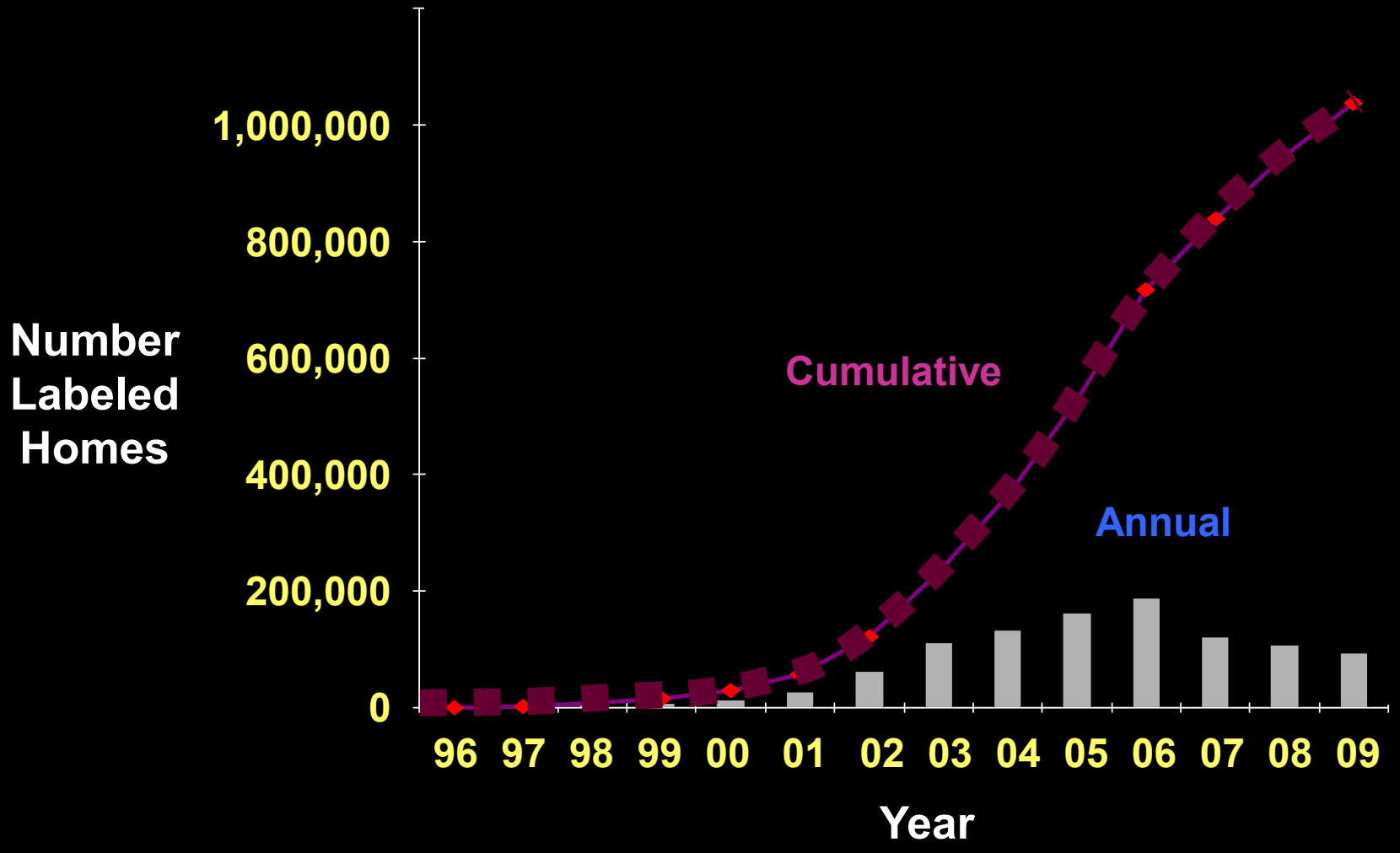
2010 MICHIGAN ENERGY CONFERENCE
APRIL 7, 2010

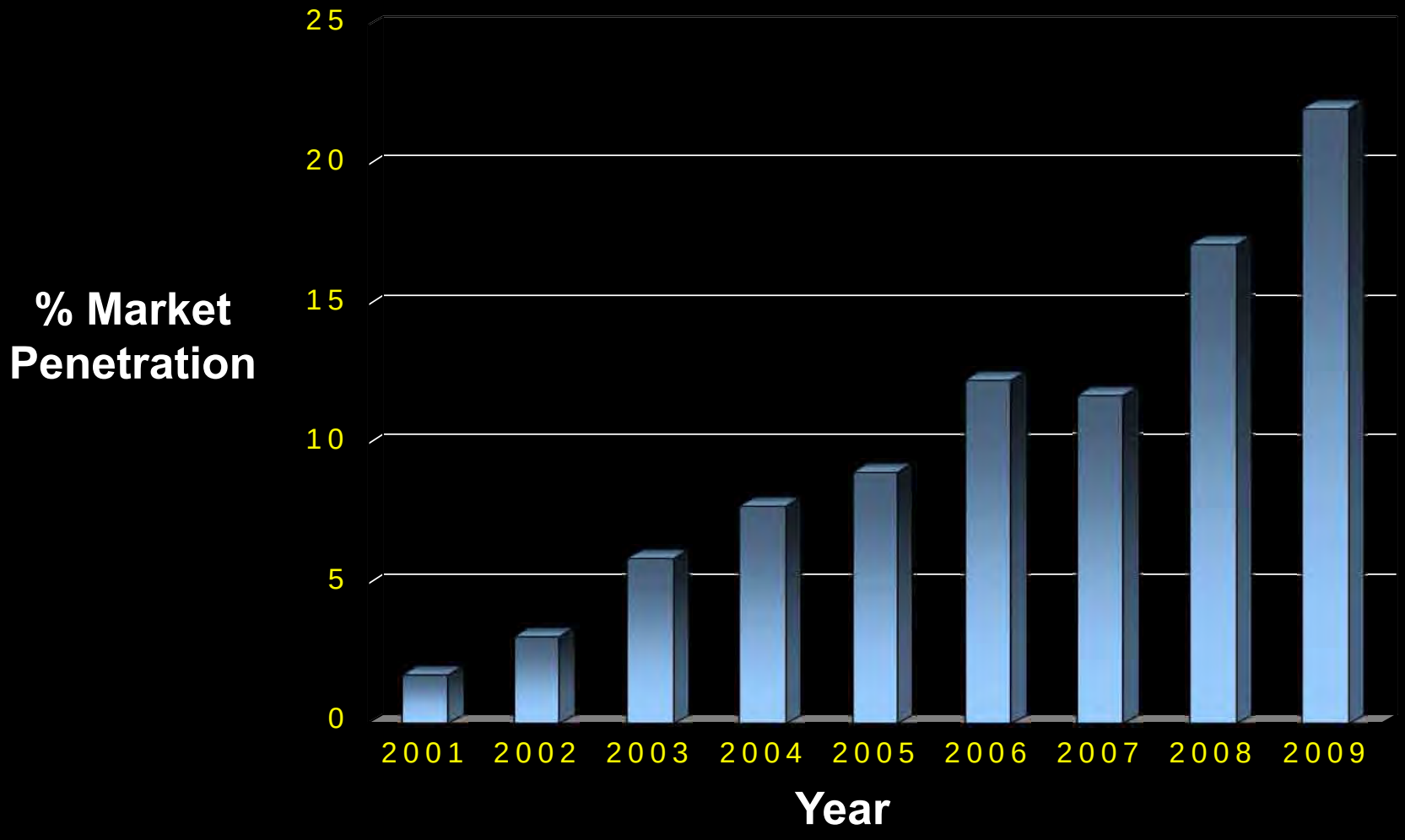
ENERGY STAR Qualified Homes

All the Rules Have Changed

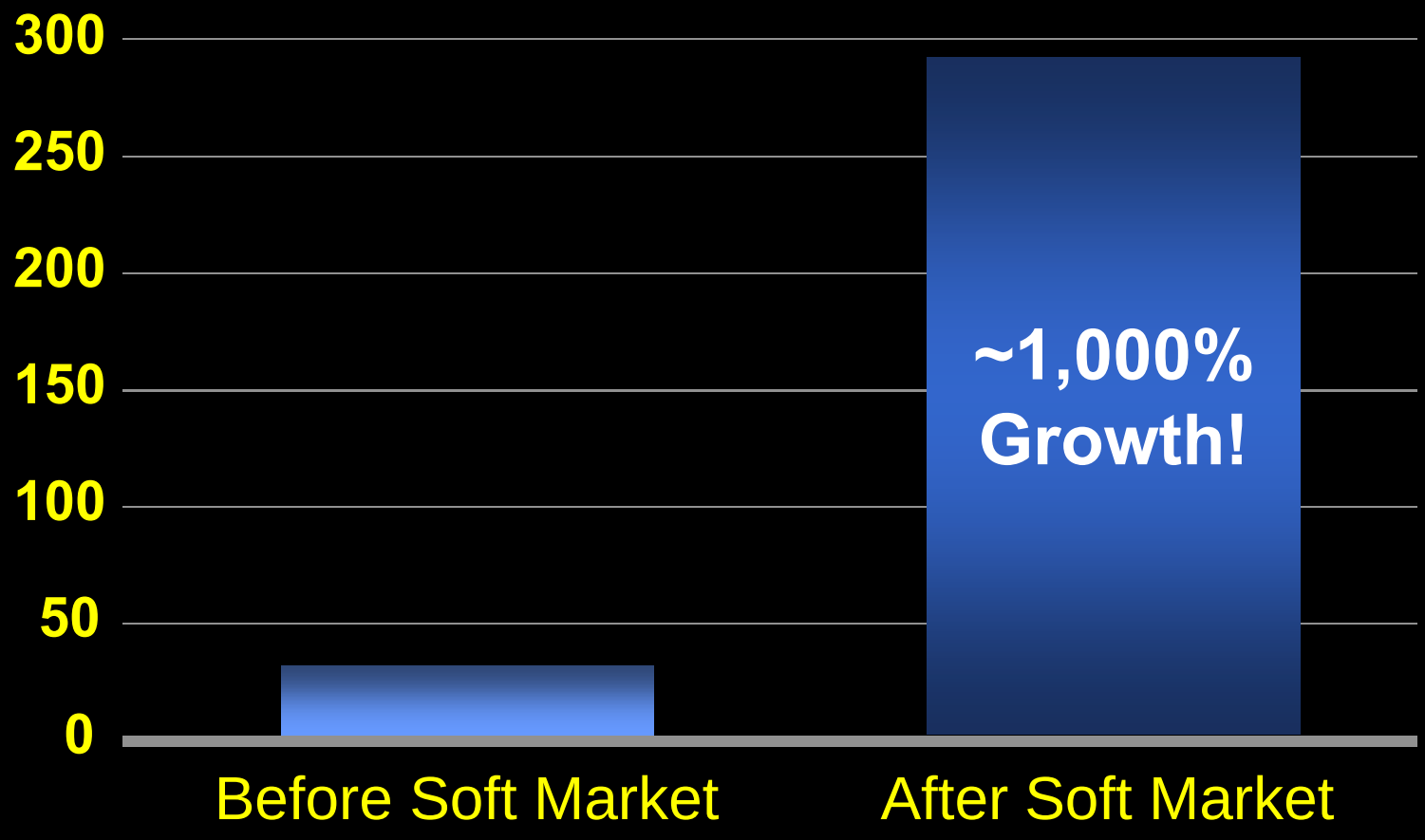
ENERGY STAR FOR HOMES GROWTH
THE ROAD TO ONE MILLION HOMES



ENERGY STAR FOR HOMES GROWTH
ONE IN FIVE HOMES IN 2009



ENERGY STAR FOR HOMES GROWTH
NEW BUILDER PARTNERS PER MONTH



Why New Homes Have to Be Better: We're Not in Kansas Any More

- 75% Fewer Housing Starts
- Massive Inventory of Fire-Sale Homes
- Tighter Credit = Less Qualified Buyers
- Less Compelling Reasons to Buy
- Energy Codes on Hyper Drive

CONTEXT: ENERGY STAR vs. GREEN

ENERGY STAR for Homes	Green Programs for Homes
Voluntary	
Recognizes Builders Label Web Site, Marketing, Awards	

CONTEXT: ENERGY STAR vs. GREEN

ENERGY STAR for Homes	Green Programs for Homes
Voluntary	
Recognizes Builders Label Web Site, Marketing, Awards	
Defines Efficient Rigorous Specifications Third-Party Verified	Offers Flexibility Points Multiple Tiers

‘GREEN’ BEGINS WITH ‘BLUE’

Energy Efficiency

- Air Flow
- Thermal Flow
- Moisture Flow
- Equipment

Indoor Environment

- Source Control
- Ventilation
- Filtration

Resource Efficiency

- Water
- Materials
- Waste
- Recycling
- Land
- Renewables

WHY SPECIFICATIONS SO IMPORTANT

A voluntary labeling program that:

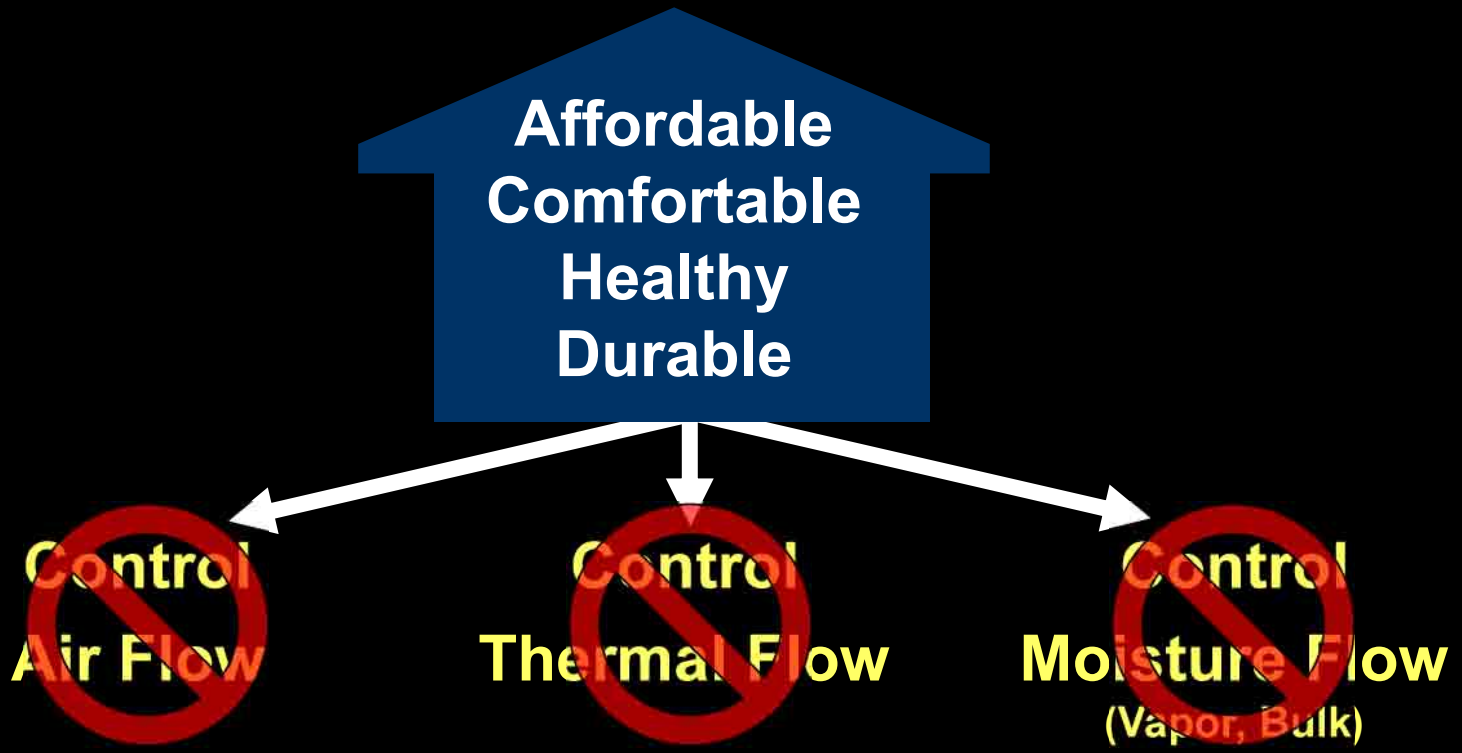
Defines Energy Efficient

Rigorous Specifications
Third-Party Verified

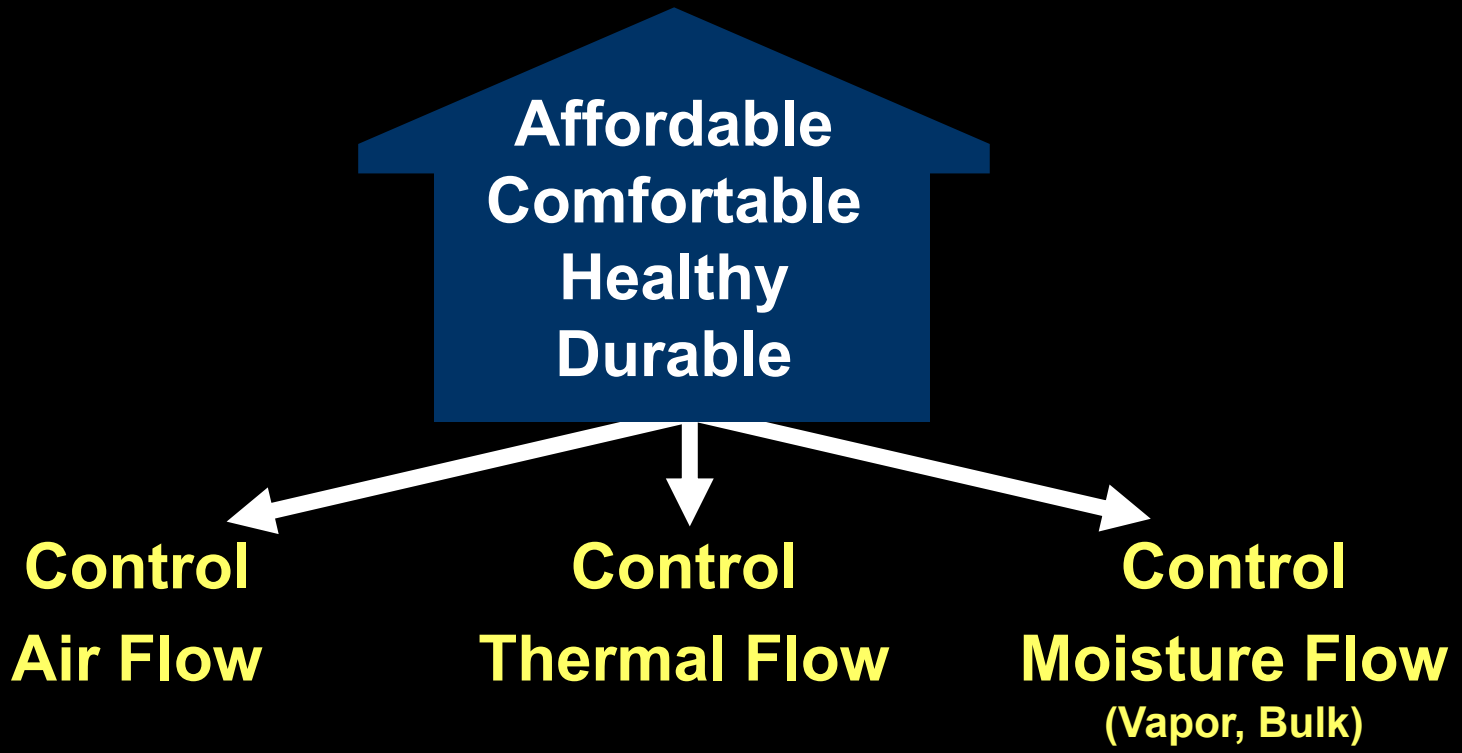
Recognizes Builders

Government-Backed Label
Web Site, Marketing, Awards

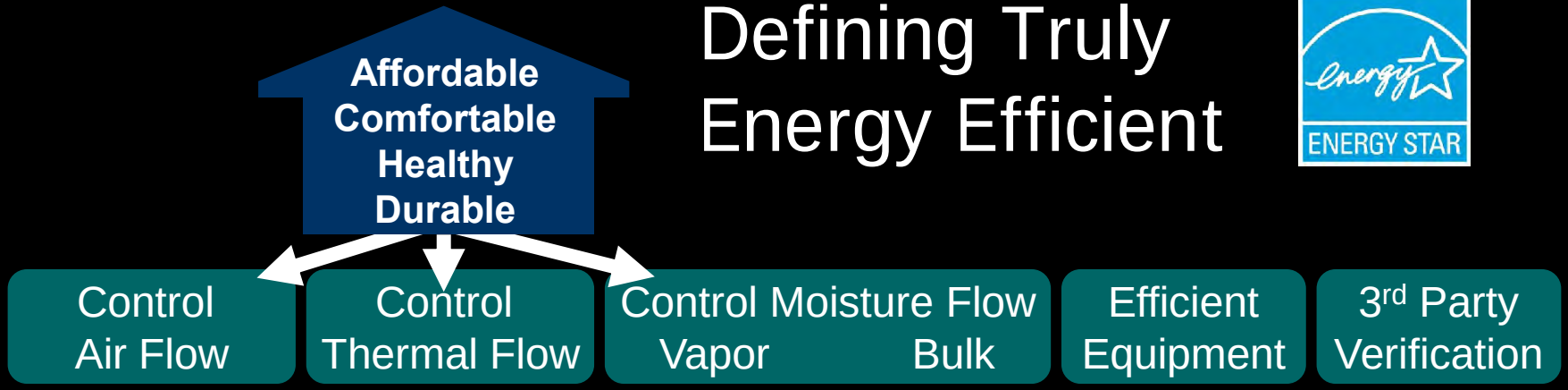
Status Quo: Homes That Fail



ENERGY STAR 2011: Homes That Work



Defining Truly Energy Efficient



Defining Truly Energy Efficient

Control Air Flow	Control Thermal Flow	Control Moisture Flow Vapor / Bulk	Efficient Equipment	3rd Party Verification
Air Sealing	Air Sealing	Air Sealing	Efficient HVAC	Inspect Features
Tight Ducts	Tight Ducts	Tight Ducts		Test Infiltration
	Insulation R-Value			
	Low-E Windows			Test Duct Leakage

1996
V.1

Defining Truly Energy Efficient

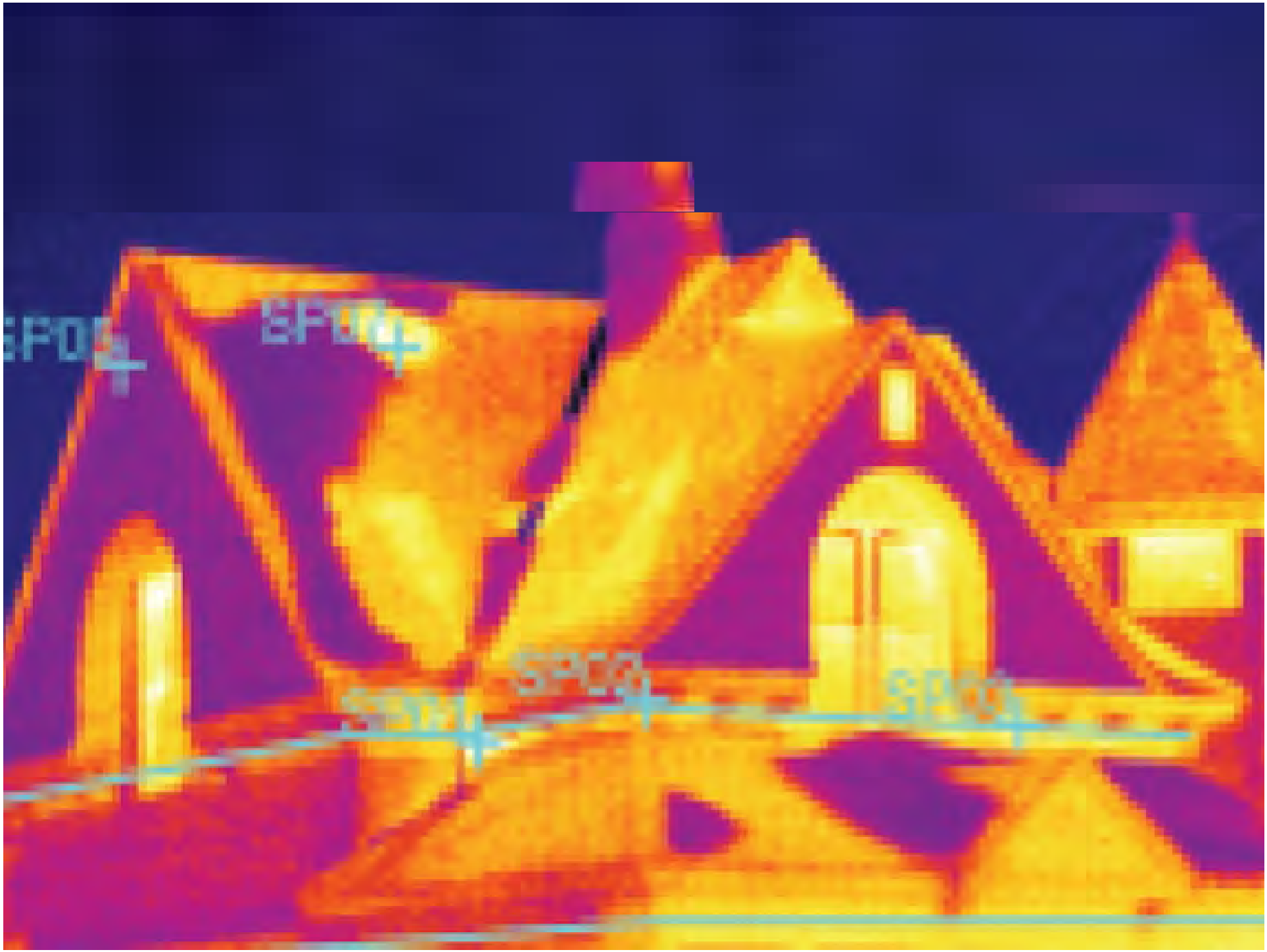
Control Air Flow	Control Thermal Flow	Control Moisture Flow Vapor	Control Moisture Flow Bulk	Efficient Equipment	3rd Party Verification
1996 V.1					
Air Sealing	Air Sealing	Air Sealing		Efficient HVAC	Inspect Features
Tight Ducts	Tight Ducts	Tight Ducts			Test Infiltration
	Insulation R-Value				
	Low-E Windows				Test Duct Leakage
2006 V.2					
Air Barriers	Air Barriers	Air Barriers		Efficient WH System	Thermal Bypass Chk
	Insulation Alignment	Right-Sizing		Efficient Lgtg./Appl.	

How we sold 2006 spec:
First we asked a question...

What technology will revolutionize the housing industry?

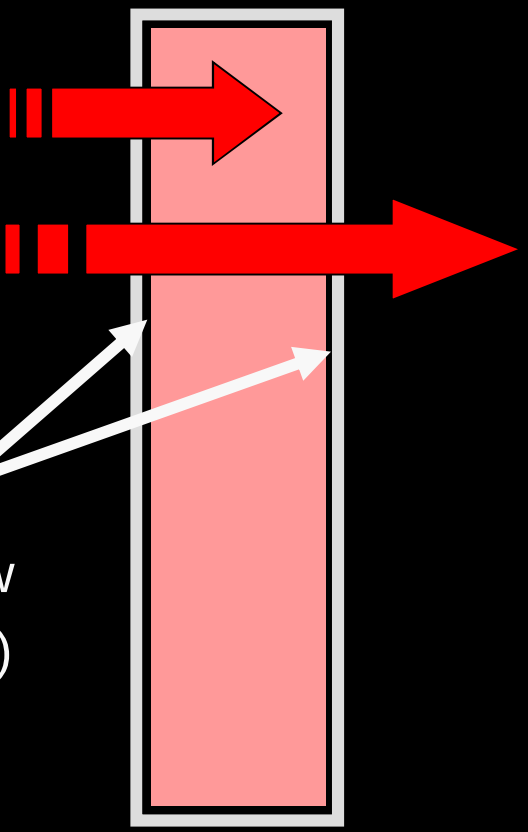
Hint: it has nothing to do with construction...

Answer…
Low Cost Infrared Cameras



BUILDING SCIENCE

FIBROUS NSULATION ≠ AIR BARRIER



...need Air Barrier...

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

...on all six sides...

...in direct contact with insulation (alignment)

BUILDING SCIENCE

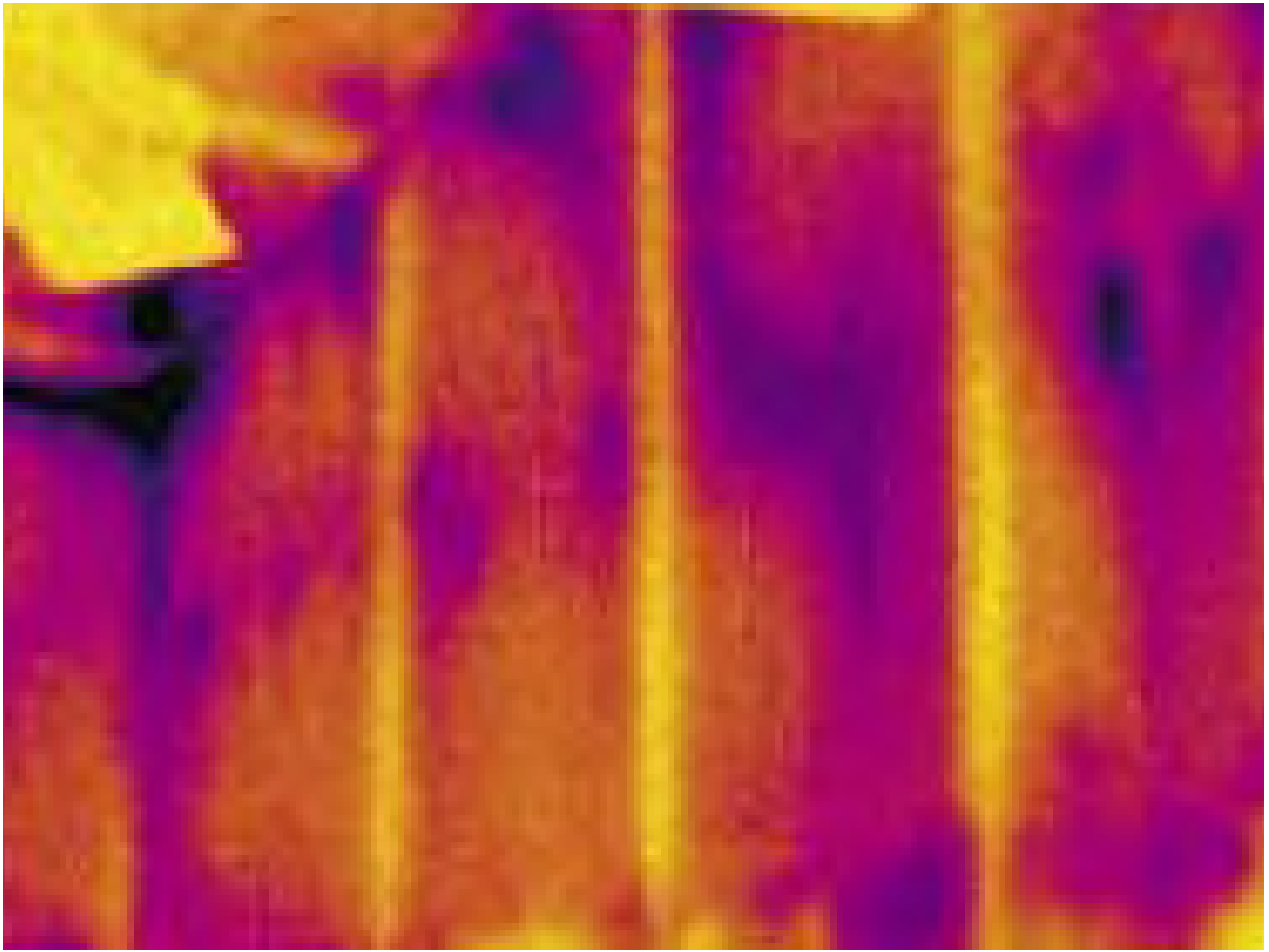
INSULATION IS NOT AN AIR BARRIER

Courtesy of Blue Grass Energy

ATTIC KNEE WALLS

Hot Wall

Courtesy of Building Science Corp.



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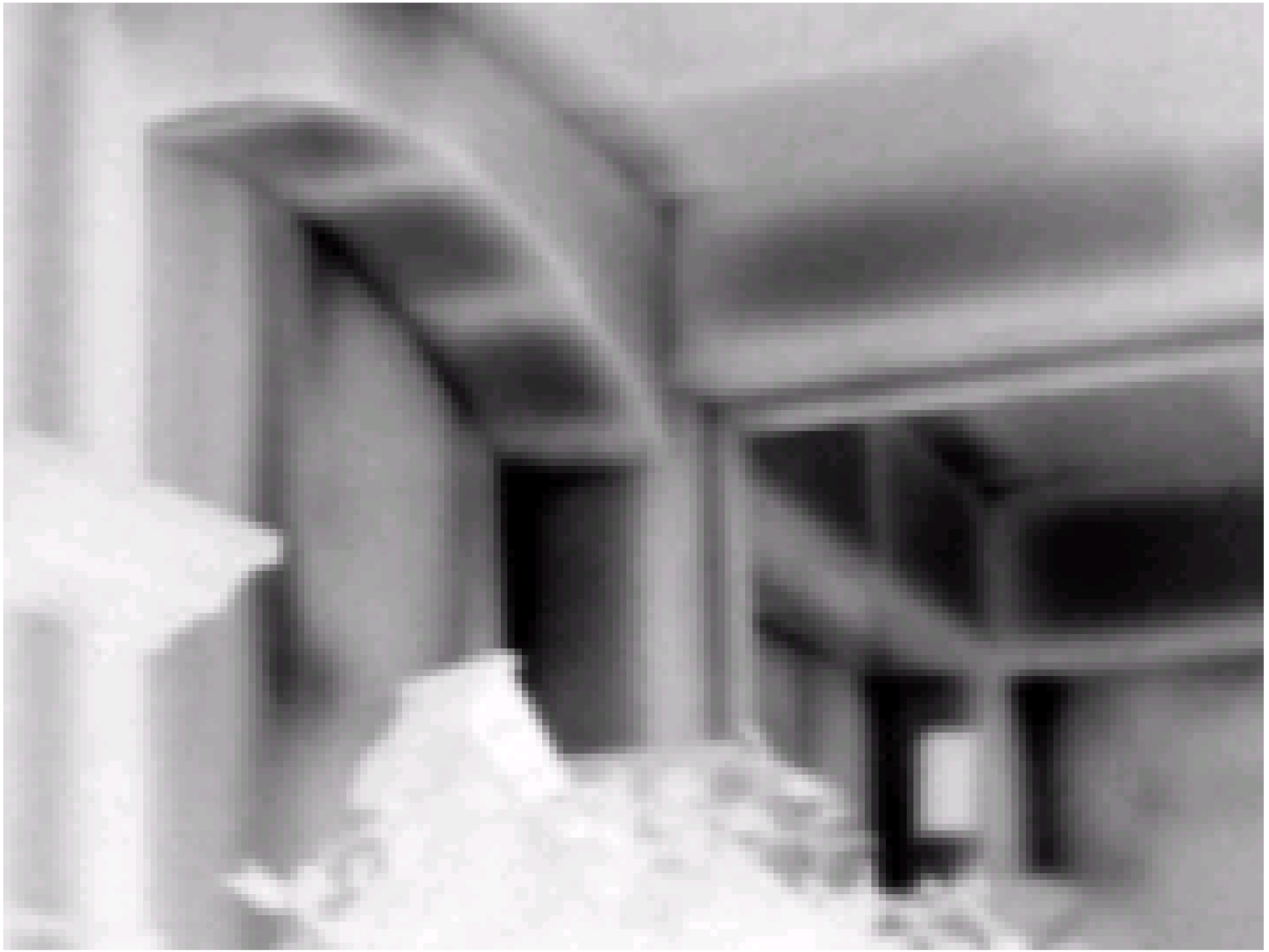


AIR BARRIER/THERMAL BARRIER ALIGNMENT

DROPPED CEILING

Courtesy of Building Science Corp.

