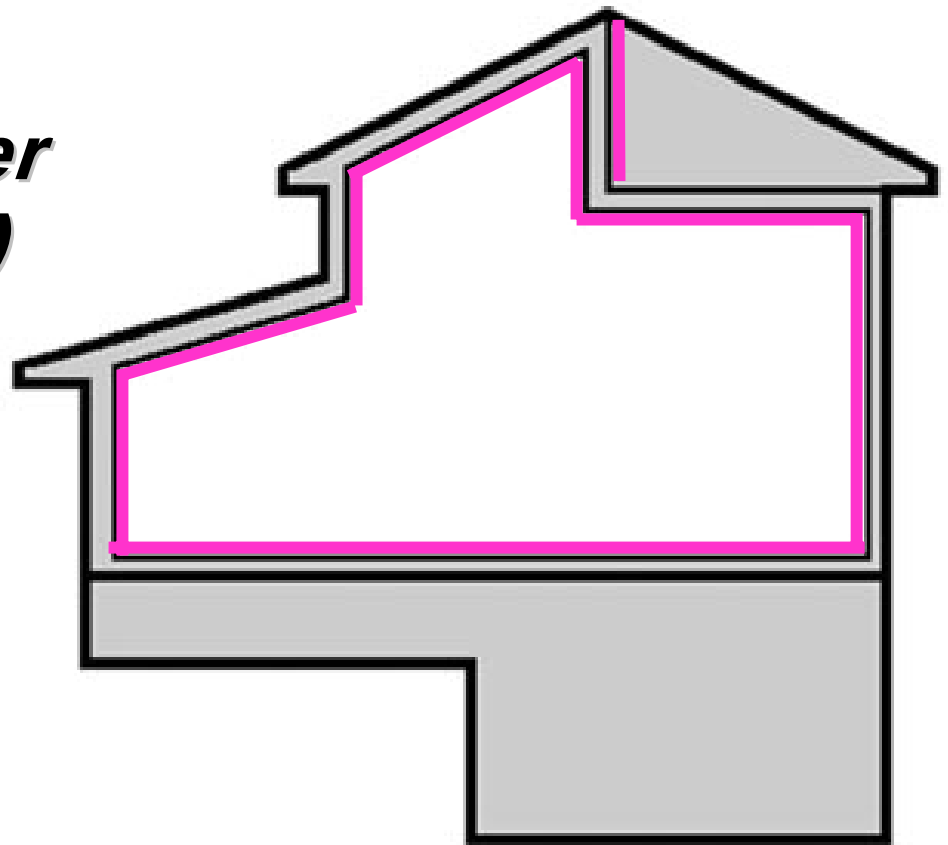


THERMAL BYPASS CHECKLIST:

1. INSULATION ALIGNMENT



- ***Continuous***
- ***Full contact with interior air barrier (e.g., sheet rock)***
- ***Fully enclose conditioned space***



Courtesy of Southface Institute

THERMAL BYPASS CHECKLIST:

1. INSULATION ALIGNMENT



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THERMAL BYPASS CHECKLIST:

1. INSULATION ALIGNMENT



THERMAL BYPASS CHECKLIST:

1. INSULATION ALIGNMENT



ENERGY STAR

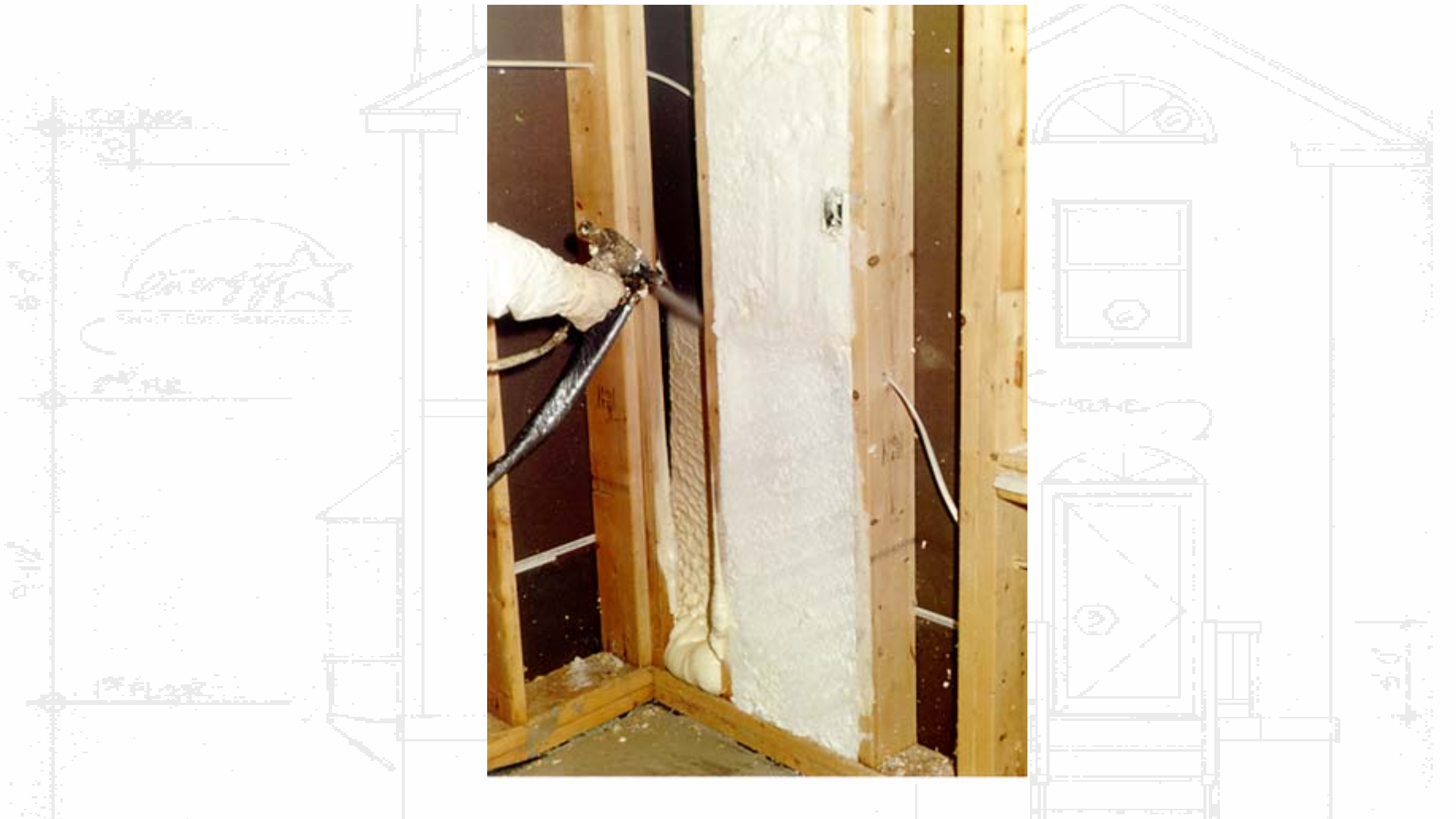


THERMAL BYPASS CHECKLIST:

1. INSULATION ALIGNMENT



ENERGY STAR

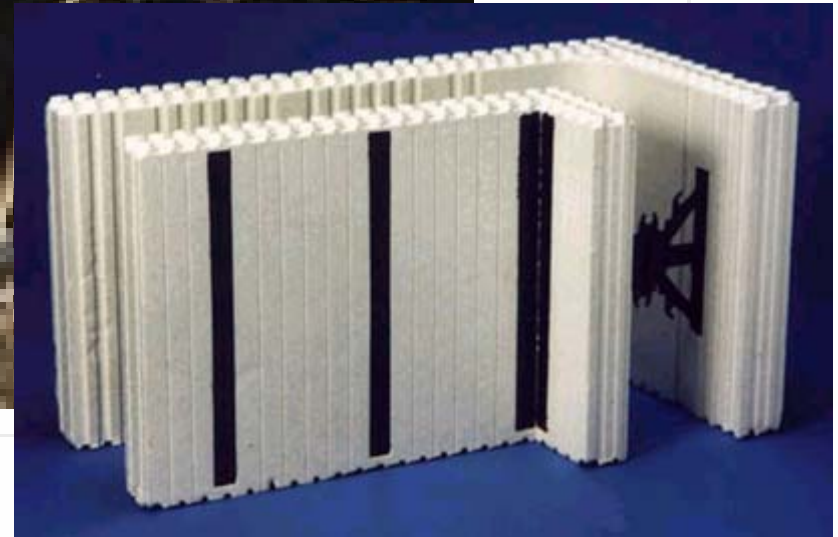


THERMAL BYPASS CHECKLIST:

1. INSULATION ALIGNMENT



ENERGY STAR

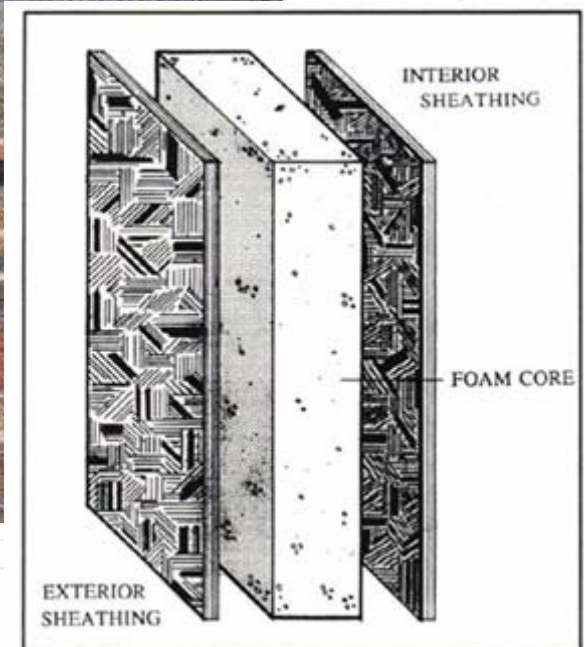


THERMAL BYPASS CHECKLIST:

1. INSULATION ALIGNMENT



ENERGY STAR



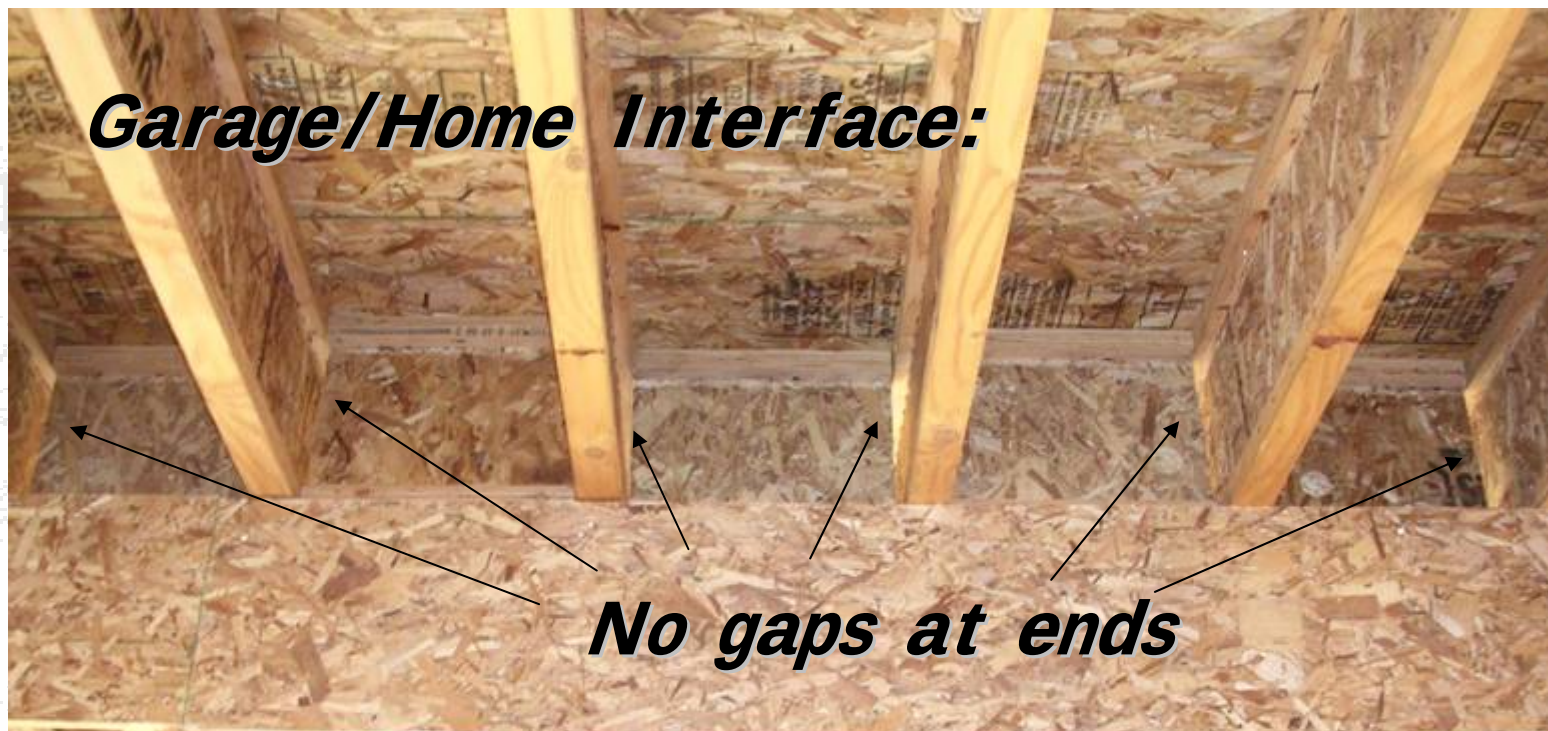
THERMAL BYPASS CHECKLIST:

1. INSULATION ALIGNMENT



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Garage/Home Interface:



No gaps at ends



THERMAL BYPASS CHECKLIST:

1. INSULATION ALIGNMENT



Band Joists:

- ***Highly Encourage,***
but don't require complete air barrier detail
- ***Exception:***
complete air barrier detail required where HVAC duct systems, leakier than 4/cfm/100 sq. ft., are run in joists between sub-floor and finished ceiling

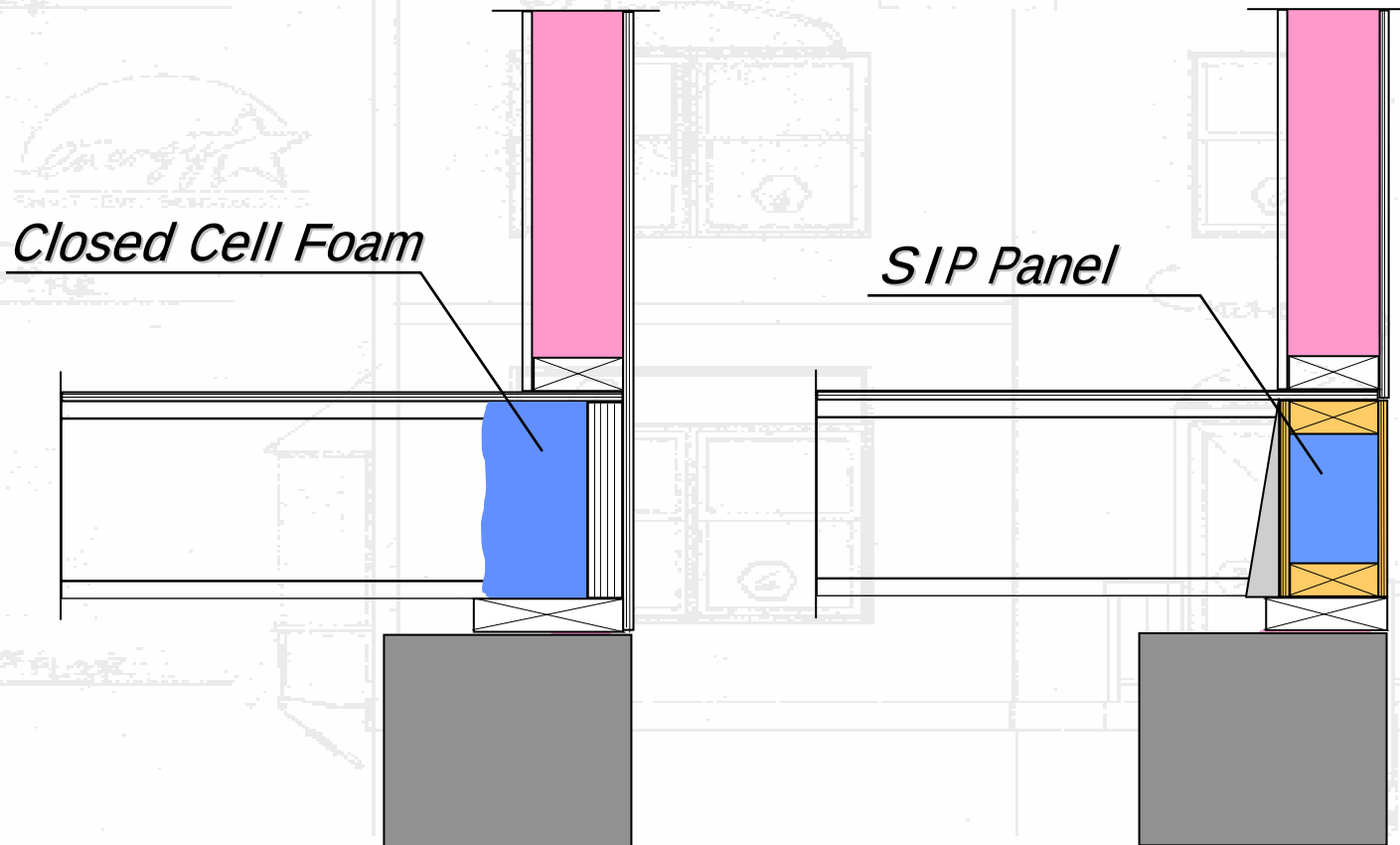
THERMAL BYPASS CHECKLIST:

1. INSULATION ALIGNMENT



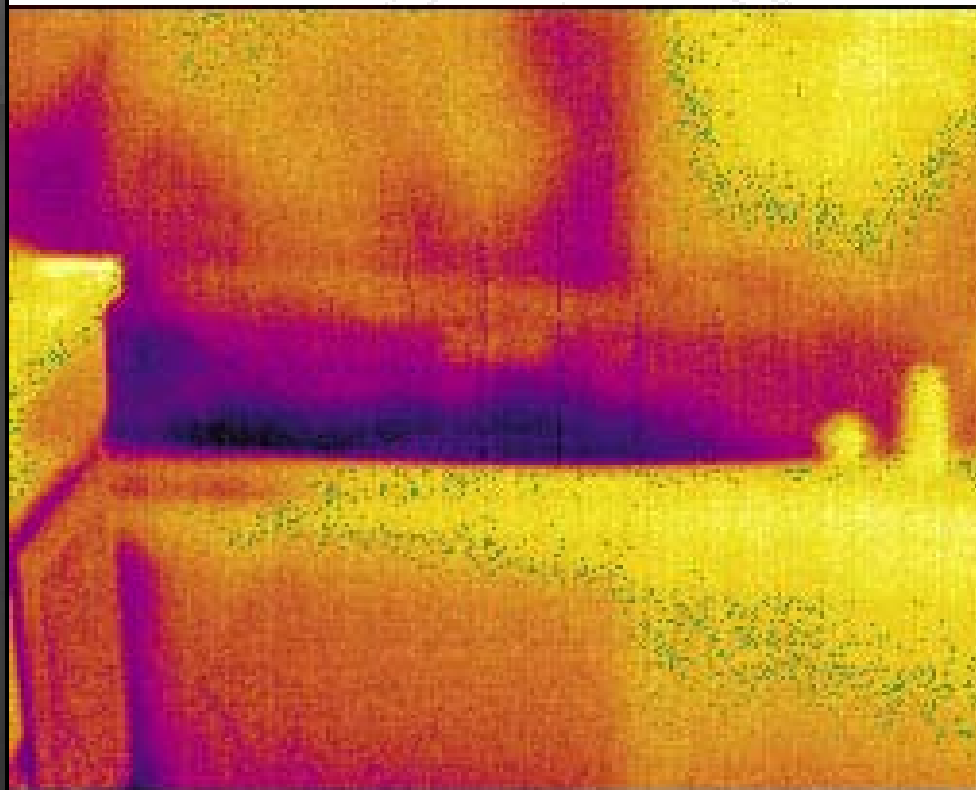
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Band Joist Recommendations:



THERMAL BYPASS CHECKLIST:

2. SHOWER/TUB EXTERIOR WALL



Courtesy of Fort Collins Utilities

THERMAL BYPASS CHECKLIST:

2. SHOWER/TUB EXTERIOR WALL



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THERMAL BYPASS CHECKLIST:

2. SHOWER/TUB EXTERIOR WALL



Courtesy of Building Science Corp.



ENERGY STAR

THERMAL BYPASS CHECKLIST:

2. SHOWER/TUB EXTERIOR WALL



Courtesy of Building Science Corp.

THERMAL BYPASS CHECKLIST:

2. SHOWER/TUB EXTERIOR WALL



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THERMAL BYPASS CHECKLIST:

3. INSULATED FLOOR OVER GARAGE

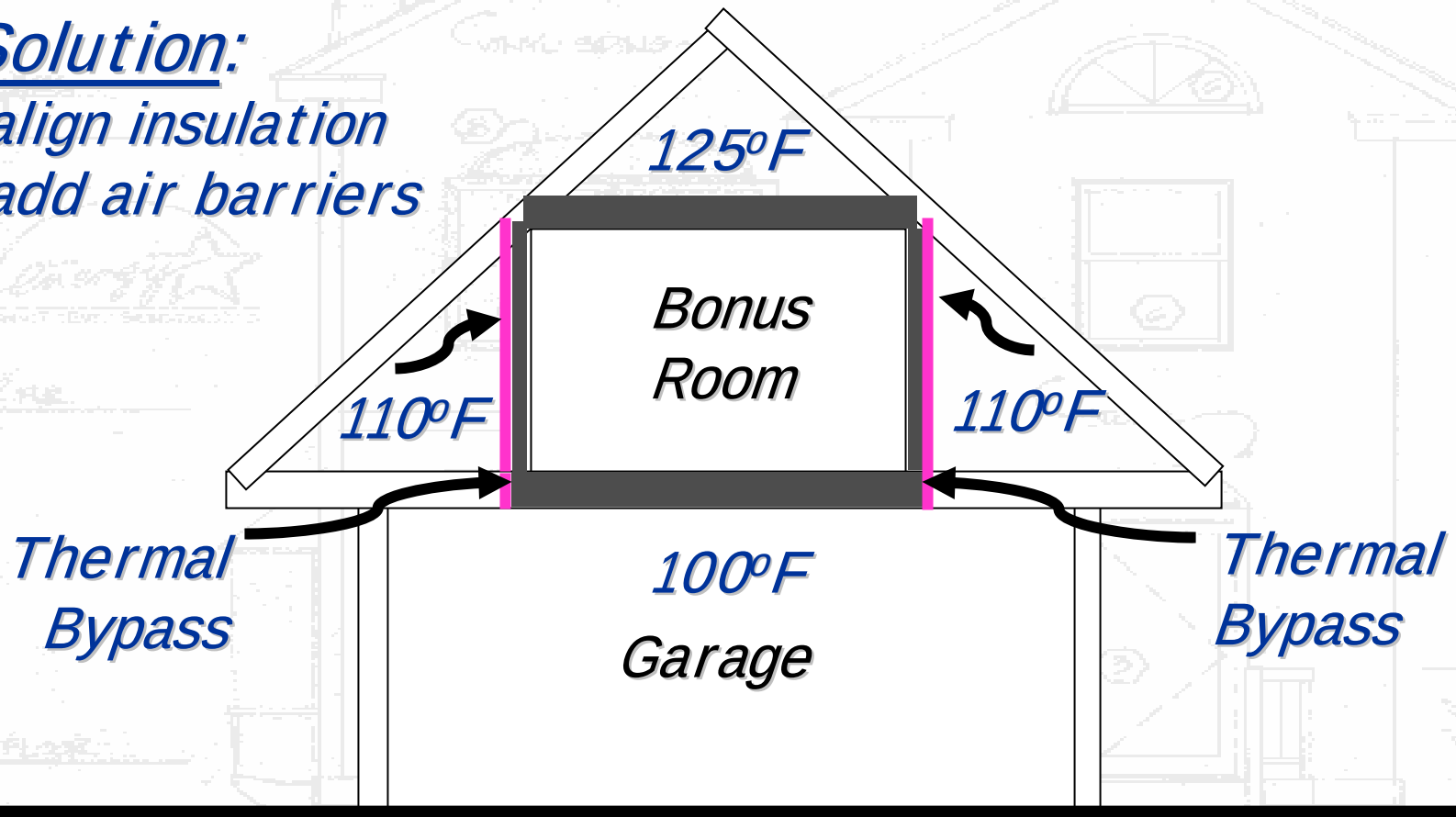
4. ATTIC KNEE WALLS



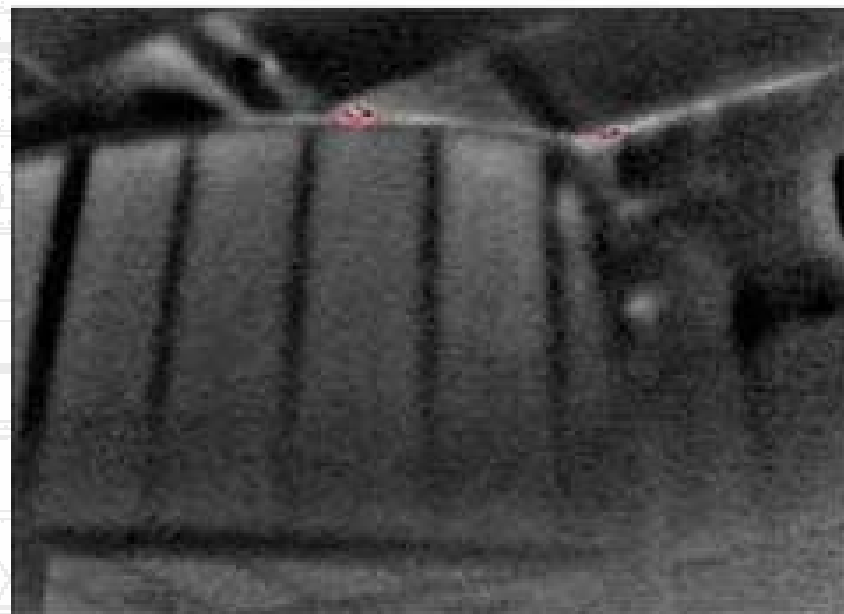
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Solution:

- *align insulation*
- *add air barriers*



THERMAL BYPASS CHECKLIST: 4. ATTIC KNEE WALLS



THERMAL BYPASS CHECKLIST:

4. ATTIC KNEE WALLS



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Hot Wall

Courtesy of Building Science Corp.

