Uniform Dwelling Code

2017 Updates

SPS 322

ENERGY CONSERVATION STANDARDS

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UDC Energy Conservation Code Summary

- 2016 Code Change to 2009 IECC
- Plan Review and Permit Issuance Process
- Rough Inspection

SPS 322.01 Scope of Code

SPS 322.01 Scope. (1) This chapter applies to all one– and 2–family dwellings covered by this code that use any amount of non–renewable energy for heat generation.

(2) The equipment efficiency standards in this chapter apply to all one– and 2–family dwellings covered by this code that use the respective equipment.

(3) (a) The vapor retarder requirements under s. SPS 322.38 and the moisture control and ventilation requirements under s. SPS 322.39 apply to any dwelling with insulation installed, whether or not the insulation is required under this code.

(b) The vapor retarder requirements under s. SPS 322.38 do not apply to an unheated space, such as an attached, unheated garage.

Jan 1, 2016 Code Change How it Affected RESCheck

- **New Code and RESCheck Applications**

- **Code Compliance**
  - **Heat loss calculations**
  - **Equipment sizing**

What CHANGED: SPS 322 Effective 1-1-2016

Chapter SPS 322

ENERGY CONSERVATION

Subchapter I — Scope and Application
SPS 322.01 Scope.
SPS 322.02 Application.

Subchapter II — Definitions
SPS 322.10 Definitions.

Subchapter III — Insulation Materials and Installation
SPS 322.20 Basic requirements.
SPS 322.21 Protection of insulation.

Subchapter IV — Dwelling Thermal Envelope
SPS 322.30 General design requirements.
SPS 322.31 Prescriptive insulation and fenestration criteria.
SPS 322.32 Specific insulation requirements.
SPS 322.33 Slab floors.
SPS 322.34 Crawl spaces.
SPS 322.35 Thermally isolated sunrooms.
SPS 322.36 Fenestration.
SPS 322.37 Air leakage.

Note: New Testing Options and Requirements

SPS 322.38 Vapor retarders.
SPS 322.39 Ventilation and moisture control.

Subchapter V — Systems
SPS 322.40 Indoor temperatures and equipment sizing.
SPS 322.41 Temperature control.
SPS 322.42 Duct systems.
SPS 322.43 Duct and plenum sealing.
SPS 322.44 Pipe insulation.
SPS 322.45 Air conditioner and heat pump efficiencies.
SPS 322.46 Replacement furnace and boiler efficiencies.
SPS 322.47 Equipment requirements.
SPS 322.48 Indoor Pools.
SPS 322.49 Lighting Equipment.

Subchapter VI — Simulated Performance Alternative
SPS 322.50 General.
SPS 322.51 Performance–based compliance.
SPS 322.52 Documentation.
SPS 322.53 Calculation procedure.

Published under s. 35.93, Stats. Updated on the first day of each month. Entire code is always current. The Register date on each page is the date the chapter was last published.

Register December 2015 No. 720

Federal Registry 2014

DEPARTMENT OF ENERGY

Office of Energy Efficiency and Renewable Energy

Guidance Surrounding Department of Energy Support of Building Energy Code Compliance Software

AGENCY: Office of Energy Efficiency and Renewable Energy, Department of Energy.

ACTION: Notice of availability.

SUMMARY: The U.S. Department of Energy (DOE) Building Energy Codes Program has made available guidance on how it intends to respond to requests for modified versions of energy code compliance software.

DOE has historically created a small number of custom versions of RES*check* and COM*check* when requested by individual states which have adopted the national model codes with amendments. In recent years the number of these requests has increased to exceed available program resources. The following priorities provide internal consistency and transparency to the public regarding resources dedicated to RES*check* and COM*check*.

1. Order of Priorities for Developing and Maintaining REScheck and COMcheck Versions

(a) Current version of national model codes as published.

DOE will not provide a custom version of RES*check* or COM*check* for State or local codes that provide less energy savings than the current versions of the national model codes.