INSET STAPLING = MISALIGNMENT

ENERGY STAR

INSET STAPLING = MISAGLIGNMENT

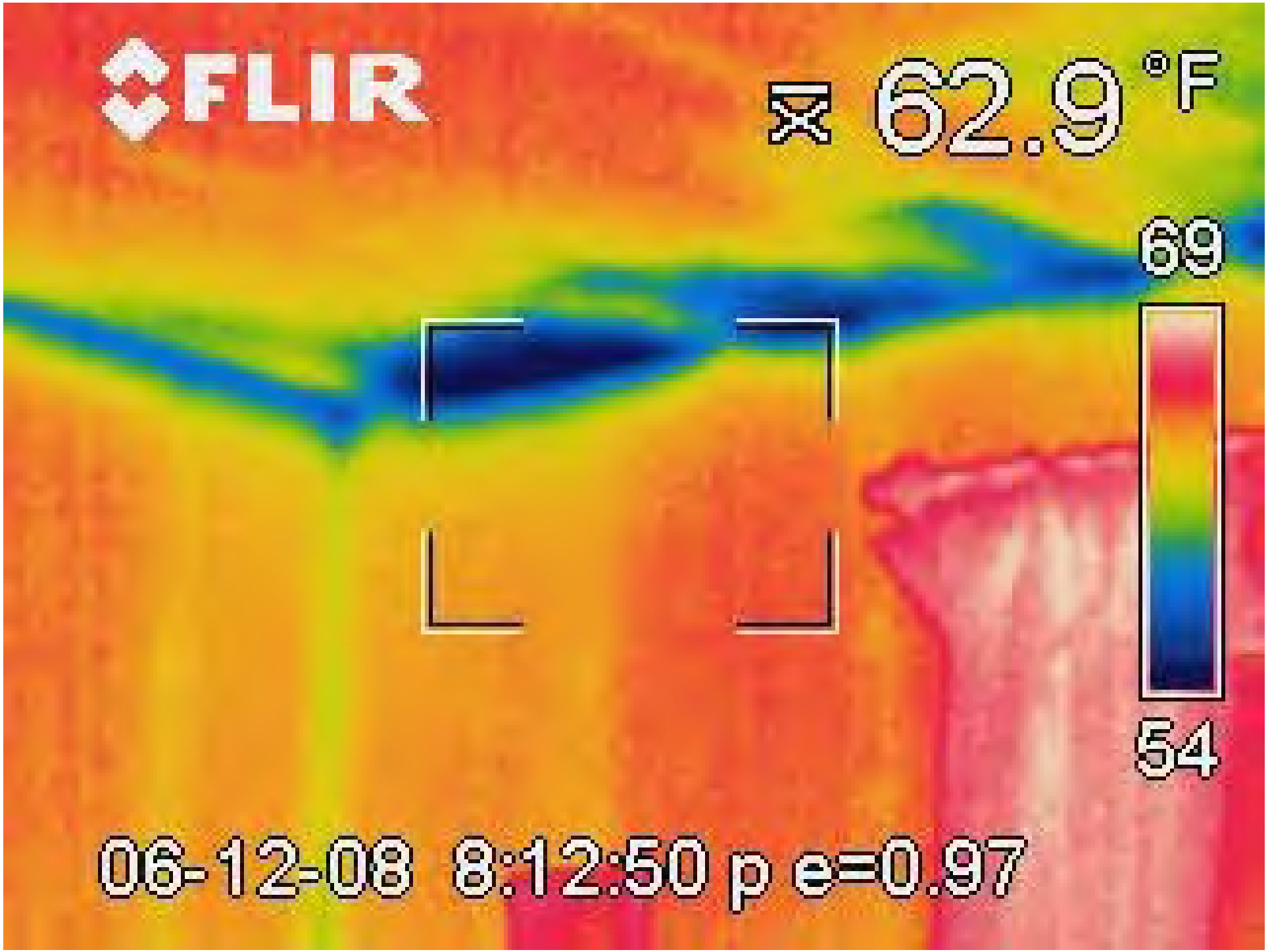

R-19

INSULATED FLOOR OVER GARAGE

Improper installation!

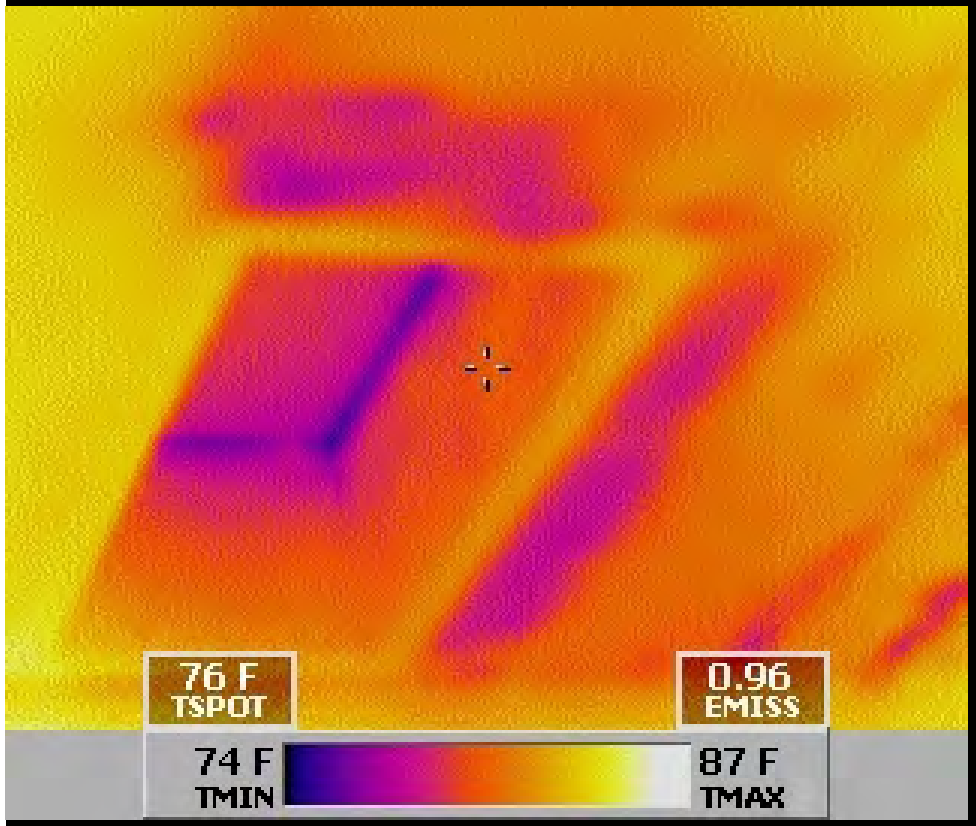
Insulation must be in direct contact with the surface it is intended to insulate

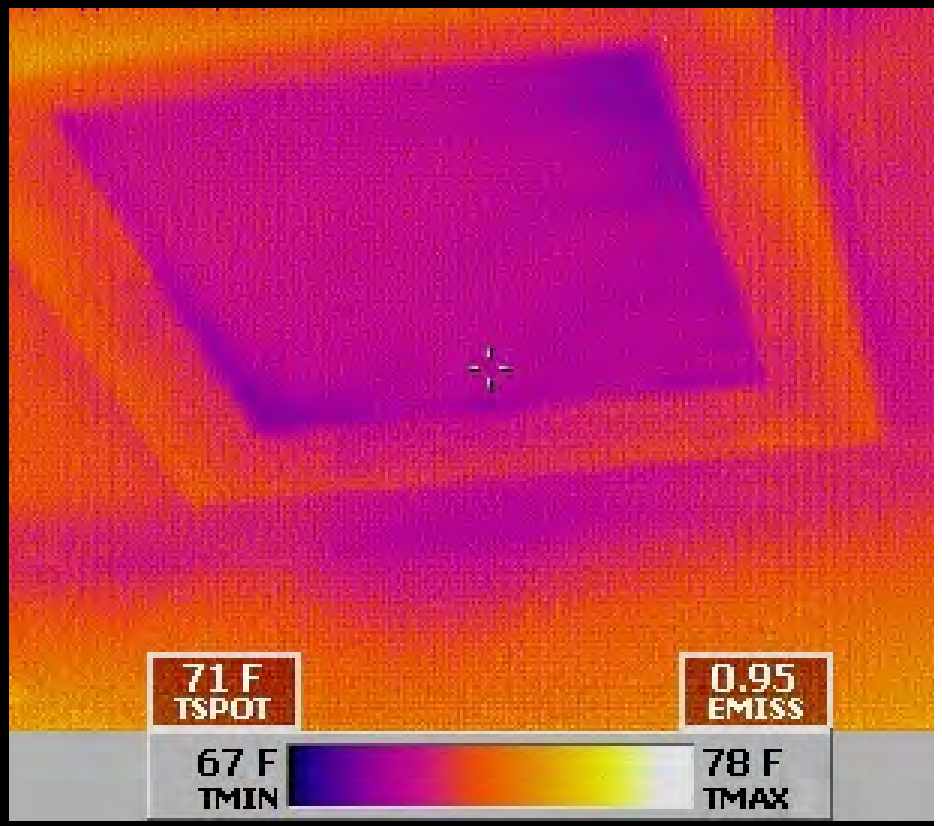
Wind intrusion, what’s that?

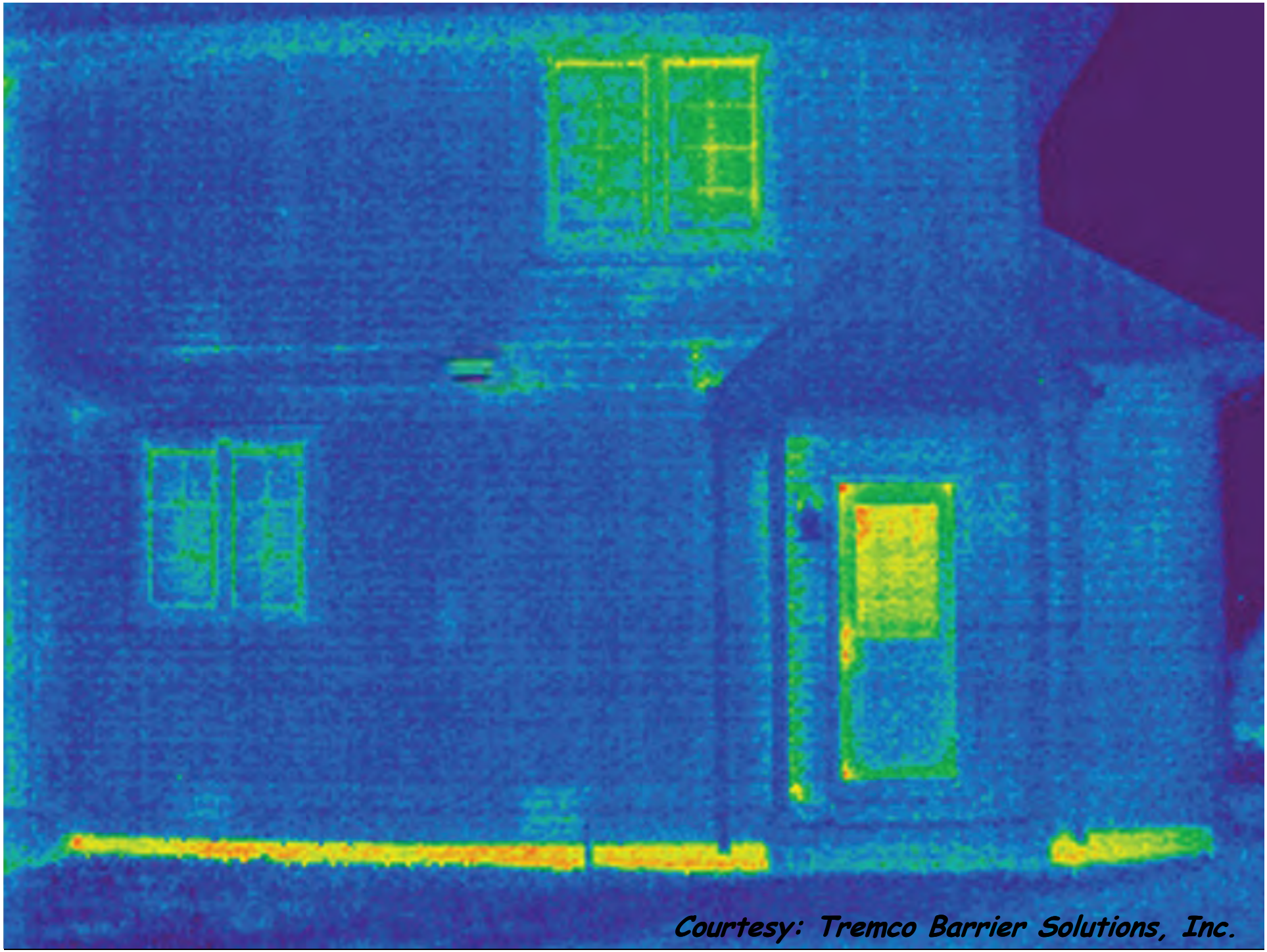

FLIR
x 62.9 °F
69
54
06-12-08 8:12:50 p e=0.97

WIND BAFFLES AT EACH BAY

ATTIC ACCESS PANEL PROBLEM







Courtesy: Tremco Barrier Solutions, Inc.

Now it's time for 2011 spec...

What value proposition will make used and minimum code homes even more obsolete?

Complete Systems

Defining Truly Energy Efficient

	Control Air Flow	Control Thermal Flow	Control Moisture Flow Vapor / Bulk	Efficient Equipment	3rd Party Verification
1996 V.1	Air Sealing Tight Ducts	Air Sealing Tight Ducts Insulation R-Value Low-E Windows	Air Sealing Tight Ducts	Efficient HVAC	Inspect Features Test Infiltration Test Duct Leakage
2006 V.2	Air Barriers	Air Barriers Insulation Alignment	Air Barriers Right-Sizing	Efficient WH System Efficient Lgtg./Appl.	Thermal Bypass Chk
2011 V.3	Pressure Balancing	Insulation Installation Min.Thermal Bridging	Ventilation Dehumid. in Hot/Humid Water Man. Construction Building Materials	HVAC Quality Inst.	Thermal Enclos. Chk HVAC Sys. QI Chk Water Man. System Chk

COMPLIANCE PATH

Baseline:

[Performance or Prescriptive]

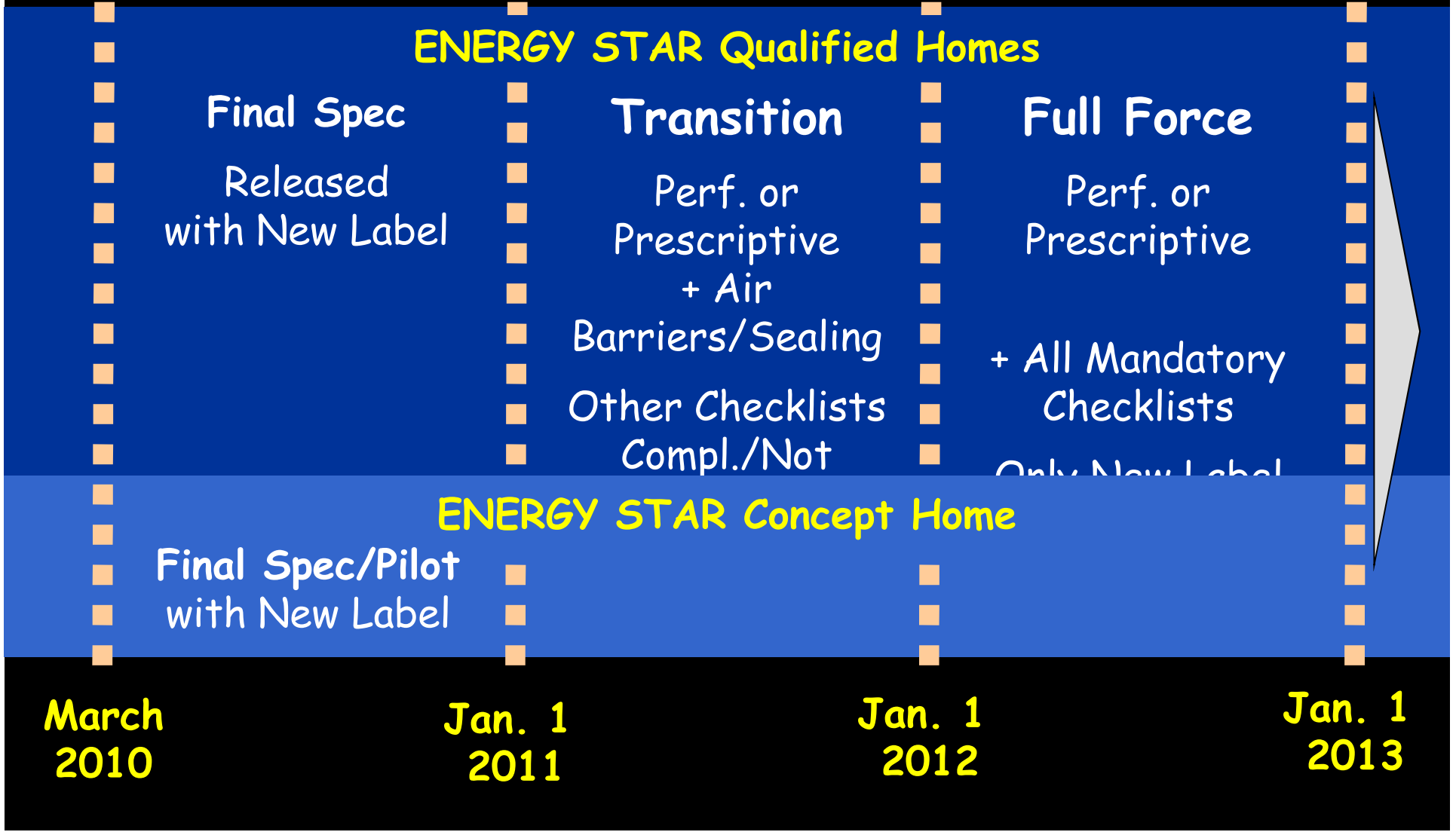
- Efficient Htg./Cooling
  - Equipment
  - Thermostats
  - Tightly Sealed Ducts
  - Insulated Ducts
- Efficient Envelope
  - Tight Construction Tested
  - IECC Insulation min.
  - Insulation Installation
  - IECC Windows min.
- Efficient Components
  - ENERGY STR Lighting
  - ENERGY STAR Appliances