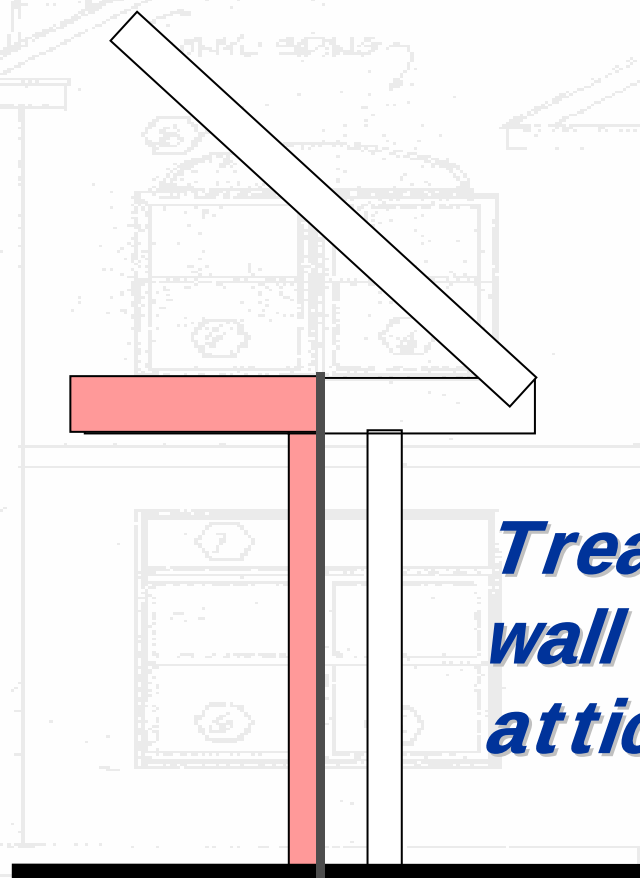
THERMAL BYPASS CHECKLIST:

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THERMAL BYPASS CHECKLIST:

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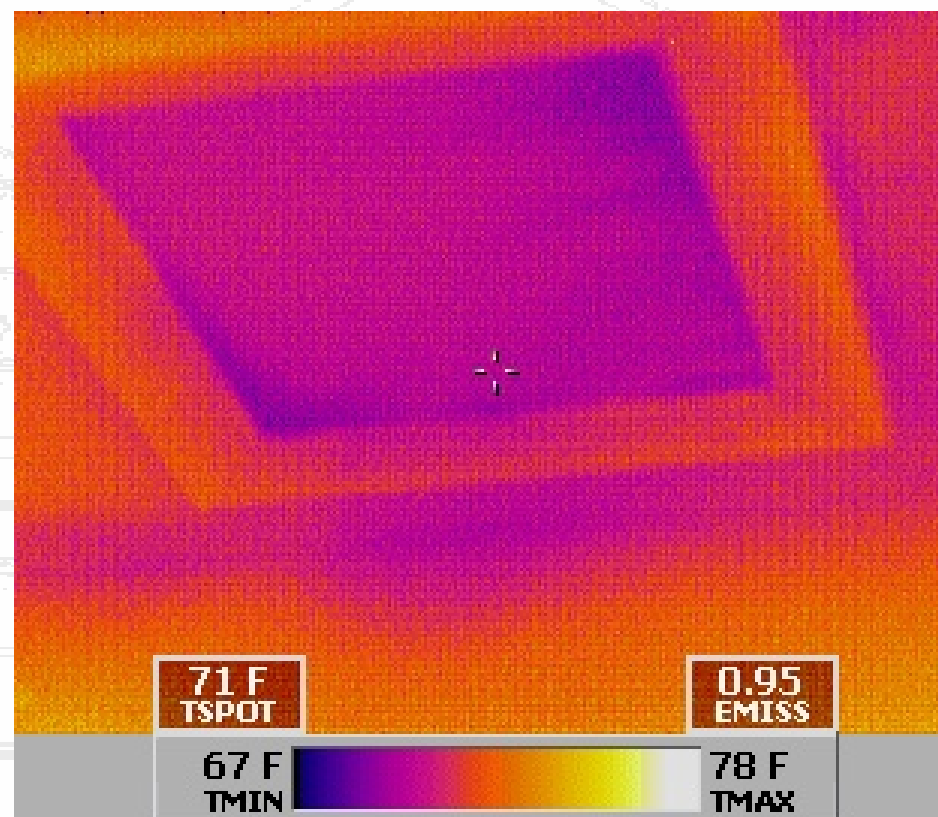
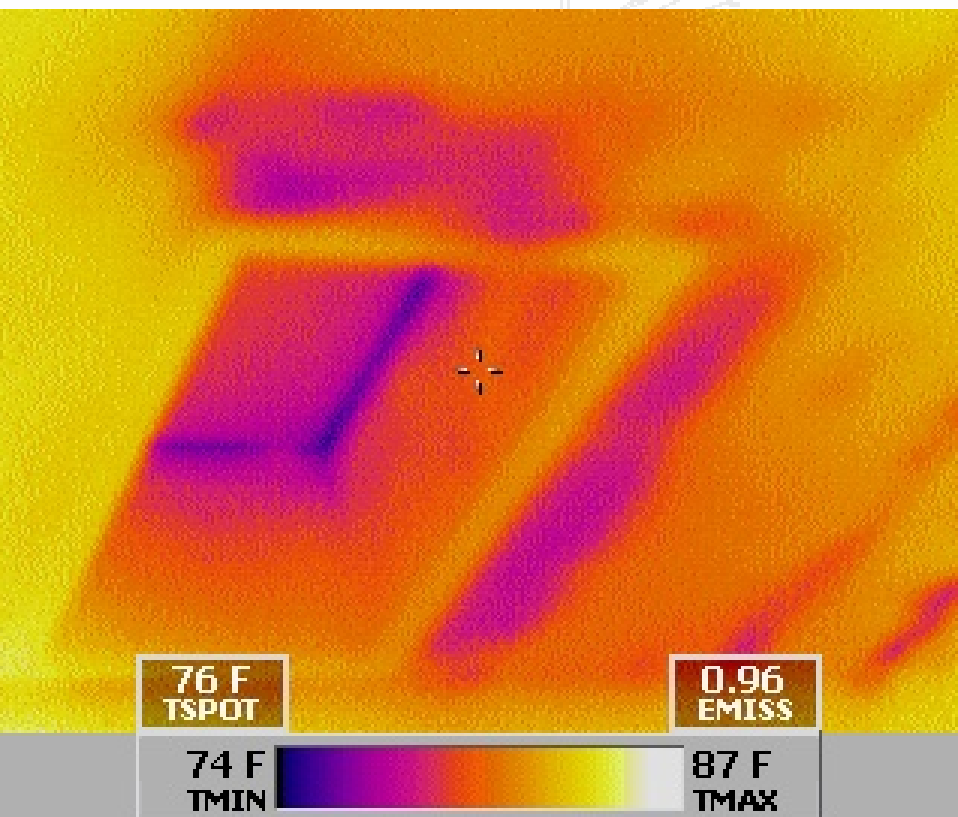
***Treat pop-out
wall as
attic knee wall***

THERMAL BYPASS CHECKLIST:

5. ATTIC ACCESS PANEL/STAIRS



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5. ATTIC ACCESS PANEL/STAIRS



THERMAL BYPASS CHECKLIST: 6. CANTILEVERED FLOOR



ENERGY STAR

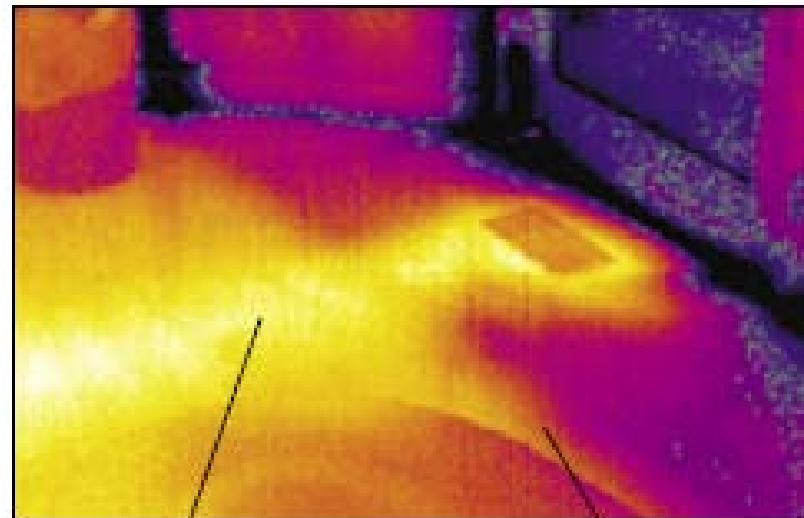


THERMAL BYPASS CHECKLIST: 6. CANTILEVERED FLOOR



Exterior soffit appeared to be tightly fit

As the infrared photo (right) shows, this dining room cantilever was cold due to ineffective insulation and air leakage. (Infrared photo taken with blower door operating.)