REScheck Software: Version and Function 322.31(2)(b)

Use Version **IECC 2009 Setting for Building Envelope Compliance**

Version **4.6.2.0** will provide **'Compliance report'** using the **2009 IECC** and then run the **'Loads report'** using the **WI UDC 2009**

2009 IECC Baseline for Prescriptive Table

TABLE 322.31-1

INSULATION AND FENESTRATION REQUIREMENTS BY COMPONENT[a]

Zone	Fenestration U-Factor	Skylight U-Factor	Ceiling R-Value	Wood Frame Wall R-Value	Mass Wall R-Value[i]	Floor R-Value	Basement Wall R-Value[b]	Crawl Space Wall R-Value[b]	Heated Slab R-Value[c]	Unheated Slab R-Value[d]
1	0.35	0.60	49[e]	20[f] or 13+5[g]	15/19	30[h]	15/19	10/13	10/15	10
2	0.35	0.60	49[e]	21[f]	19/21	38[h]	15/19	10/13	10/15	10

[a] R-values are minimums. U-factors are maximums.

[b] "15/19" means R-15 continuous insulated sheathing on the interior or exterior of the home or R-19 cavity insulation at the interior of the basement wall. "15/19" shall be permitted to be met with R-13 cavity insulation on the interior of the basement wall plus R-5 continuous insulated sheathing on the interior or exterior of the home. "10/13" means R-10 continuous insulated sheathing on the interior or exterior of the home or R-13 cavity insulation at the interior of the basement wall.

[c] The first R-value applies under the entire slab, regardless of depth below grade. The second R-value applies to the slab edge where the bottom of the slab is less than 12 inches below adjacent grade. Slab edge insulation shall extend downward from the top of the slab for a minimum of 48 inches or downward to at least the bottom of the slab and then horizontally to the interior or exterior for a minimum total distance of 48 inches. Also, see s. SPS 321.16 for protection against frost for slabs with supports less that 4 feet below grade.

Don't Forget the Footnotes

U-Factor and Total UA (RES*check* Approach)

322.02 gives options

- **U-factor Alternative**
  - Similar to Prescriptive but uses U-factors instead of R-values
  - Allows for innovative or less common construction

    Techniques such as structural insulated panels or log walls

- **Total UA Alternative**
  - Same as U-factor alternative but allows trade-offs
  - across all envelope components
  - Approach used in RES*check* software

Total UA Alternative (REScheck Approach) SPS 322.31-1

- Per Proposed Bldg
  - $U_{wall} \times A_{wall}$
  - $U_{roof} \times A_{roof}$
  - $U_{door} \times A_{door}$
  - $U_{window} \times A_{window}$
  - $U_{skylight} \times A_{skylight}$
  - Etc.

Per Table 322.31-1

- $U_{wall} \times A_{wall}$
- $U_{roof} \times A_{roof}$
- $U_{door} \times A_{door}$
- $U_{window} \times A_{window}$
- $U_{skylight} \times A_{skylight}$
- Etc.