+

Mandatory Checklists:

- Thermal Enclosure
- HVAC Quality Installation
- Water Managed Construction

2011 SPEC/CONCEPT HOME TIMELINE



SIZE ADJUSTED TARGET SCORE

Benchmark Home Size

BRs	1	2	3	4	5	6	7	8
CFA	1,000	1,600	2,200	2,800	3,400	4,000	4,600	5,200

$$\left(\frac{\textit{CFA Benchmark Home}}{\textit{CFA Rated Home}} \right)^{0.25} \times \textit{HERS Index Target Score}$$

Size Modification Factor not to exceed 1.0

SIZE ADJUSTMENT EXAMPLE

5,500 sf, 4 BR Home with HERS Index Target Score of 78

$$\left(\frac{\text{2,800 sf 4-BR benchmark home}}{\text{5,500 sf 4-BR rated home}}\right)^{0.25} \times 78$$

= **69** ENERGY STAR HERS Index Target Score

COMPLETING SYSTEMS: CHECKLISTS

Thermal Enclosure System:

- Air Leakage
- Insulation R-Value
- Insulation Installation
- Air Barriers
- Thermal Bridging
- High-Perf. Windows

HVAC System Quality Installation:

- Efficient Equipment
- Right-Sizing
- Air Distribution
- Refrigerant Charge
- Duct Installation
- Pressure Balancing
- Ventilation
- Filtration

Water Management System:

- Roof Membranes
- Flashing
- WRB's
- Fabric Filters
- Capillary Breaks
- Drainage Layer

TEST PLUS INSPECT BIG HOLES

Access Panels

Drywall at Top Plate

Penetrations:

- Ceiling Fixtures
- Vents
- Plumbing

Chases

Cracks:

- Window Openings
- Door Openings
- Sill Plates

BYPASS AT WALL/ATTIC INTERFACE

WALL/ATTIC INTERFACE DETAIL

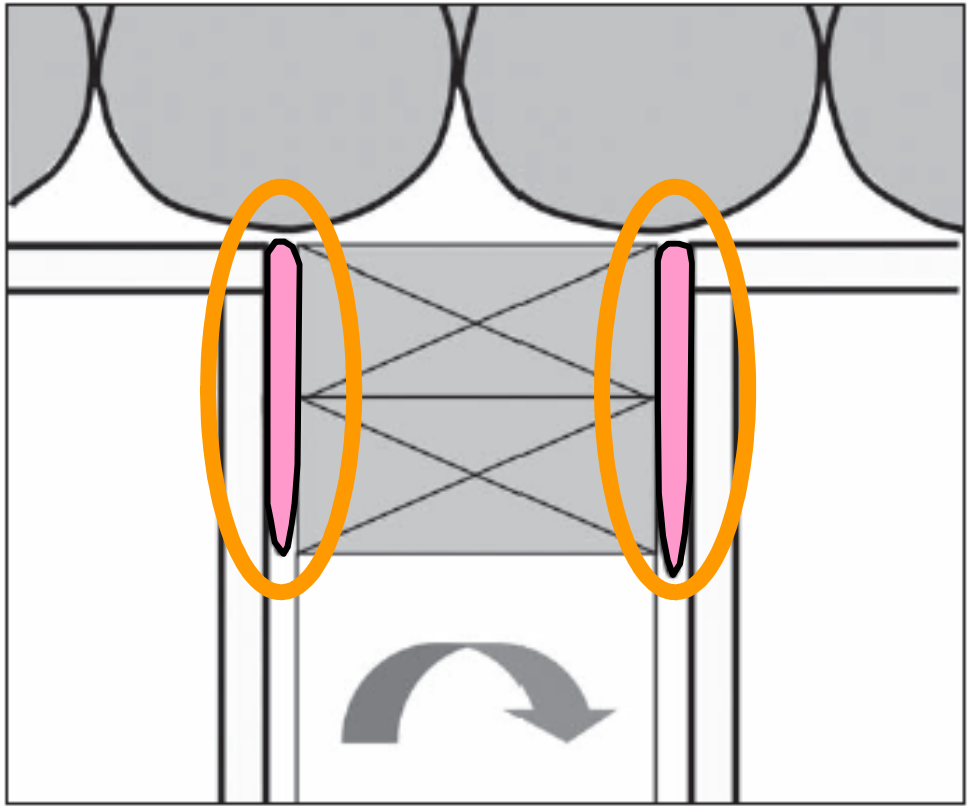
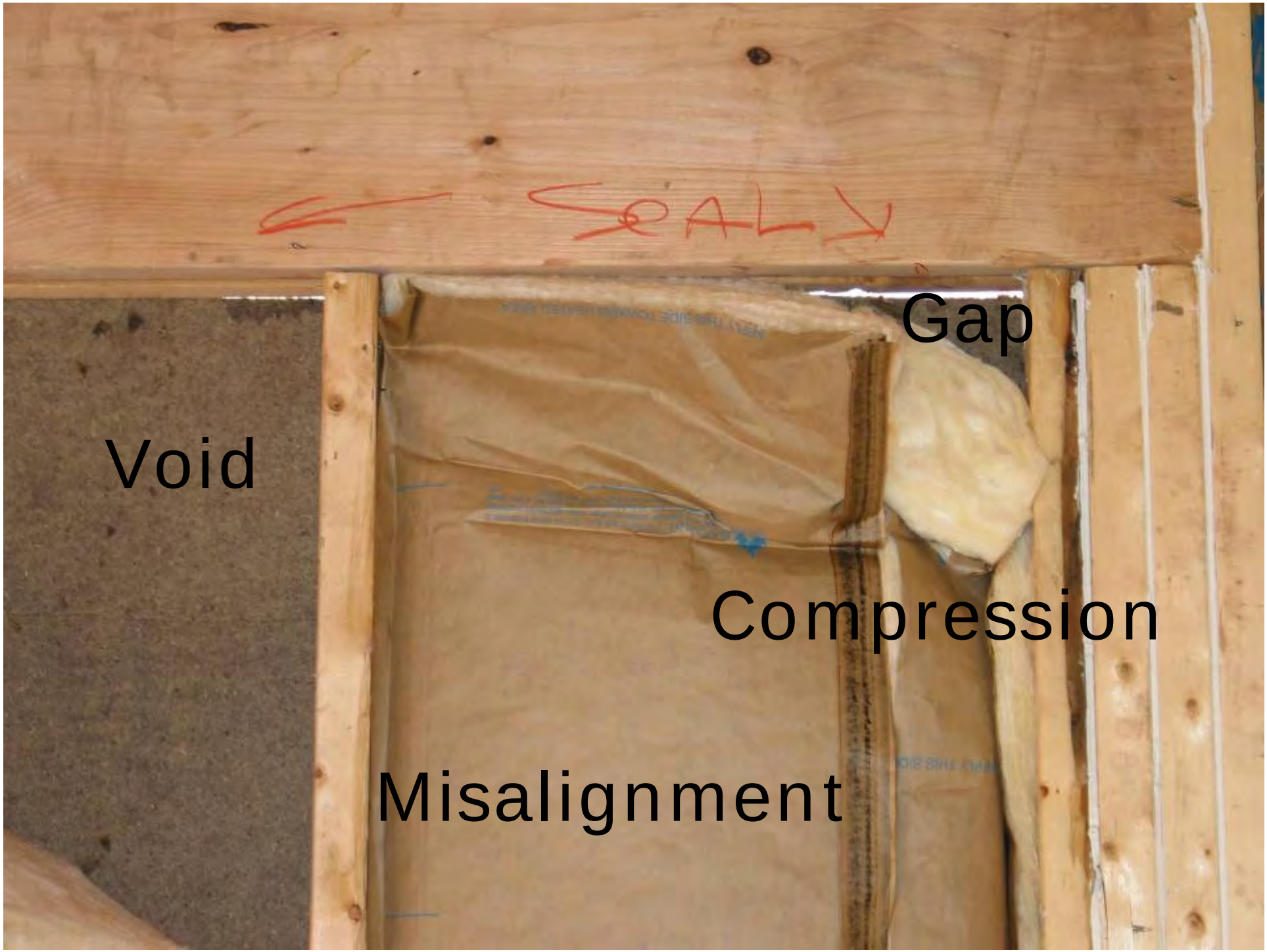
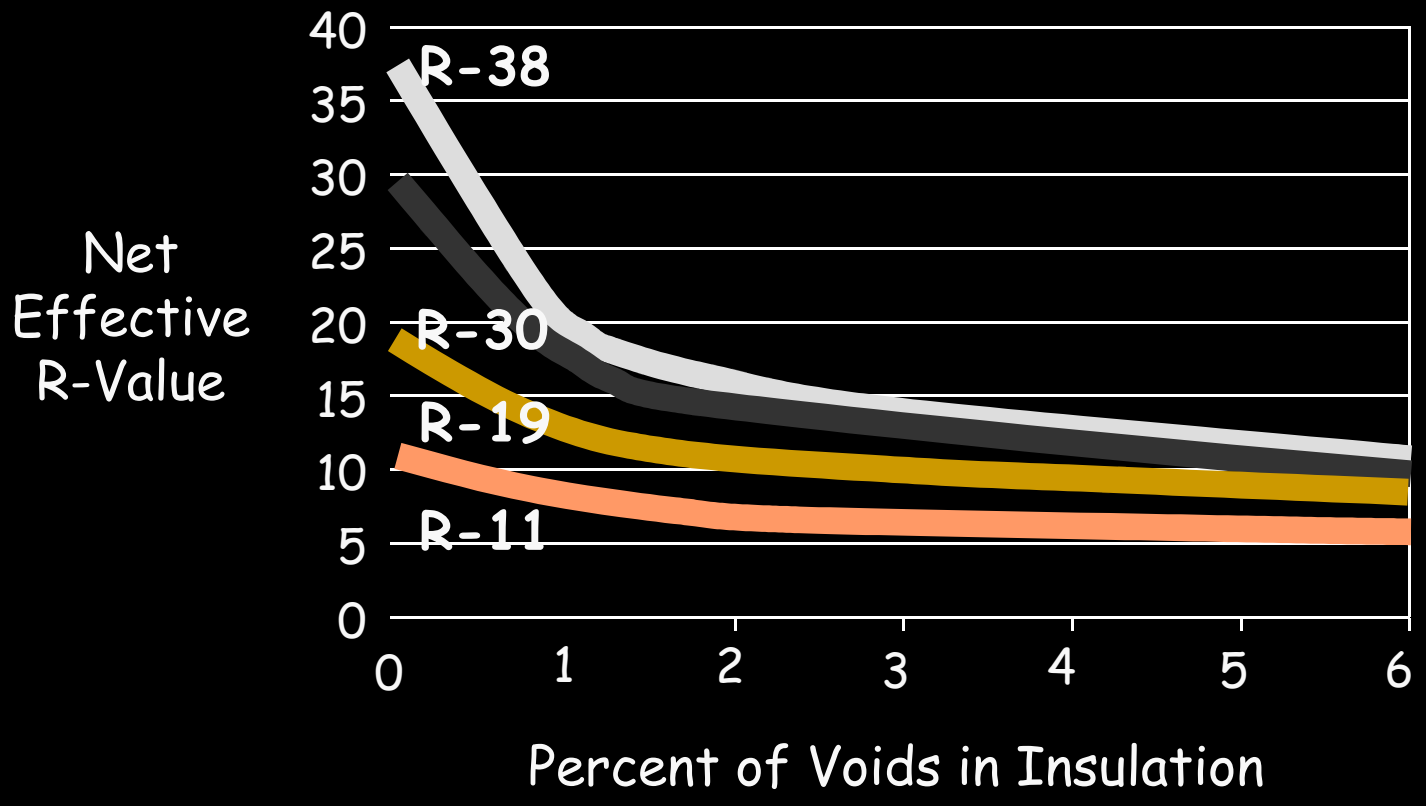


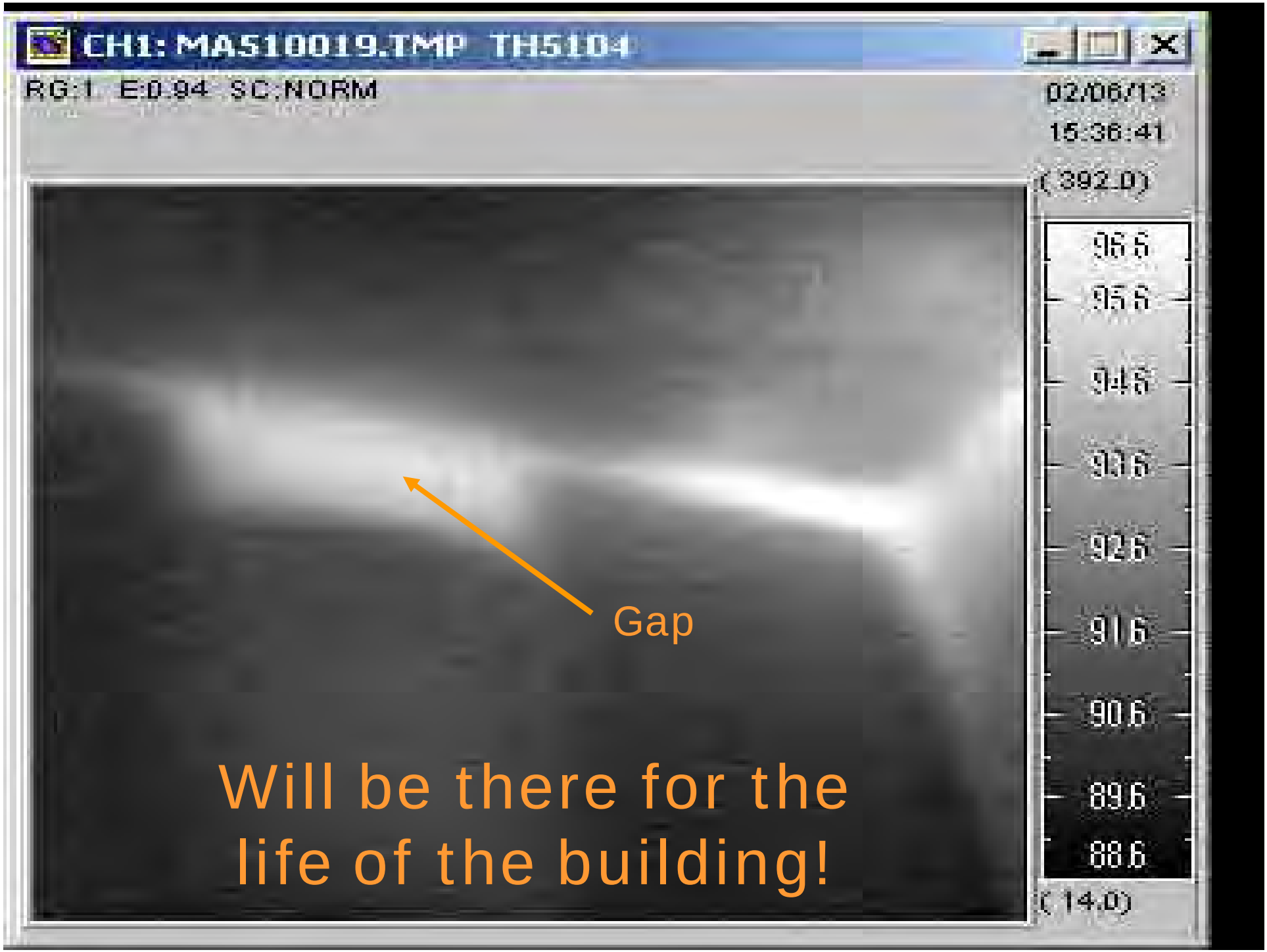
Figure 7. The spray foam is designed to be applied to the exposed edges of framing members, as at this double top plate at an interior partition, where it serves as an air-sealing gasket after the application of drywall.