Warm
Cool

Residual warmth from heat run

Cantilever boundary clearly visible

Courtesy of Fort Collins Utilities

THERMAL BYPASS CHECKLIST:

6. CANTILEVERED FLOOR



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***Not a
recommended
solution!***

THERMAL BYPASS CHECKLIST:

6. CANTILEVERED FLOOR

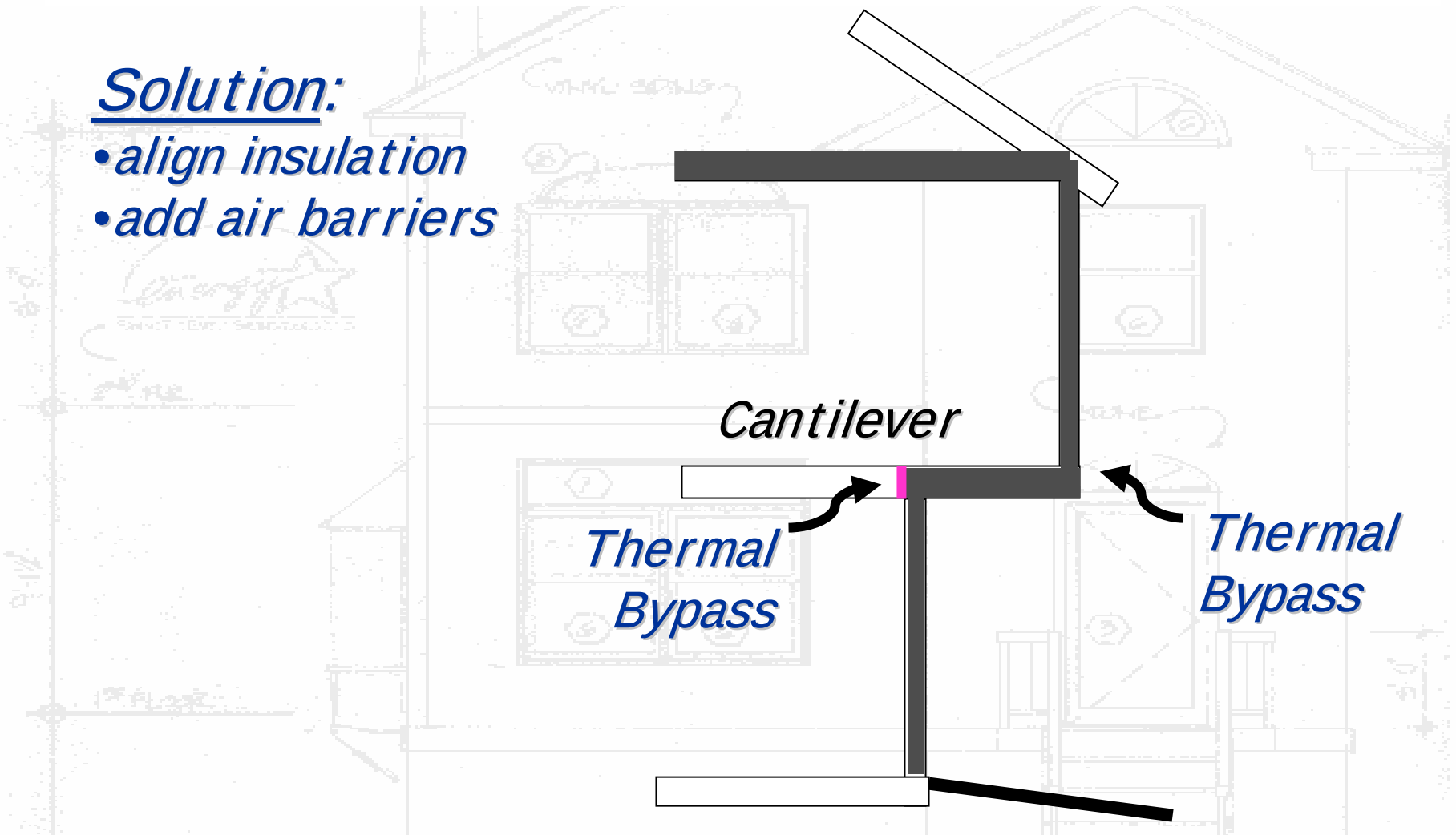
Solution:

- *align insulation*
- *add air barriers*

Cantilever

*Thermal
Bypass*

*Thermal
Bypass*



THERMAL BYPASS CHECKLIST: 6. CANTILEVERED FLOOR



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THERMAL BYPASS CHECKLIST:

6. CANTILEVERED FLOOR



ENERGY EFFICIENCY CANTILEVERED FLOORS



ENERGY STAR



Courtesy of Fort Collins Utilities

THERMAL BYPASS CHECKLIST:

7. DUCT/PIPING PENETRATIONS



THERMAL BYPASS CHECKLIST:

7. DUCT/PIPING PENETRATIONS



Courtesy of Advanced Energy

THERMAL BYPASS CHECKLIST:

7. DUCT/PIPING PENETRATIONS



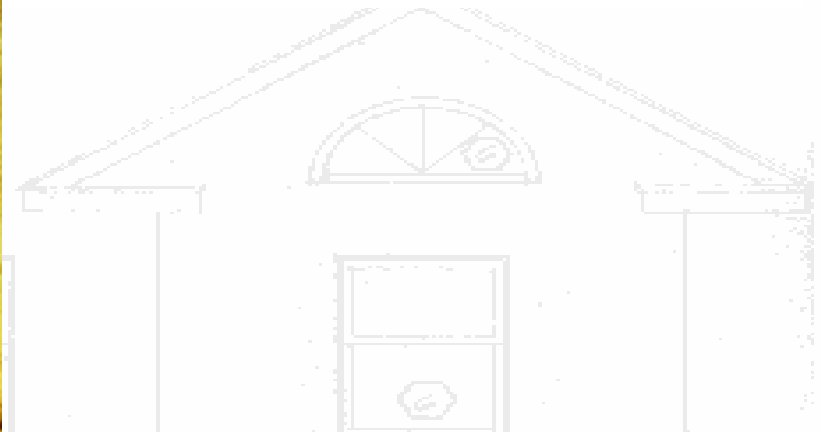
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Courtesy of Building Science Corp.

THERMAL BYPASS CHECKLIST:

8. FLUE SHAFT



Courtesy of Building Science Corp.

THERMAL BYPASS CHECKLIST:

8. FLUE SHAFT



THERMAL BYPASS CHECKLIST: 9. ATTIC EAVES



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THERMAL BYPASS CHECKLIST:

9. ATTIC EAVES



ENERGY STAR

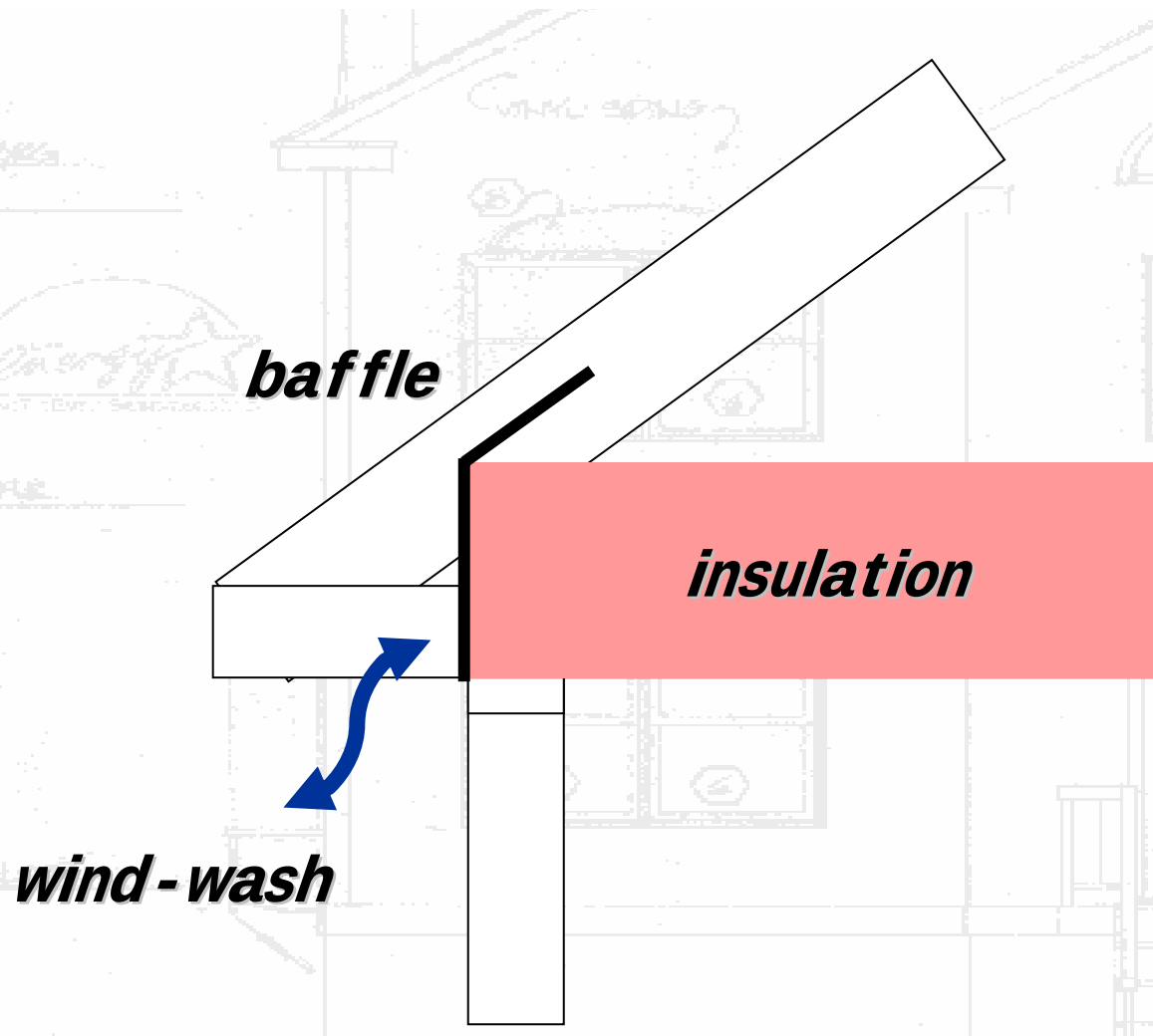


THERMAL BYPASS CHECKLIST:

9. ATTIC EAVES



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THERMAL BYPASS CHECKLIST: 9. ATTIC EAVES



THERMAL BYPASS CHECKLIST:

10. DROPPED CEILINGS

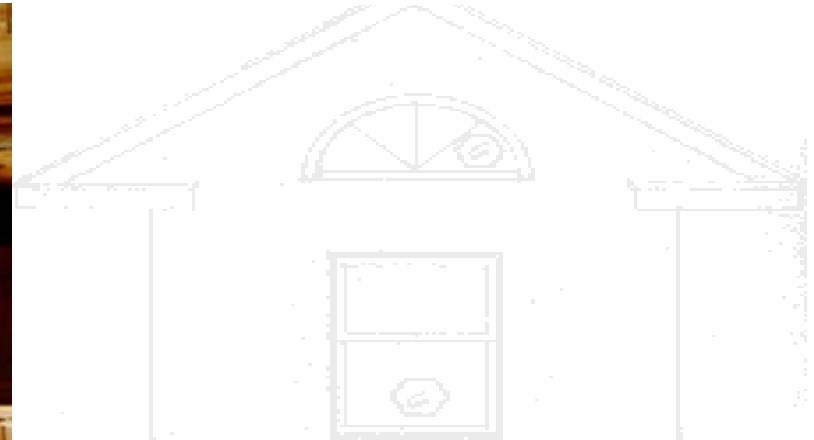


ENERGY STAR



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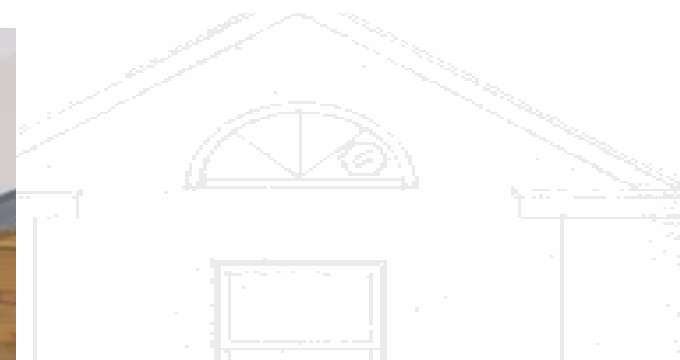
10. DROPPED CEILINGS



Courtesy of Building Science Corp.

THERMAL BYPASS CHECKLIST:

10. DROPPED CEILINGS



Courtesy of Building Science Corp.

THERMAL BYPASS CHECKLIST:

11. FIREPLACE SHAFT WALL



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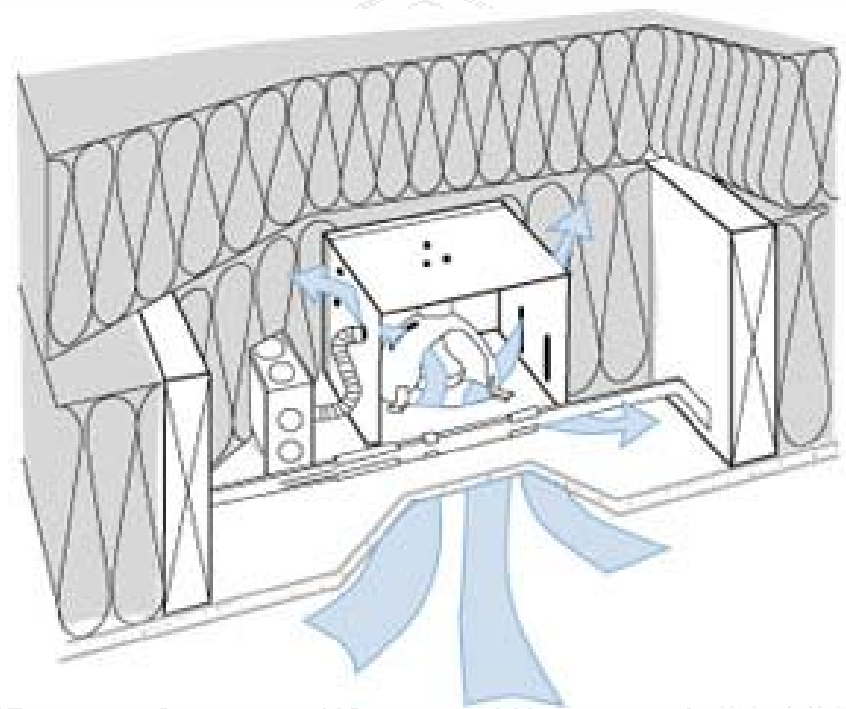
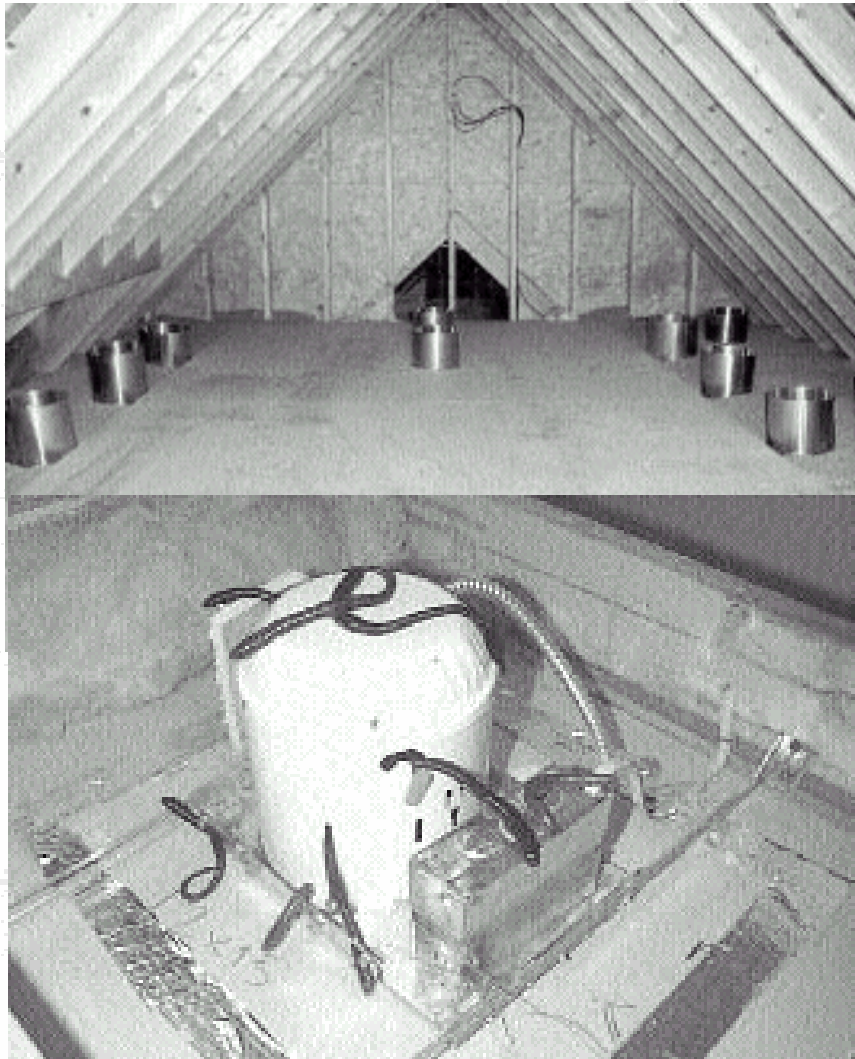


Courtesy of Building Science Corp.