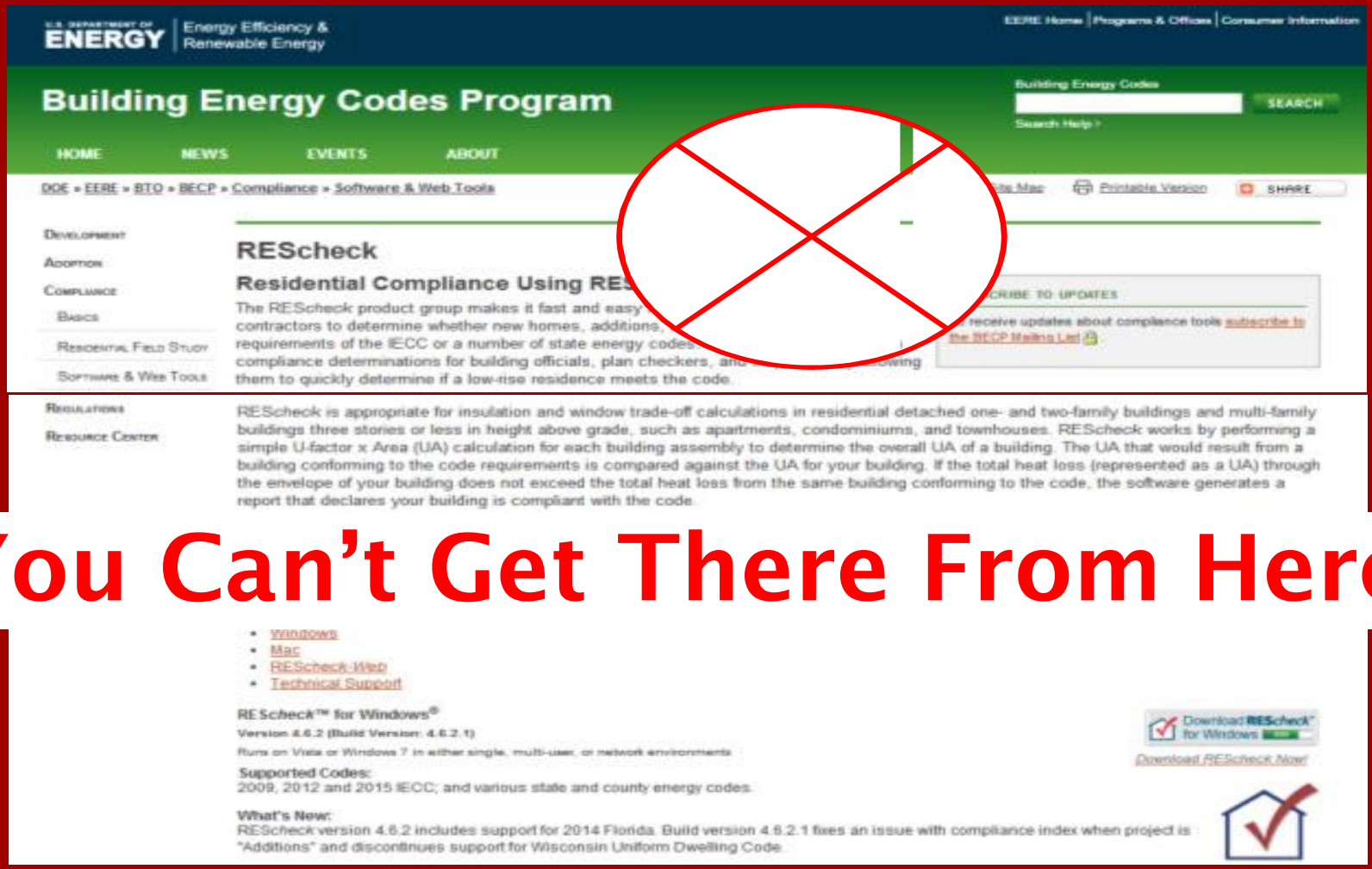
Total $U_{Proposed} \times A_{Proposed} \leq$ Total $U_{Allowed} \times A_{Proposed}$

Energy Conservation Basics – Heat Loss Calculations

Heat flux (Q) is the rate of heat energy transfer through a given surface per unit time.

- **Q (Heat Flux) = U*A* ΔT**
  - **Q: Conduction Heat Loss (Btu/Hr)**
  - **U: Heat Transfer Coefficient or "U-Value" (Btu/Hr/ft^2/°F)**
  - **A: Area (Ft^2)**
  - **ΔT: Temperature Difference (°F)**
- **See SPS 322.31 for minimum envelope requirements.**