SEAL
Gap
Void
Compression
Misalignment

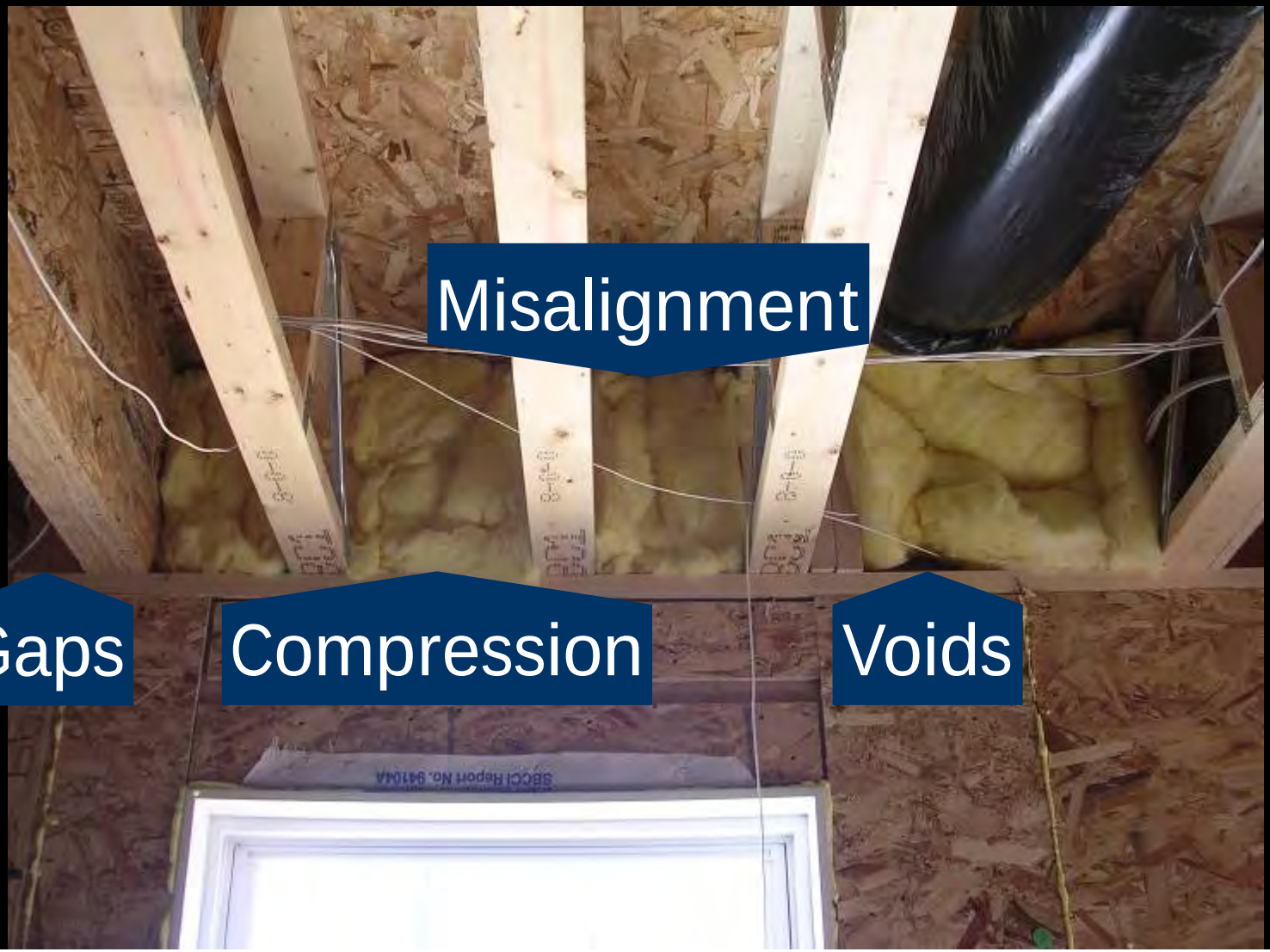
EFFECT OF GAPS AND SPACES ON BATT INSULATION EFFECTIVENESS

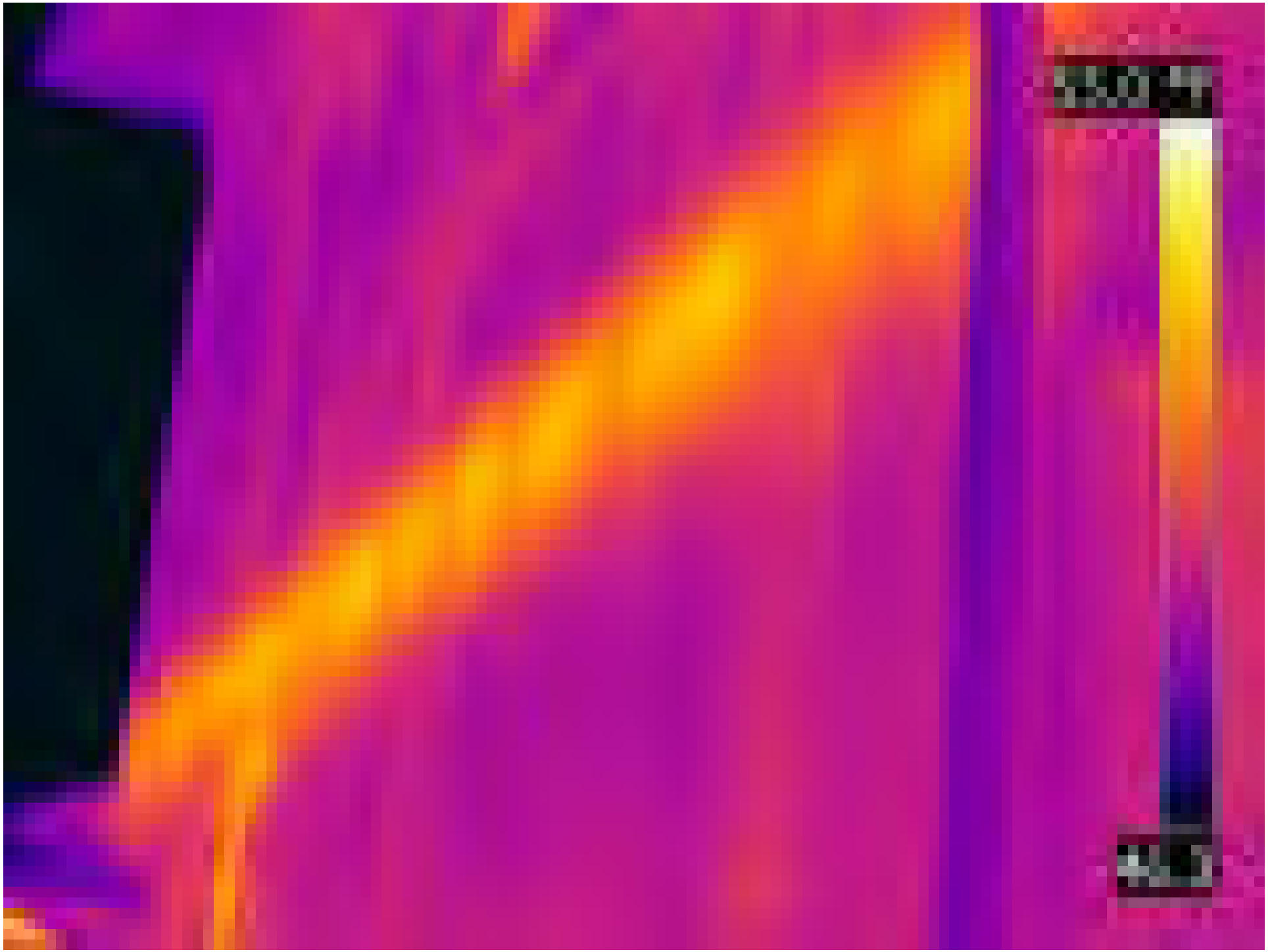


Source: Insulate and Weatherize by Bruce Harley, 2002

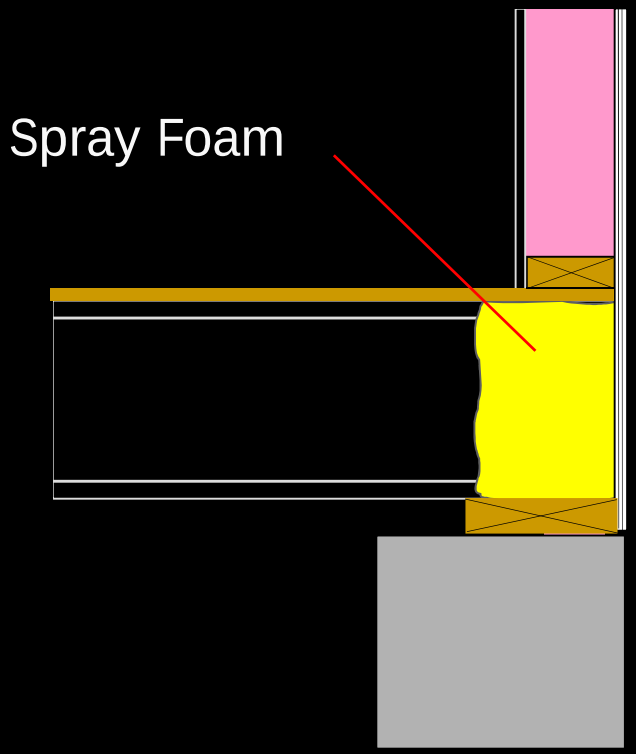

CH1: MA510019.TMP TH5104
RG:1 E:0.94 SC:NORM
02/06/13
15:36:41
(392.0)
96.6
95.6
94.6
93.6
92.6
91.6
90.6
89.6
88.6
(14.0)
Gap
Will be there for the life of the building!

BAND JOIST INSULATION PROBLEM

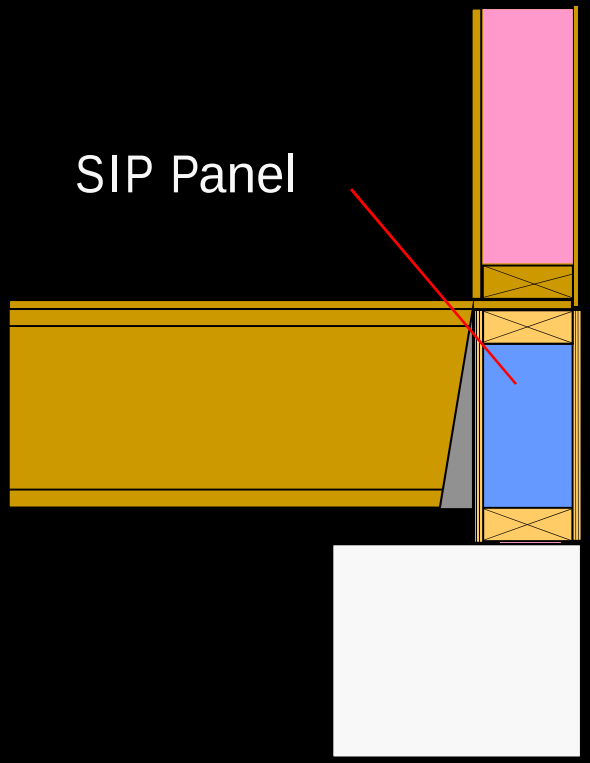




PROPER INSULATION: BAND JOISTS



PROPER INSULATION: BAND JOISTS



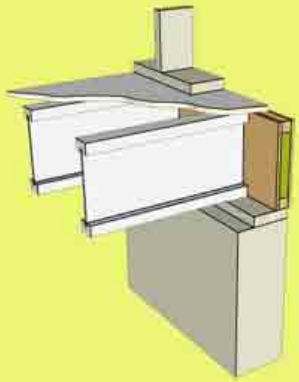
EMERCOR

Home | Contact | Professional Tools | Estimate Request

ABOUT US | PRODUCTS | EMERCOR HOMES | WARRANTY & SERVICES | KNOWLEDGE CENTRE

Floors
- ➤ Insulated Rimboard
  - Cantilever Soffit
  - Insulated Panels

Exterior Walls
Foundation & Basement Walls
Cathedral Ceilings & Attics
Bonus Rooms



Insulated Rimboard

The Quick & Easy Way To Insulate The Floor Perimeter

EMERCOR's Insulated Rimboard is an integral part in building a better home, delivering comfort, health and energy efficiency to homeowners. Accounting for up to 14 per cent of a homes total air infiltration, the Insulated Rimboard eliminates air leakage and enables proper workmanship during installation. Truly a time saving material, the Insulated Rimboard turns a three-step process into one easy and sure way to install insulation at the floor system.

Advantages
Load Table
Specifications

Brochure
Installation Guide

Advantages

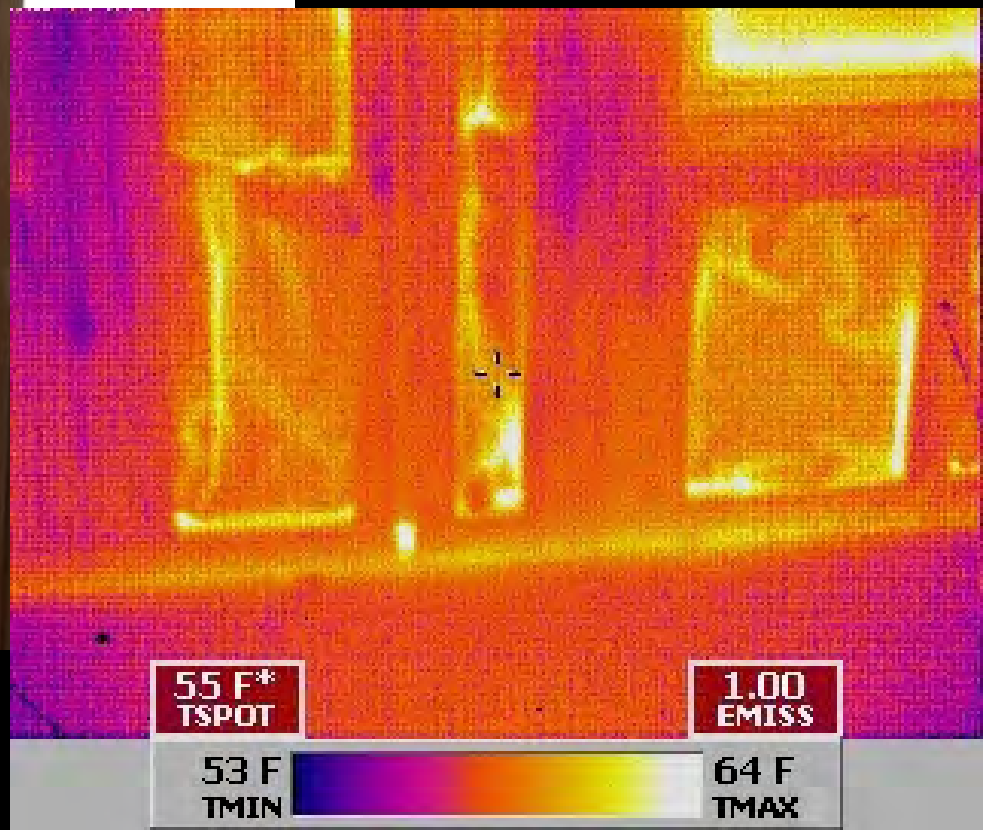
Energy Efficient - R 14:
Up to 14 per cent of total home air leakage occurs around the rim joist. EMERCOR's Insulated Rimboard decreases air leakage by ensuring that continuous R-14 insulation is placed around the floor perimeter.

Easy Installation - 20% Faster Install:
EMERCOR's Insulated Rimboard has a unique joining detail and installs up to 20 per cent faster than regular Rimboard. It also eliminates the nightmare of trying to insulate and seal around every floor joist.

Moisture Resistant - Type 1 Vapor Barrier:
EMERCOR's Insulated Rimboard has a vapor permeance of less than one, making it a Type 1 vapor barrier. This barrier prevents moisture condensation in the building envelope which leads to rot, mold and eventually structural damage.

Environmental - Reduce job site waste:
EMERCOR's Insulated Rimboard is engineered with a unique joining detail. This joining detail allows traditionally discarded pieces to be reused along the floor perimeter. EMERCOR's commitment to sustainability is driven through the 'EMERGreen Program', with an internal focus on implementing lean in both their manufacturing and office facility.

THERMAL BRIDGING



ADVANCED FRAMING

Courtesy of Building Science Corp.

RIGID INSULATION SHEATHING

STRUCTURAL INSULATION SHEATHING

ADVANCED WALL SYSTEMS

SIPs

ICF

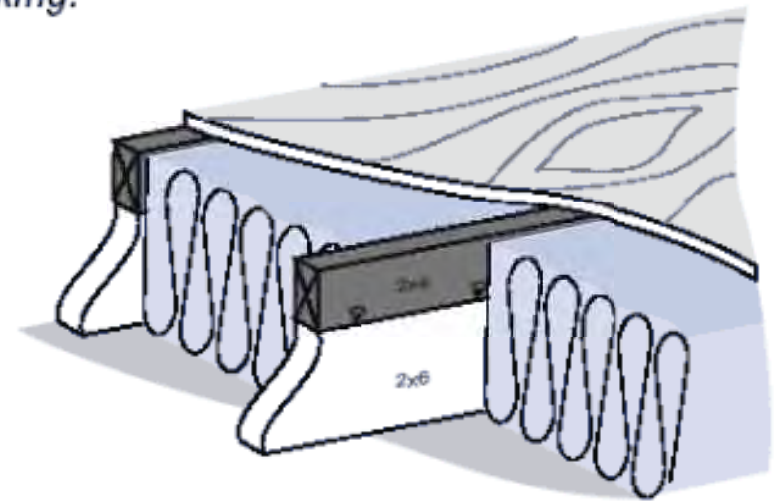
Double Wall

RAISED HEEL TRUSSES

RAISED PLATFORM FRAMING

INCREASE ATTIC INSULATION LEVELS UNDER DECKING

For many products, an insulation depth of 10 to 14 inches is needed to achieve an R-30 to R-38 insulation value. Thus, a 2x4 or 2x6 extension needs to be added to a 2x6 joist to provide sufficient depth before installing decking.