THERMAL BYPASS CHECKLIST: 12. STAIRCASE FRAMING



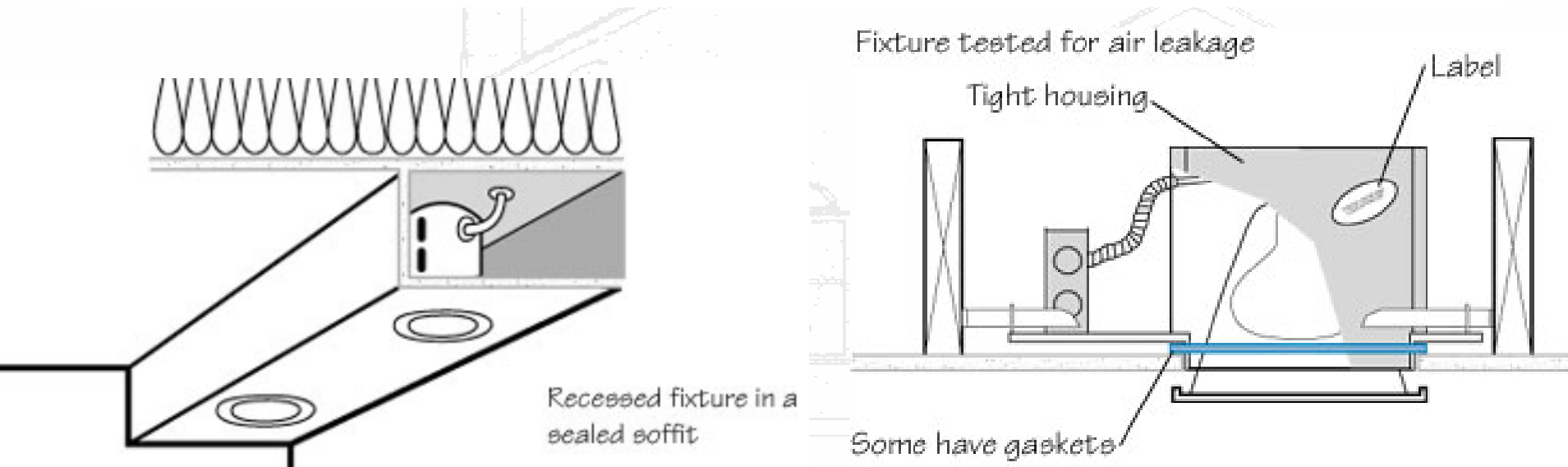
THERMAL BYPASS CHECKLIST: 13. RECESSED LIGHTING



Even when covered with insulation recessed lights pump conditioned air out of the house.

THERMAL BYPASS CHECKLIST:

13. RECESSED LIGHTING



Eliminate this air leakage by locating fixtures inside the insulated envelope or using insulated can, air-tight (ICAT) recessed fixtures.

THERMAL BYPASS CHECKLIST:

14. PORCH ROOF



THERMAL BYPASS CHECKLIST:

14. PORCH ROOF



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THERMAL BYPASS CHECKLIST:

15. WHOLE-HOUSE FAN



THERMAL BYPASS CHECKLIST:
15. WHOLE-HOUSE FAN



THERMAL BYPASS CHECKLIST: 16. COMMON WALLS



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THERMAL BYPASS CHECKLIST: 16. COMMON WALLS



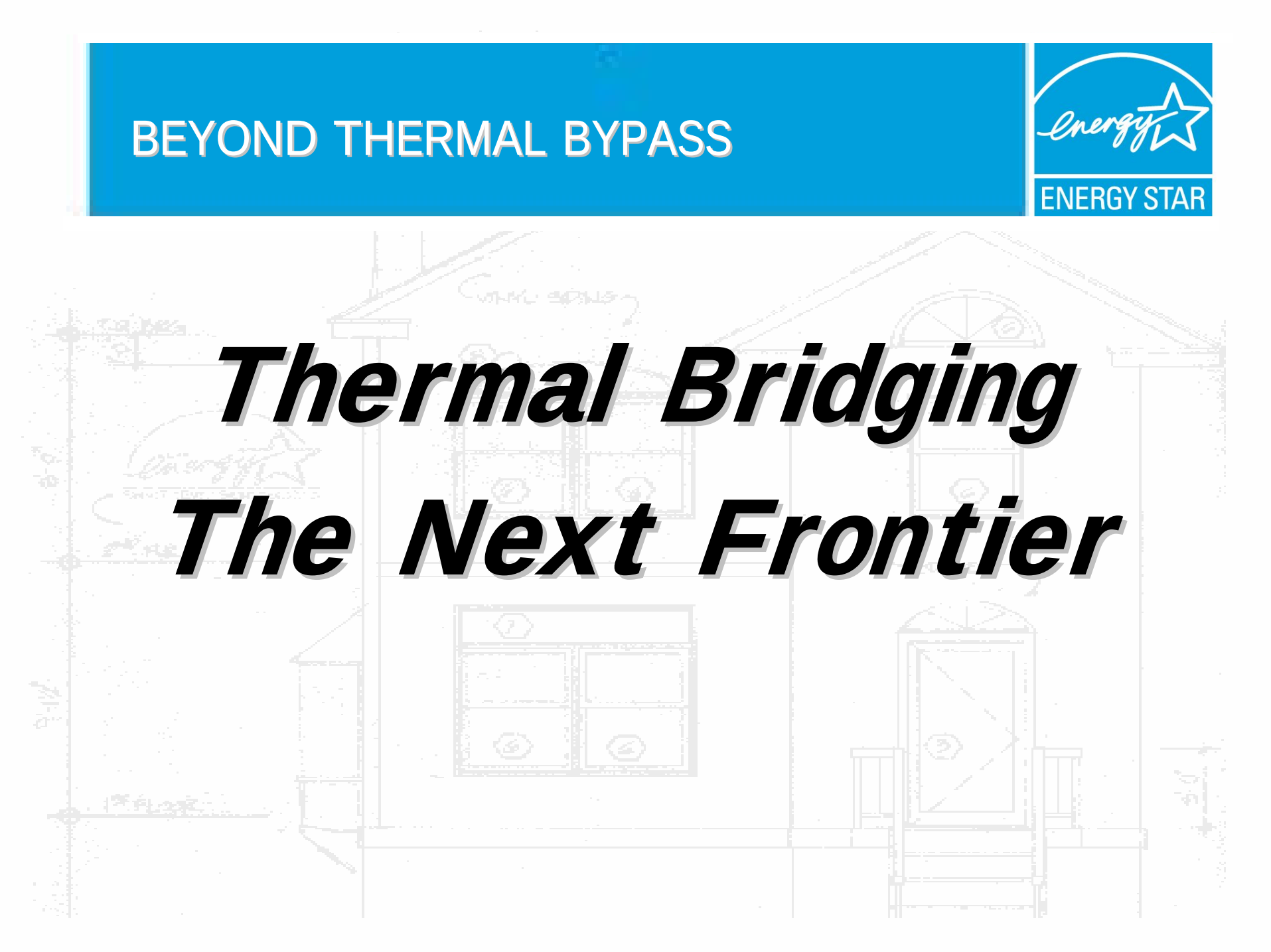
THERMAL BYPASS CHECKLIST: 16. COMMON WALLS



BEYOND THERMAL BYPASS



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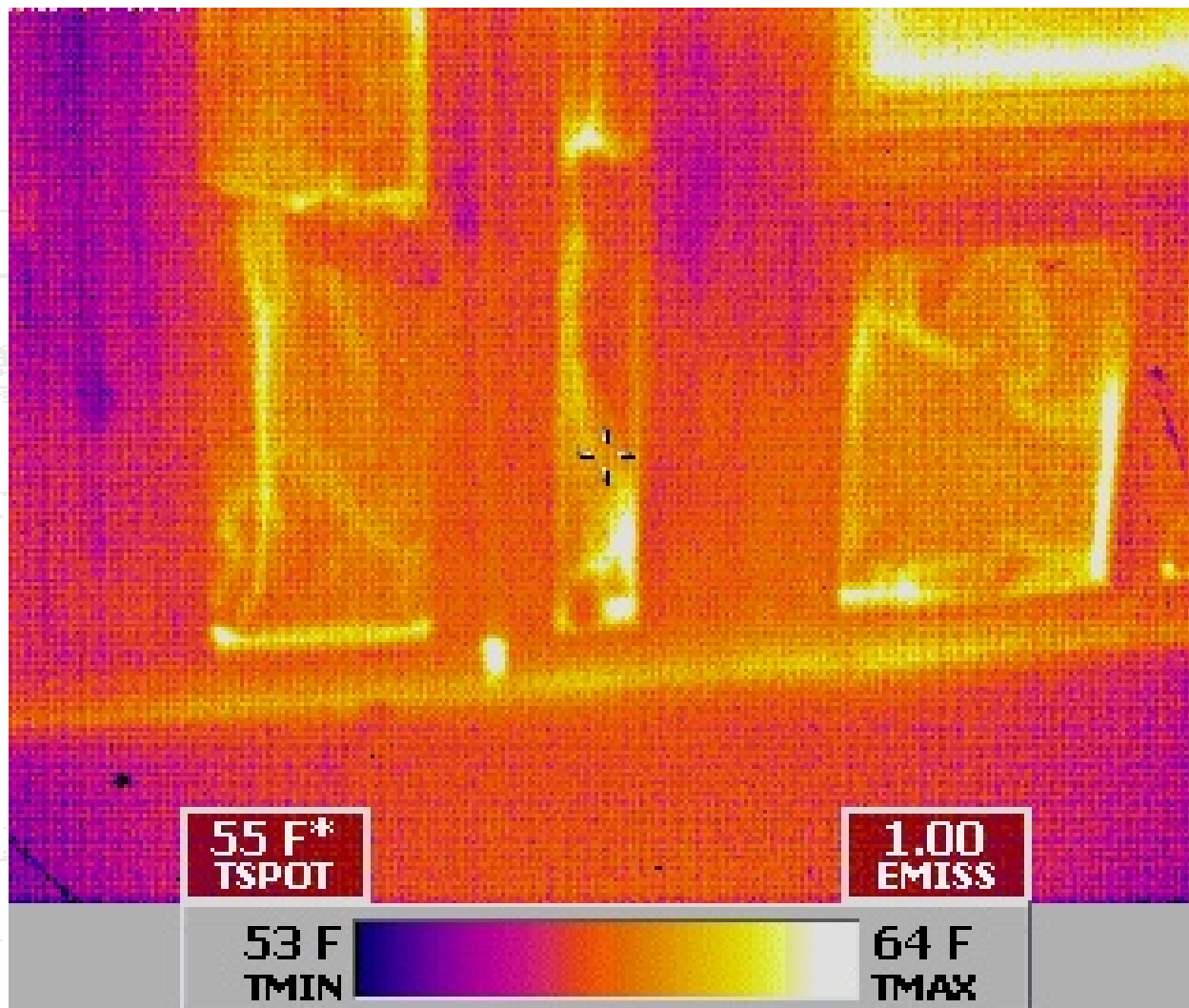
A faint, light gray architectural drawing of a house serves as the background for the title. The drawing shows the front facade with a gabled roof, a central entrance door with a transom, and a large window with multiple panes. Various lines and dimensions are visible, suggesting a technical drawing or blueprint.