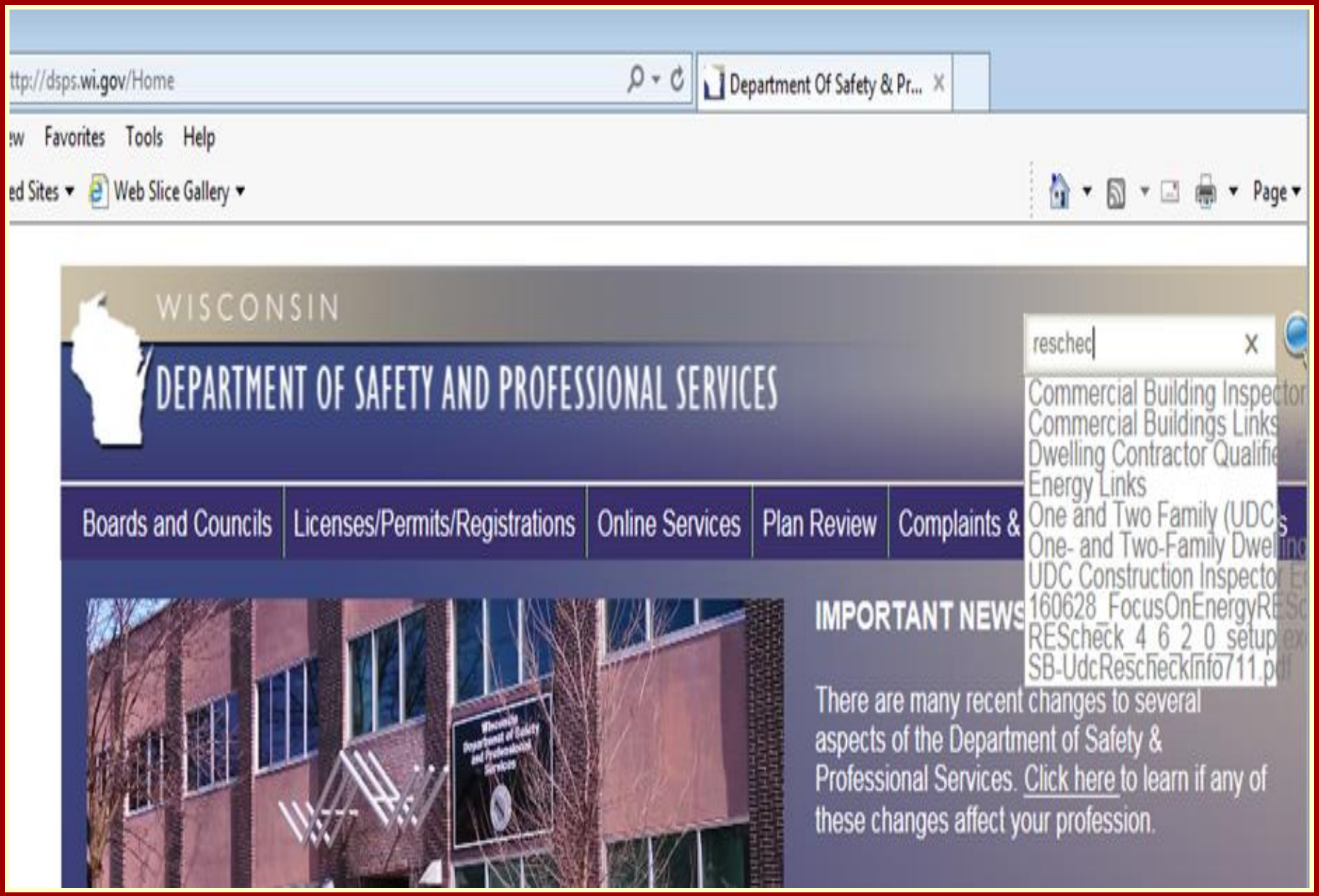
Do NOT go to the DOE website for Download!