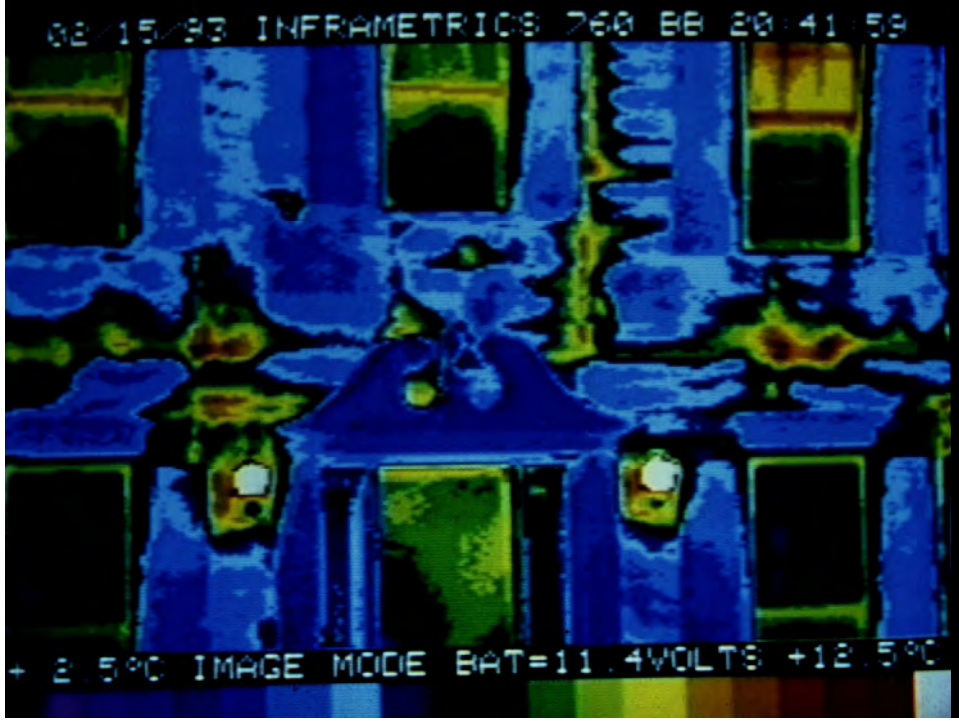


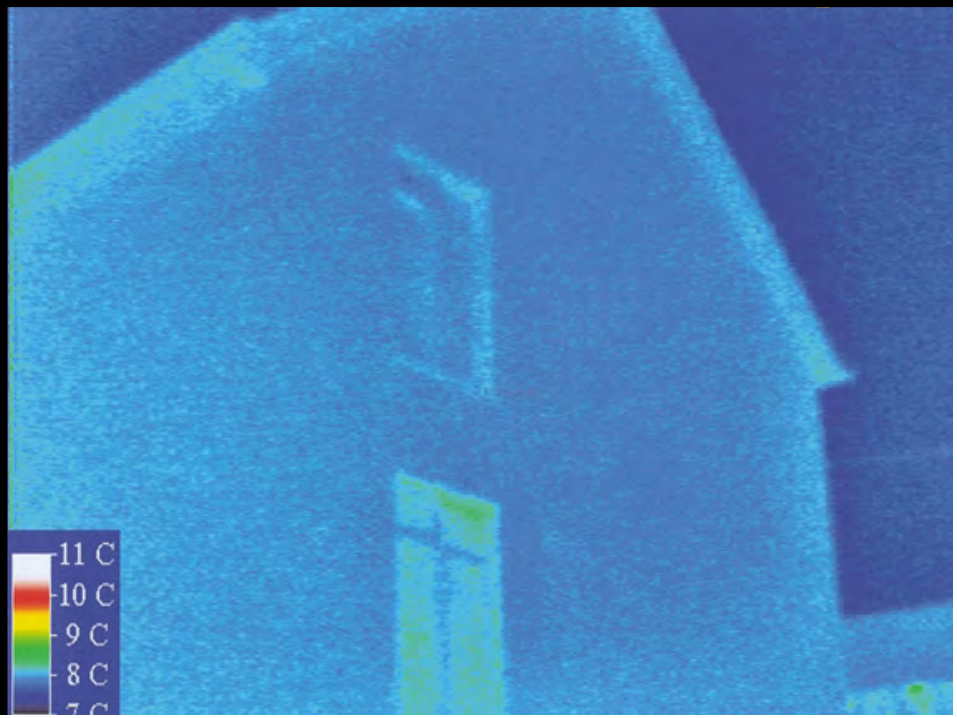
Thermal Enclosure System
Value Proposition

Visibly better **quality**

Superior **comfort and health**

Future **resale value**





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- Ventilation
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Water Management System:

- Roof Membranes
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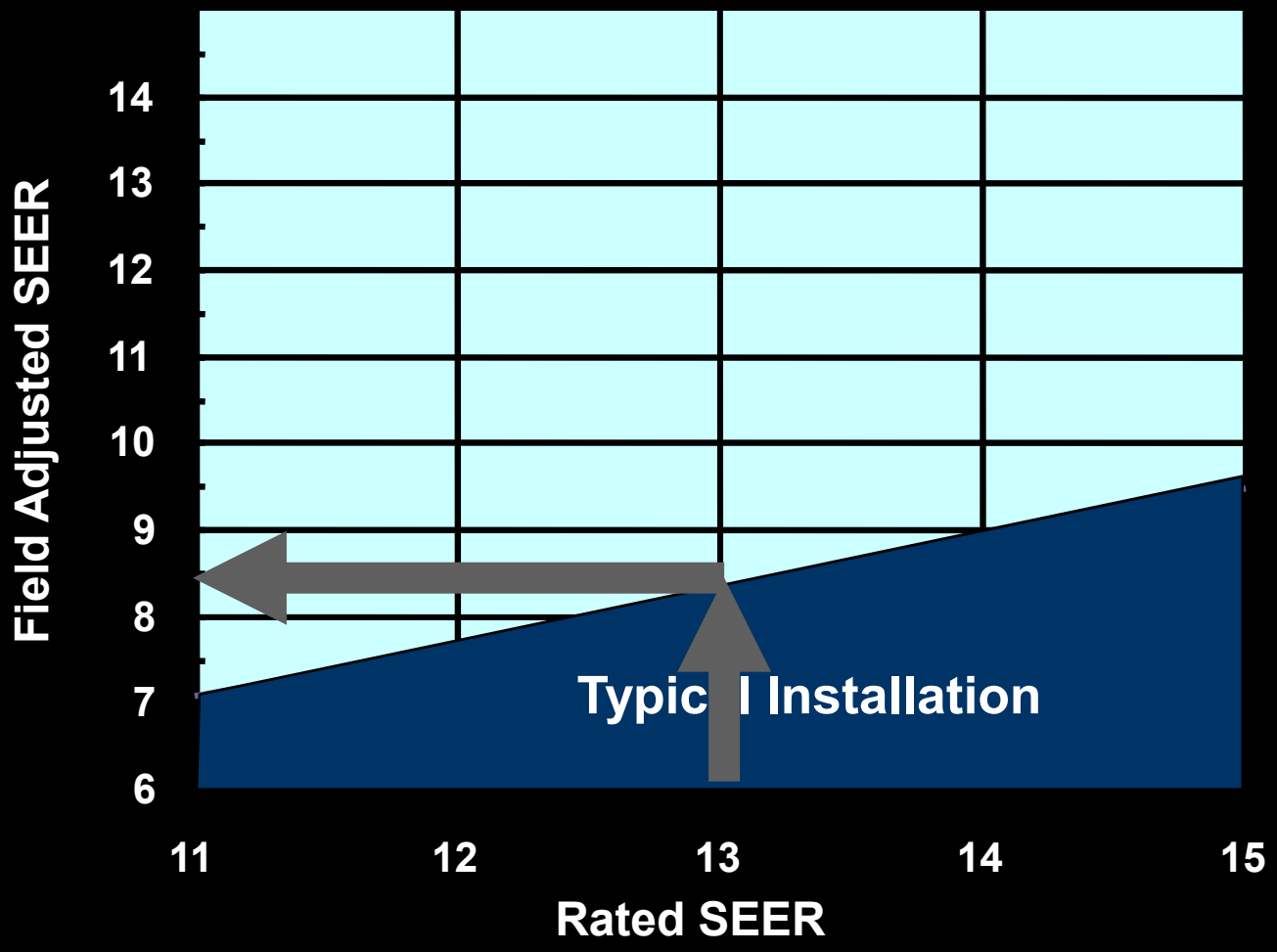
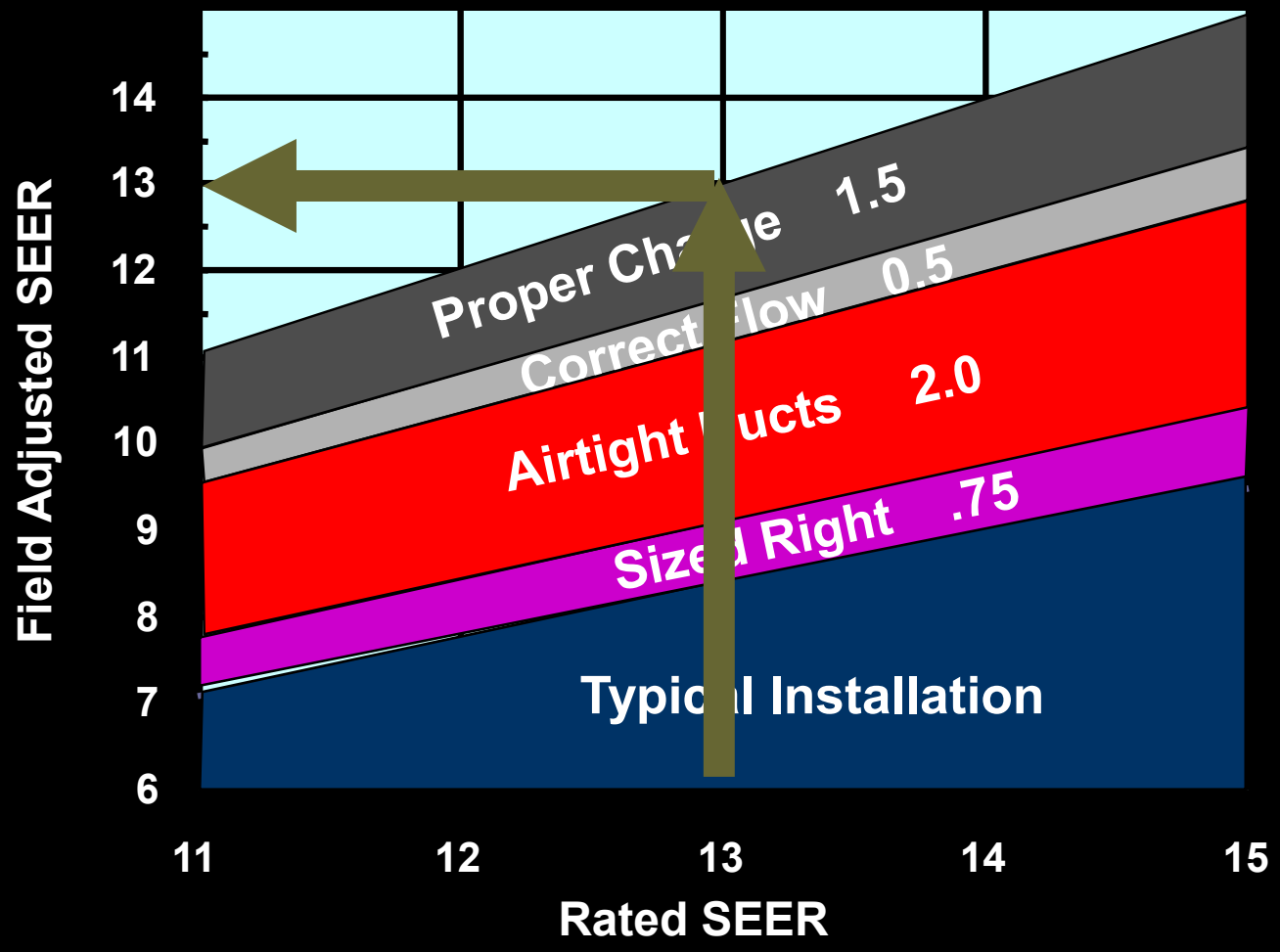
HVAC SYSTEM QUALITY INSTALLATION



Courtesy of Advanced Energy Corp.

HVAC SYSTEM QUALITY INSTALLATION



Courtesy of Advanced Energy Corp.

HVAC QUALITY INSTALLATION

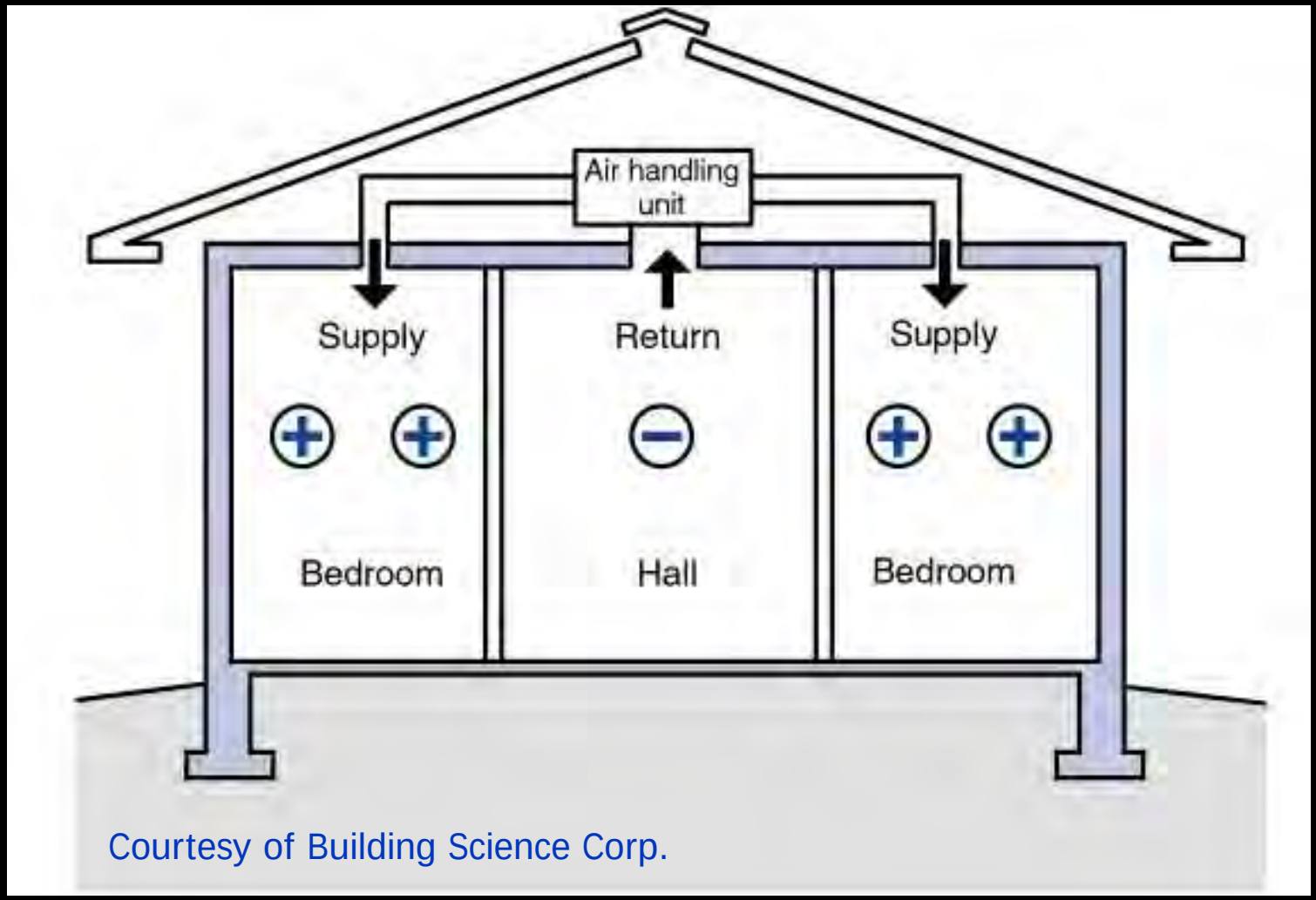
HVAC Contractor	Right-Sizing	Equipment (ACCA Manual J/S) Ducts (ACCA Manual D)
	Equipment Selection	Matched Components Sensible Heat Ratio
	Air Distribution	Flow Across Coil Room-by-Room Air Flow Static Pressure
	Refrigerant Charge	Testing TXV Valve
Rater	Duct Installation	Duct Installation R-8 Ducts in Attic Leakage to Outdoors and Total Pressure Balancing


Exit grille is over here !