Thermal Bridging The Next Frontier

THERMAL BRIDGING: FRAMING PROBLEMS



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THERMAL BRIDGING: FRAMING PROBLEMS



THERMAL BRIDGING: FRAMING PROBLEMS



***Where 4
is good;***



***5 must
be better;***



***and 9 is
Great!***

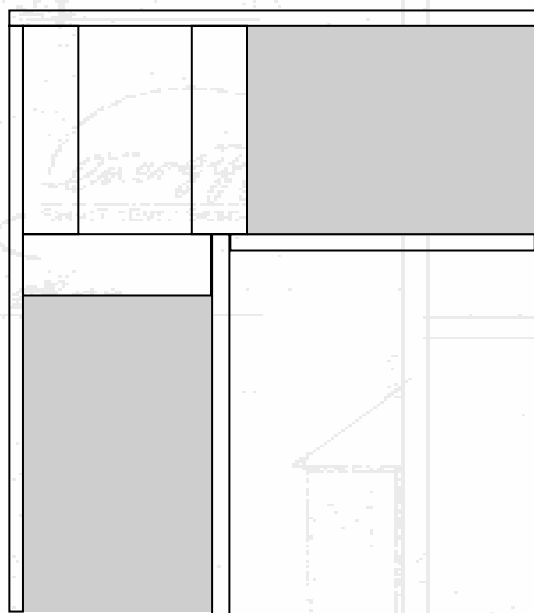


Courtesy of Building Science Corp.

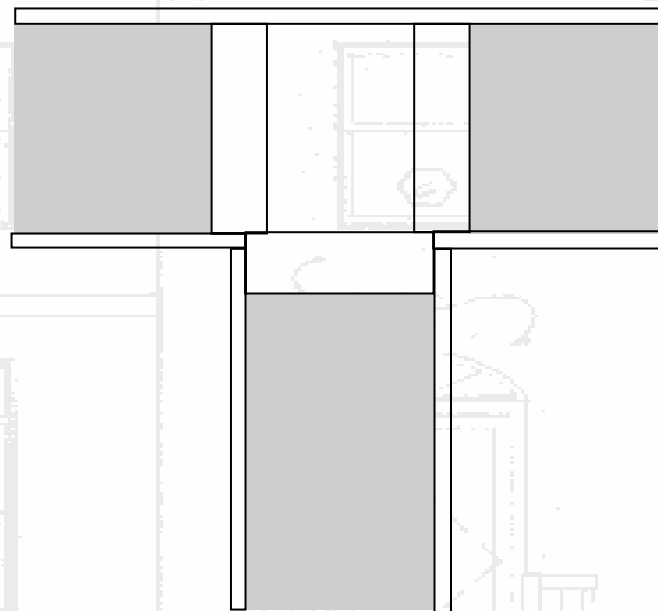
THERMAL BRIDGING: FRAMING PROBLEMS



uninsulated corner

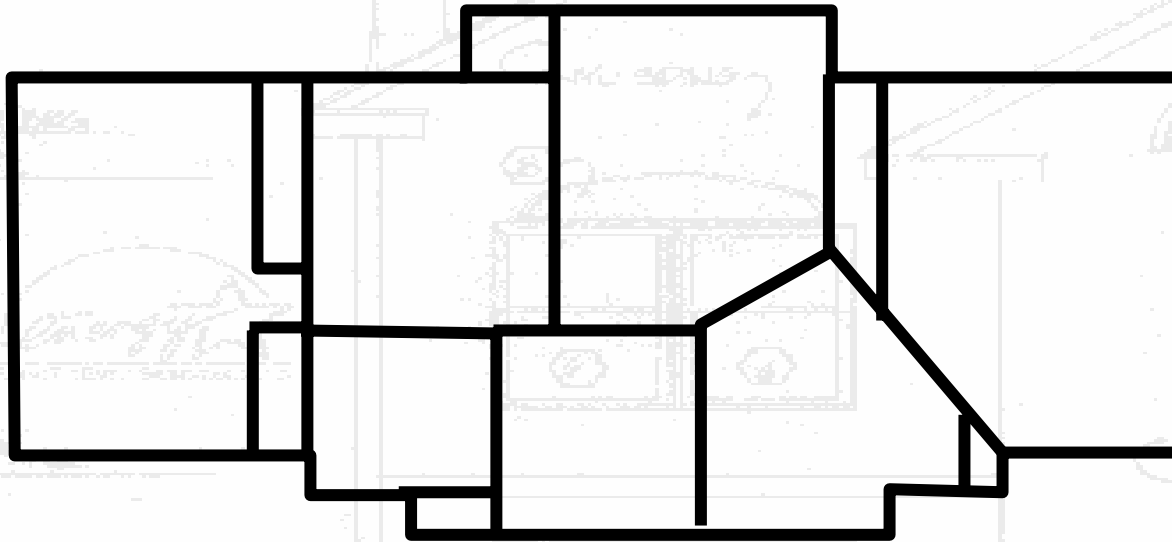


uninsulated wall intersection



Uninsulated corners and walls in typical framed home added up to a 70 square foot thermal hole!

THERMAL BRIDGING: FRAMING PROBLEMS



2-Story Home w/Uninsulated Corners/Intersections:

8 wall intersections/floor

16 corners/floor

24 x 3.5" = 7 ft. uninsulated wall



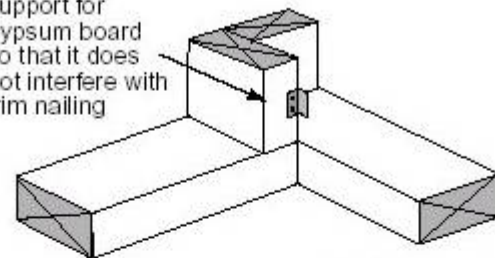
THERMAL BRIDGING: FRAMING SOLUTIONS



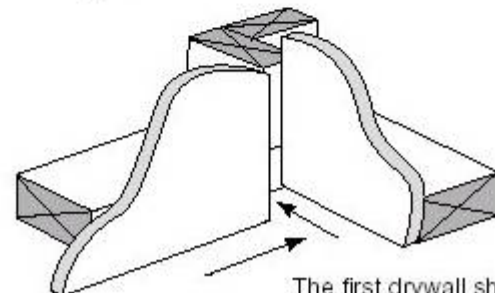
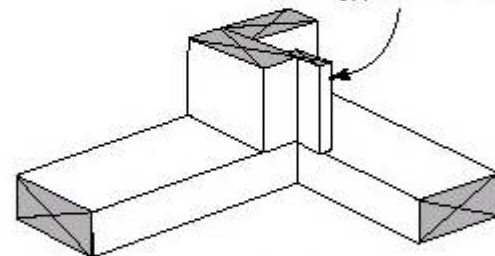
Courtesy of Building Science Corp.

INSIDE "TWO-STUD" CORNERS

Position clip support for gypsum board so that it does not interfere with trim nailing



Backer support for gypsum board



The first drywall sheet is installed against side with clip or backer

Courtesy of Southface Institute

THERMAL BRIDGING: FRAMING SOLUTIONS



***Ladder T -
Allows insulation
in exterior wall
cavity at wall
intersections***



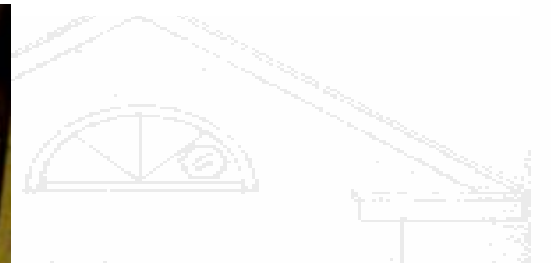








THERMAL BRIDGING: FRAMING PROBLEM/SOLUTION



Courtesy of Building Science Corp.



Thermo
ply

Maronda Inc.
AND SUBSIDIARIES

AN EASILY OBSERVABLE BETTER VALUE!

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HOW TO GET MORE INFORMATION



On the Web at:
<http://www.energystar.gov/homes>