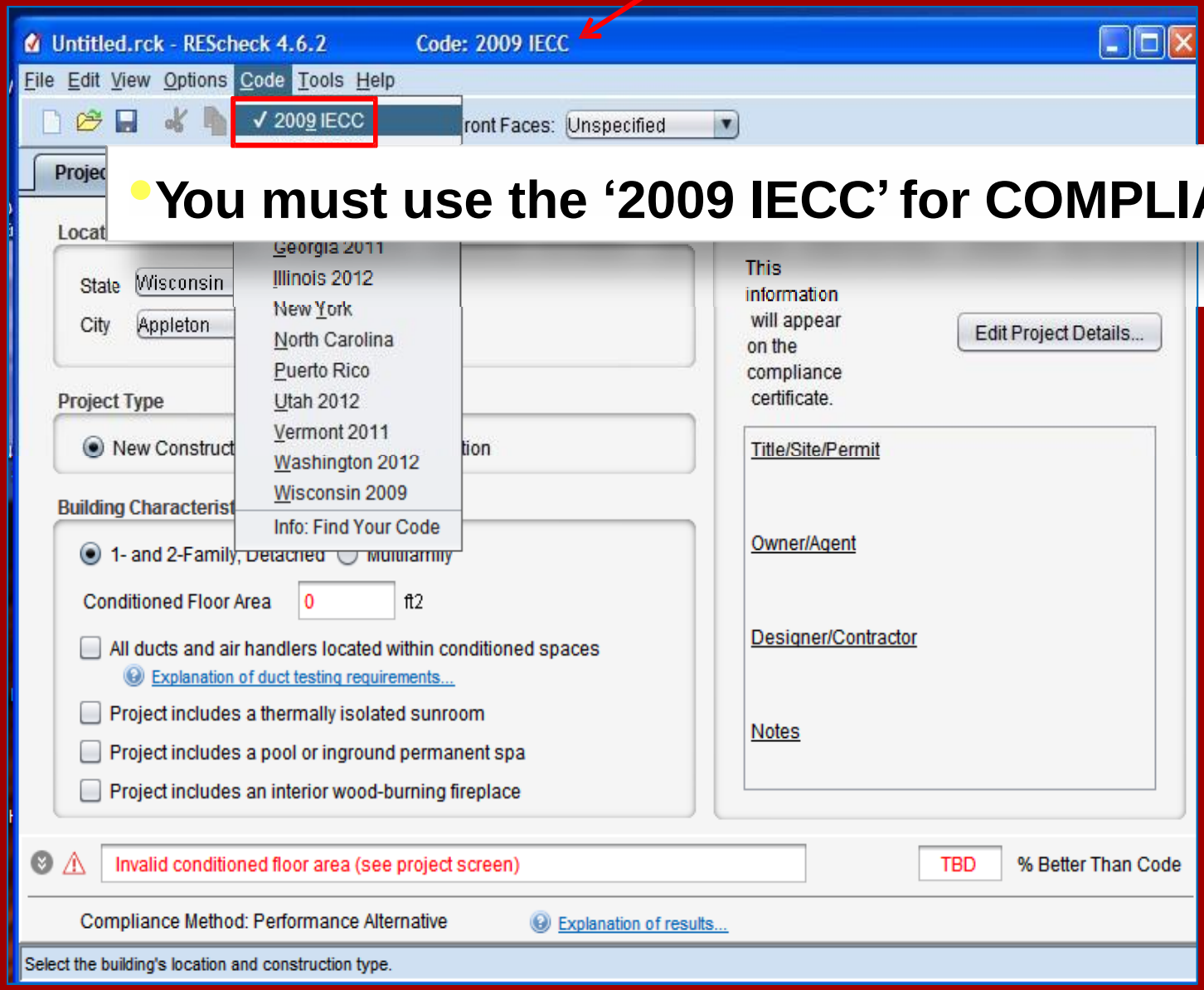
You Can't Get There From Here

What's New:
RES*check* version 4.6.2 includes support for 2014 Florida. Build version 4.6.2.1 fixes an issue with compliance index when project is "Additions" and discontinues support for Wisconsin Uniform Dwelling Code.