CLASS 1 AIR DUCT

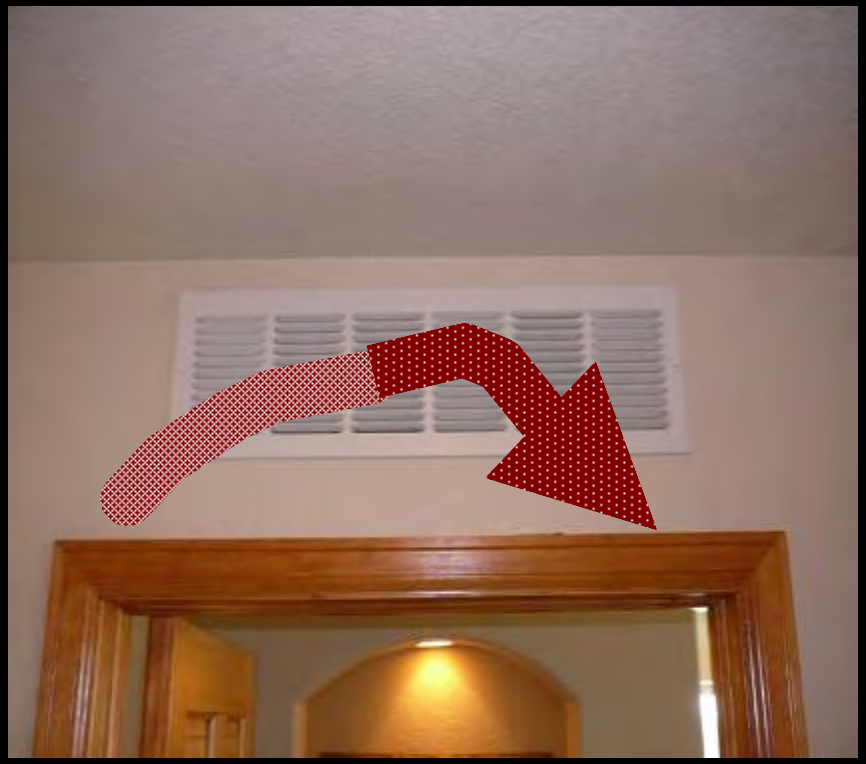

05.08.2005

PRESSURE BALANCING: PROBLEM



Courtesy of Building Science Corp.

PRESSURE BALANCING: SOLUTIONS



TRANSFER GRILLE

JUMP DUCT

WHOLE-HOUSE VENTILATION

CONTINUOUS EXHAUST

FRESH AIR DAMPER

DUCTED FRESH AIR SUPPLY

WHOLE-HOUSE VENTILATION

WHOLE-HOUSE VENTILATION

ERV AND HRV

SPOT VENTILATION

HVAC System Quality Installation Value Proposition

- Engineered Comfort
  - Thermal Control
  - Humidity Control
  - Noise Control
- Assured Fresh Air
- Filtration that Works

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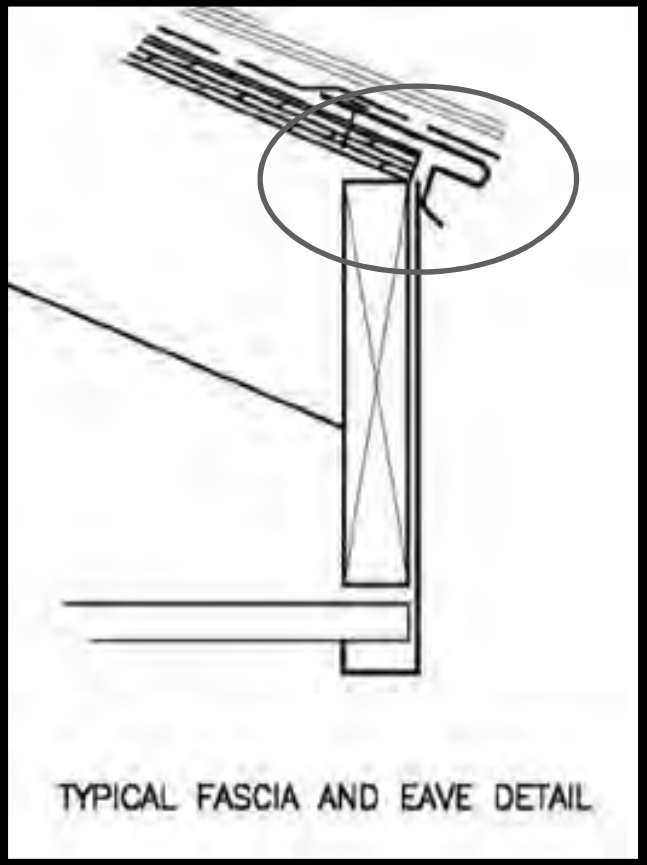
WATER MANAGED ROOFS