BUT…. You Can Get There From Here

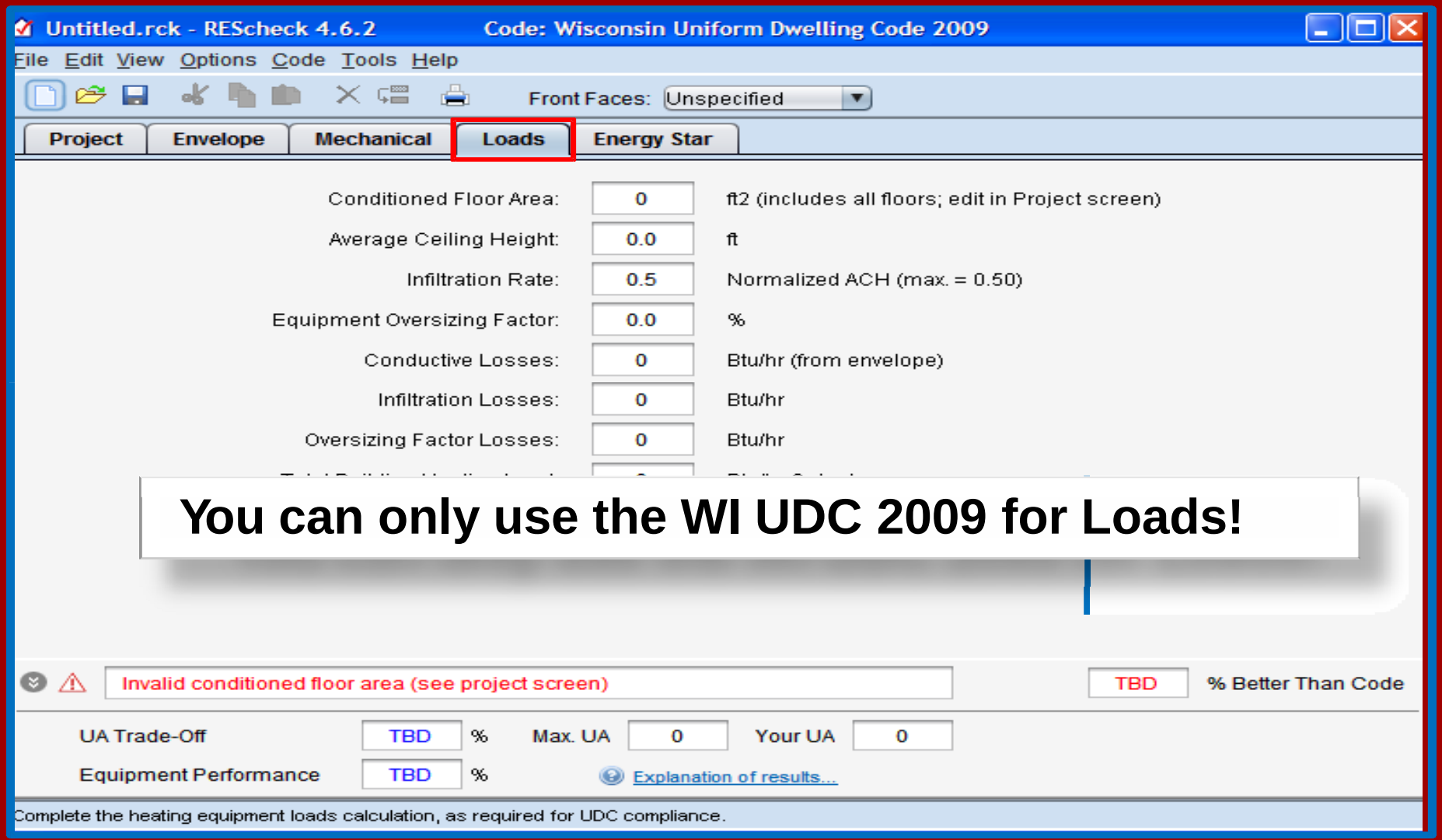


COMPLIANCE: use the 2009 IECC



- **You must use the '2009 IECC' for COMPLIANCE!**

Loads tab with WI UDC 2009



Stand Alone Load Calculator

Based on Calculated UA Value

How To Use the Heating Equipment Sizing Summary

Heating Equipment Sizing Summary		
General Information		
Project Name/Address	Test House	
County	Marathon	
Design Temperature	-20	Degrees (F)
"Your UA" from ResCheck	238	UA
Conditioned Floor Area	2320	SqFt
Average Wall Height	9	Ft
Infiltration Rate	0.50	ACH (typ 0.50)
Equipment Oversizing Factor	15	%
Load Summary		
Conductive Losses	21420	Btu/Hr
Infiltration Losses	16913	Btu/Hr
Oversizing Factor Losses	5750	Btu/Hr
Total Building Heating Load	44083	Btu/Hr

Enter Items in Yellow to get your total Heat Loss. Print and attach with your completed ResCheck Form

REScheck Software Version 4.6.2

Compliance Certificate

Project Test House

Energy Code:	2009 IECC
Location:	Wausau, Wisconsin
Construction Type:	Single-family
Project Type:	New Construction
Orientation:	Bldg. faces 0 deg. from North
Conditioned Floor Area:	2,320 ft2
Glazing Area	10%
Climate Zone:	6 (8427 HDD)
Permit Date:	
Permit Number:	