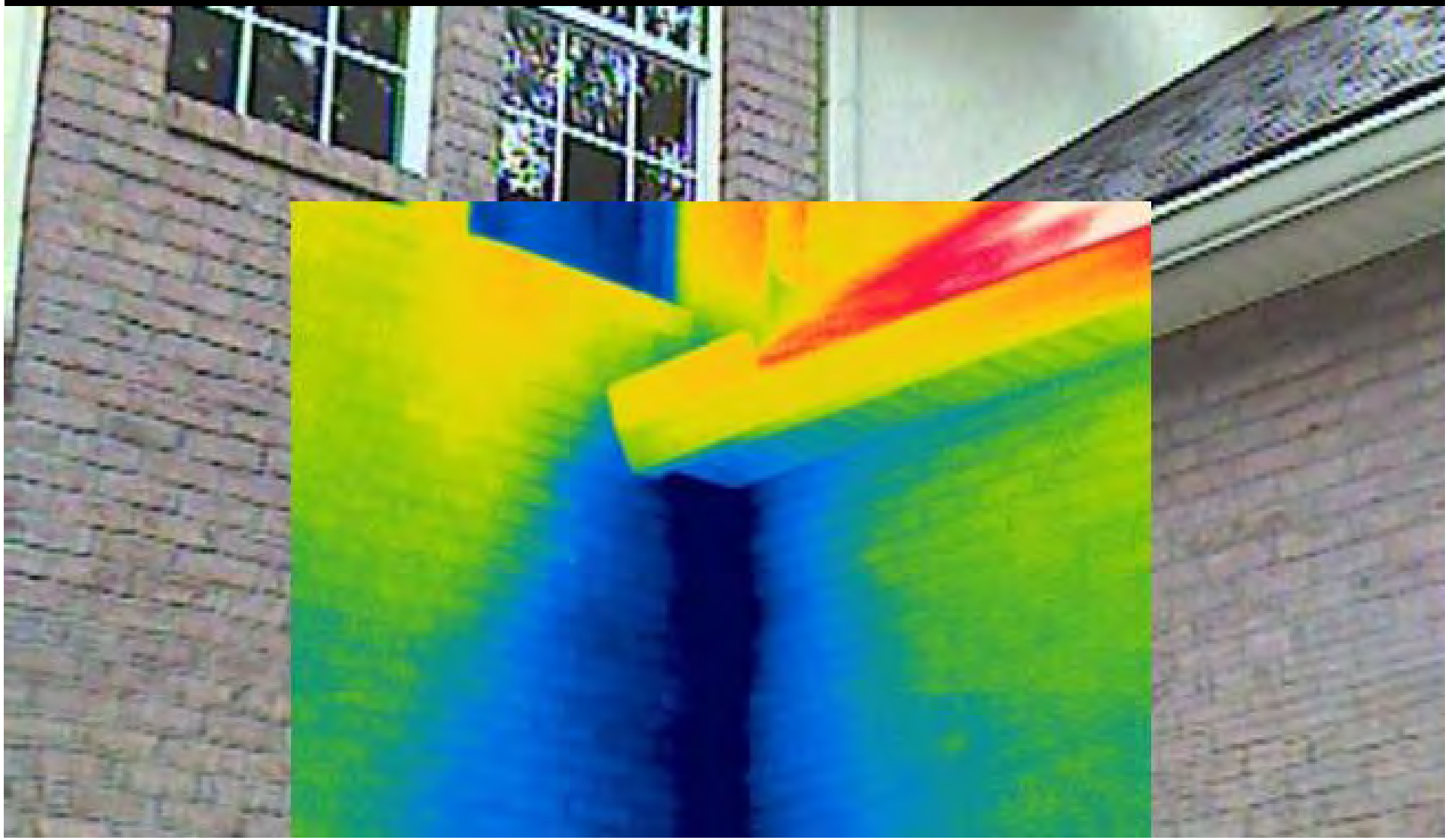


TYPICAL FASCIA AND EAVE DETAIL

HEAVY BITUMINOUS MEMBRANE AT EAVES AND VALLEYS

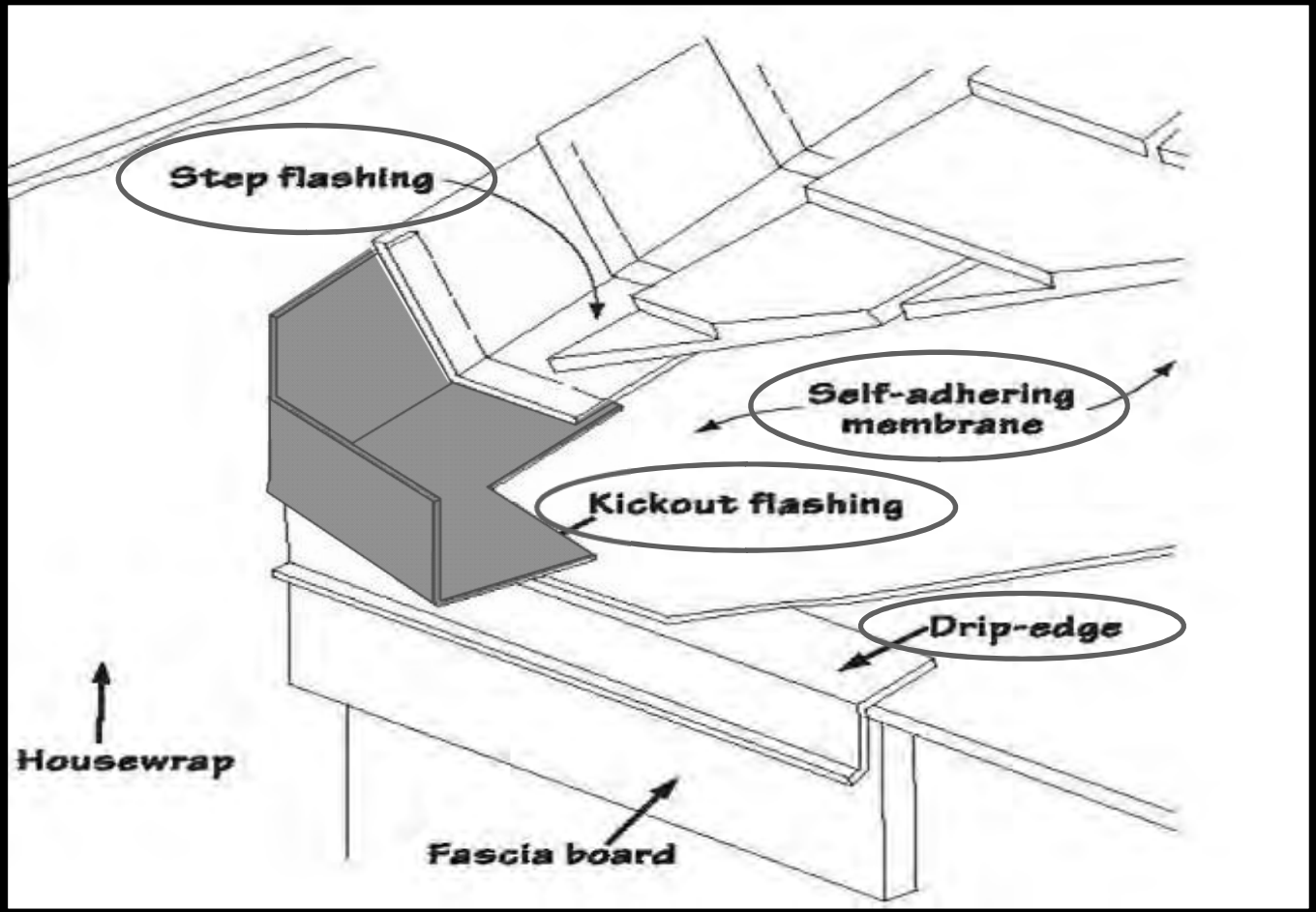

BOCA 2146
Made in USA

WATER MANAGED CONSTRUCTION



WATER MANAGED ROOFS

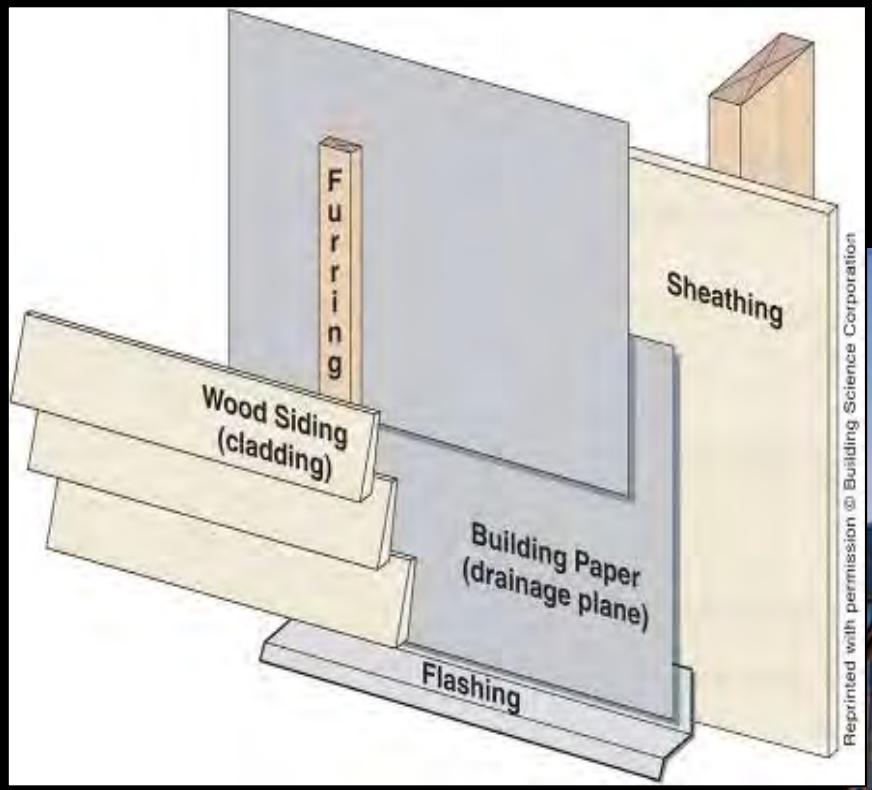
ROOF FLASHING DETAILS



WATER MANAGED WALL PROBLEM

WATER MANAGED WALLS

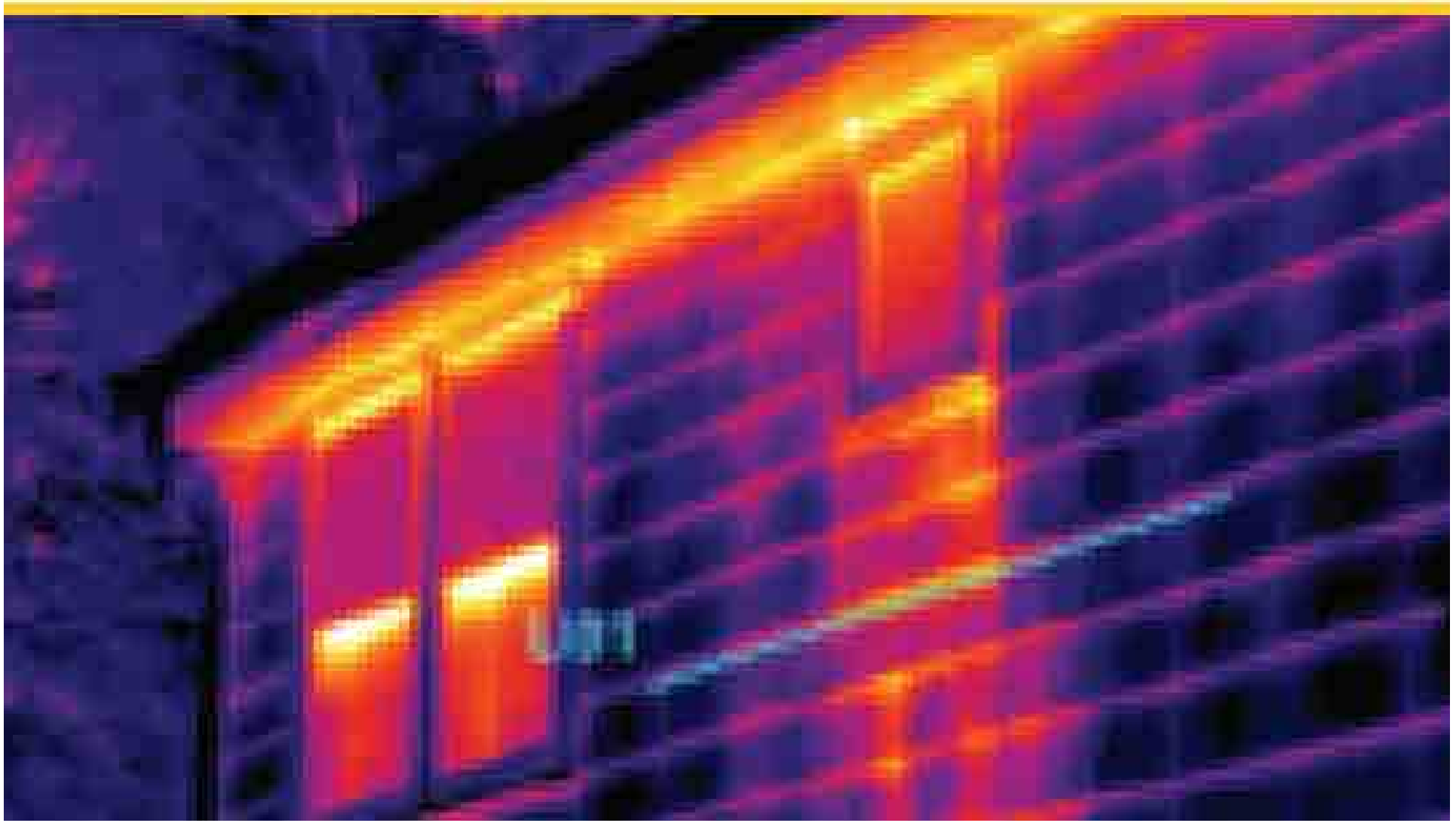
WATER MANAGED WALLS



DRAINAGE PLANE DESIGN

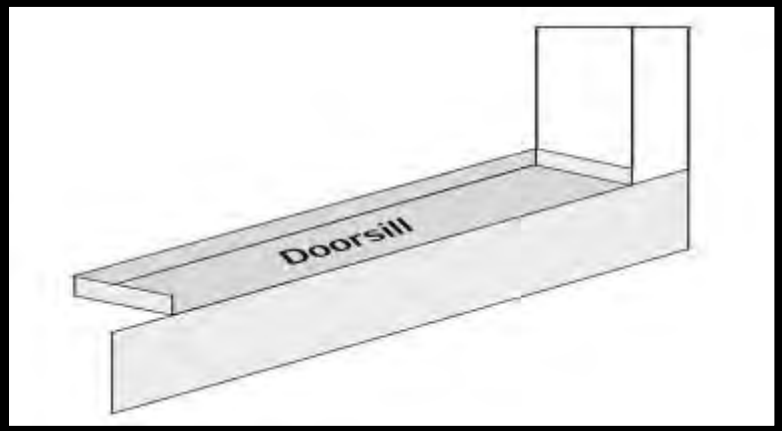
WINDOW FLASHING PROBLEM

WATER MANAGED CONSTRUCTION



WATER MANAGED WALLS

WINDOW/DOOR PAN FLASHING



BEST PRACTICE

WINDOW FLASHING

Building Tips

STEP 1

STEP 1

STEP 2

STEP 3

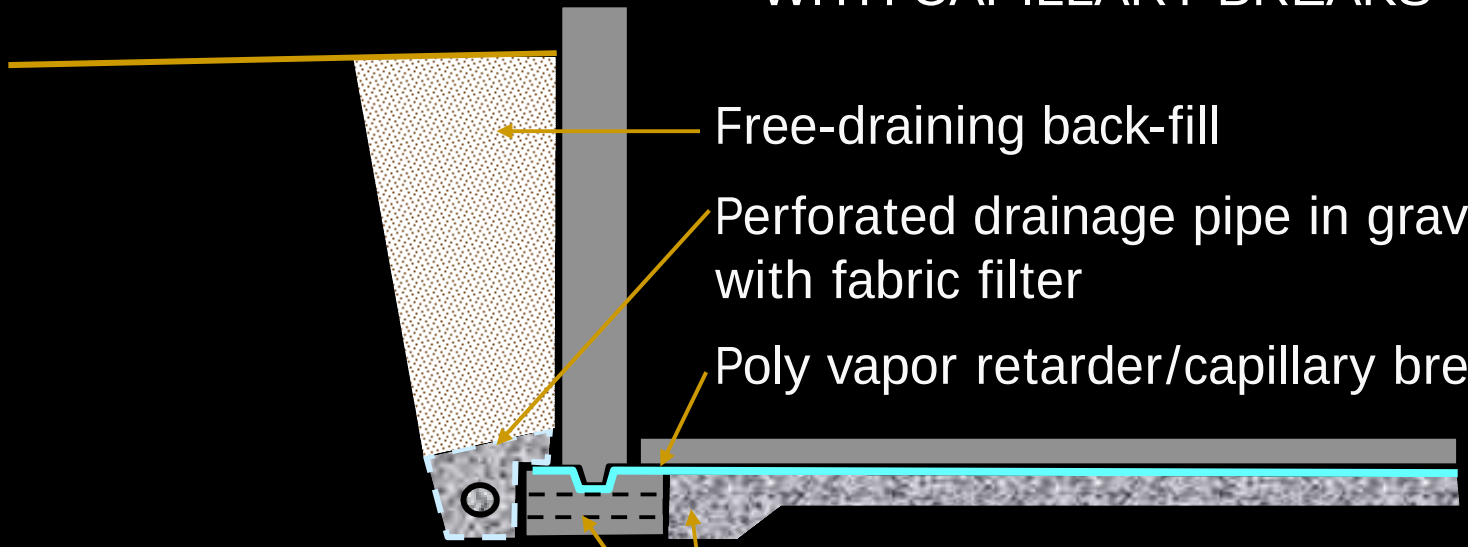
WATER MANAGED WALLS

WINDOW/DOOR PAN FLASHING

CONTROLLING MOISTURE FLOW: BULK MOISTURE

CAPILLARY BREAKS, FABRIC FILTER

FOUNDATION DRAINAGE SYSTEM WITH CAPILLARY BREAKS



Free-draining back-fill

Perforated drainage pipe in gravel with fabric filter

Poly vapor retarder/capillary break

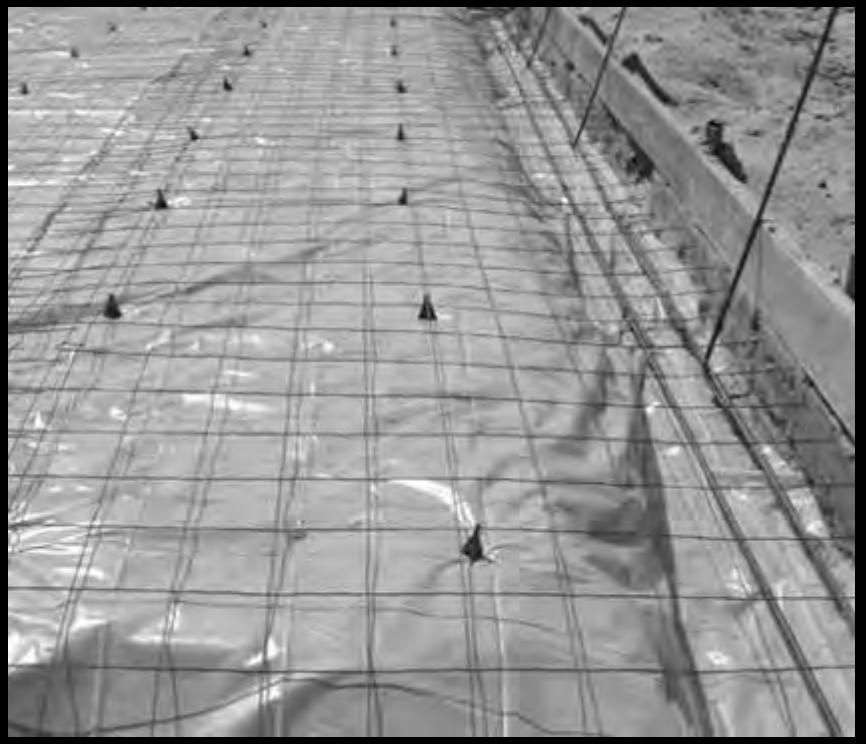
Course gravel granular drainage

Pipe connection to granular drainage

CONTROLLING MOISTURE FLOW: BULK MOISTURE

CAPILLARY BREAKS

UNVENTED CRAWLSPACE



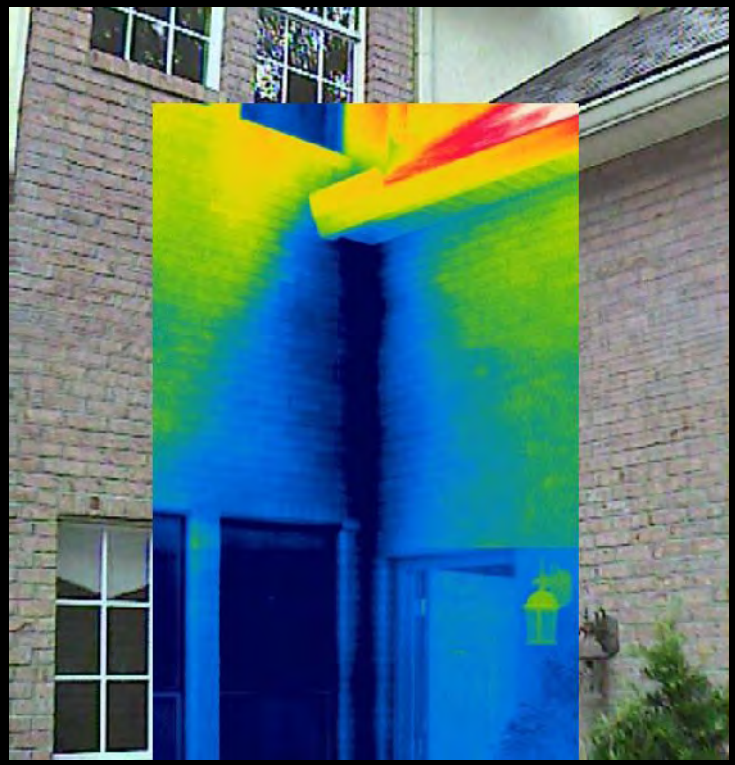
POLY UNDER SLAB
VAPOR AND RADON BARRIER

Water Management System Value Proposition

Better protection for largest investment

Lower maintenance

Healthier home



COMPLETE SYSTEMS:
ARE THEY BETTER FOR BUSINESS?

Thermal Enclosure System:
- Air Leakage
- Insulation R-Value
- Insulation Installation
- Air Barriers
- Thermal Bridging
- High-Perf. Windows

HVAC System Quality Installation:
- Efficient Equipment
- Right-Sizing
- Air Distribution
- Refrigerant Charge
- Duct Installation
- Pressure Balancing
- Ventilation
- Filtration

Water Management System:
- Roof Membranes
- Flashing
- WRB's
- Fabric Filters
- Capillary Breaks
- Drainage Layer

Answer...

Yes...

if making 90% of competition obsolete is good for business...

ENERGY STAR 30-YR. WARRANTY

Healthy Air Warranty

- Lead-Free*
- Asbestos-Free*
- Particulates Filtered to 3 Microns*
- Mold-Free*
- Combustion Gas-Free
- 150,000 CF per Day Fresh/Filtered Air*
- VOC-Free*
- Formaldehyde-Free*
- Pest-Free*
- Radon-Free*

Affordable Comfort Warranty

- $60/Month Average Heating/Cooling Bill*
- Even Room-by-Room Temperatures*
- No Outdoor Drafts*
- Outside Noise Reduction*
- No Excessive Humidity*

Durability Warranty

- No Moisture Damage to Structure*
- Dry Basements/ Construction*
- No Thermal Defects*
- 90% UV Sunlight Blocked
- No Window Condensation*
- No Termite Damage to Structure*

ENERGY STAR Qualified Homes V.3

Your home has been constructed to U.S. EPA's latest strict guidelines for energy efficiency including these building science features:

Thermal Enclosure

- Code or Better Insulation R-Value
- RESNET Grade 1 Insulation Installation
- Air-Tight Construction
- Comprehensive Air Barrier Assemblies
- Reduced Thermal Bridging
- High-Performance Windows

HVAC System

- Efficient Heating and Cooling Equipment
- Engineered Sizing of Equipment and Ducts
- Air-Tight Ducts
- Verified Proper Duct Installation
- Verified Proper Refrigerant Charge
- Whole-House Ventilation
- Spot Ventilation
- MERV 6 Filter

Water Protection

- Heavy Membranes at Valleys and Eaves
- Complete Roof Flashing Details
- Complete Wall Drainage Plane
- Pan Flashing at all Doors and Windows
- Fabric Filter at Foundation Drain
- Capillary Break Under Foundation

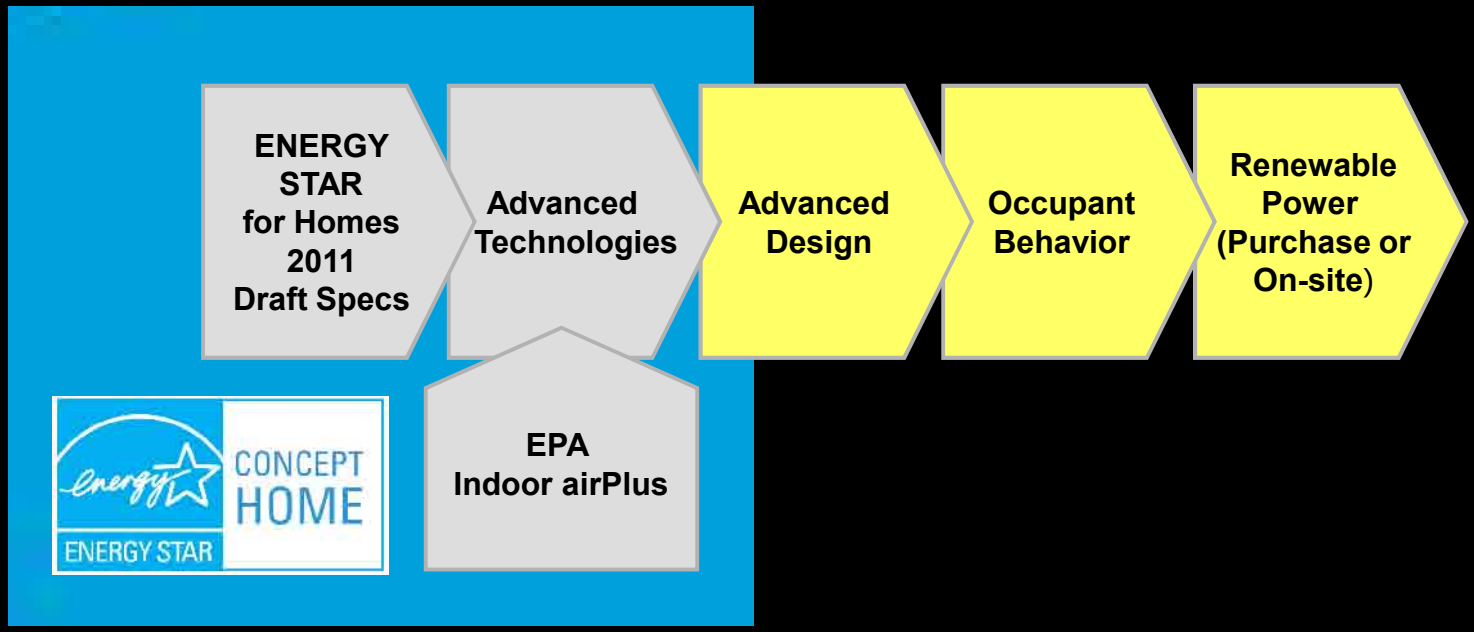
ENERGY STAR Qualified Homes 2011 Specification:

Where Go From Here?

Where to Go From Here?

	Control Air Flow	Control Thermal Flow	Control Moisture Flow Vapor	Control Moisture Flow Bulk	Efficient Equipment	3rd Party Verification
1996 V.1	Air Sealing	Air Sealing	Air Sealing		Efficient HVAC	Inspect Features
	Tight Ducts	Tight Ducts	Tight Ducts			Test Infiltration
		Insulation R-Value				
		Low-E Windows				Test Duct Leakage
2006 V.2	Air Barriers	Air Barriers	Air Barriers		Efficient WH System	Thermal Bypass Chk
		Insulation Alignment	Right-Sizing		Efficient Lgtg./Appl.	
2011 V.3	Pressure Balancing	Insulation Installation	Ventilation	Water Man. Construction	HVAC Quality Inst.	Thermal Enclos. Chk
		Min.Thermal Bridging	Dehumid. in Hot/Humid			HVAC Sys. QI Chk
						Water Man. System Chk

PATH TO NO/LOW CARBON

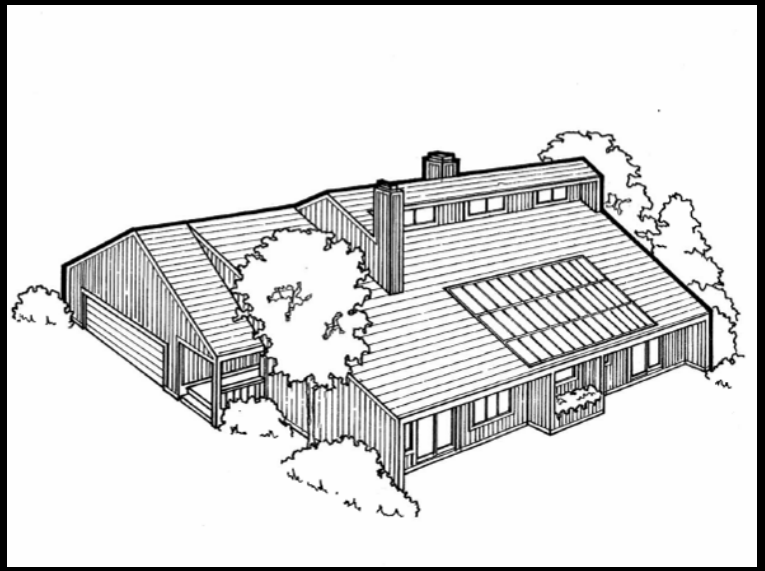


LOW/NO CARBON HOME BUSINESS CASE

Net-Zero Ready

~30% - 50% Less

- Square Feet with 100% Function
- Cooling/Heating Loads
- Framing
- Ducts
- Plumbing/Wiring
- HVAC Equipment
- Waste
- Construction Time



~70% Less Call-Backs

2011 SPEC Milestones

- Issue New Label
- Field Guides
- Nationwide Training
- New QA Requirements Builder and Rater
- Link with new RESNET QA Protocol
- Appraisal, Mortgage, Insurance Letter

ENERGY STAR QUALIFIED HOMES
2011 SPEC/CONCEPT HOME SUMMARY

- Takes Housing to Next Level
- Used/Min. Code Homes Can't Compete…

  If Builders Back Up and Sell Value
- Please Joins Us Working with the Nation's Home Builders

HOW TO GET MORE INFORMATION

On the Web at:

http://www.energystar.gov/homes