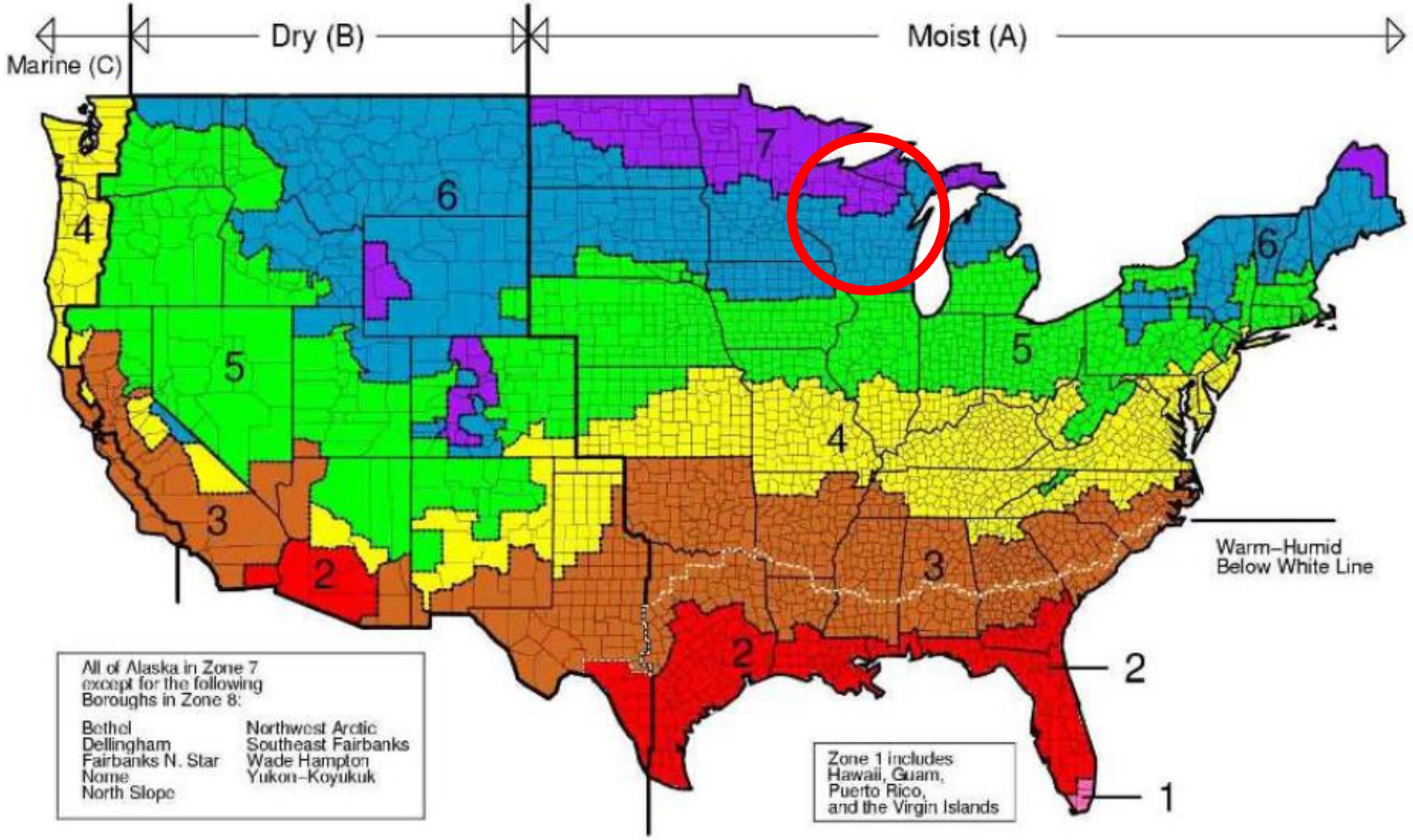
Construction Site: Owner/Agent: Designer/Contractor:

Compliance: Passes using UA trade-off

Compliance: **4.0% Better Than Code** Maximum UA: **248** Your UA: **238**

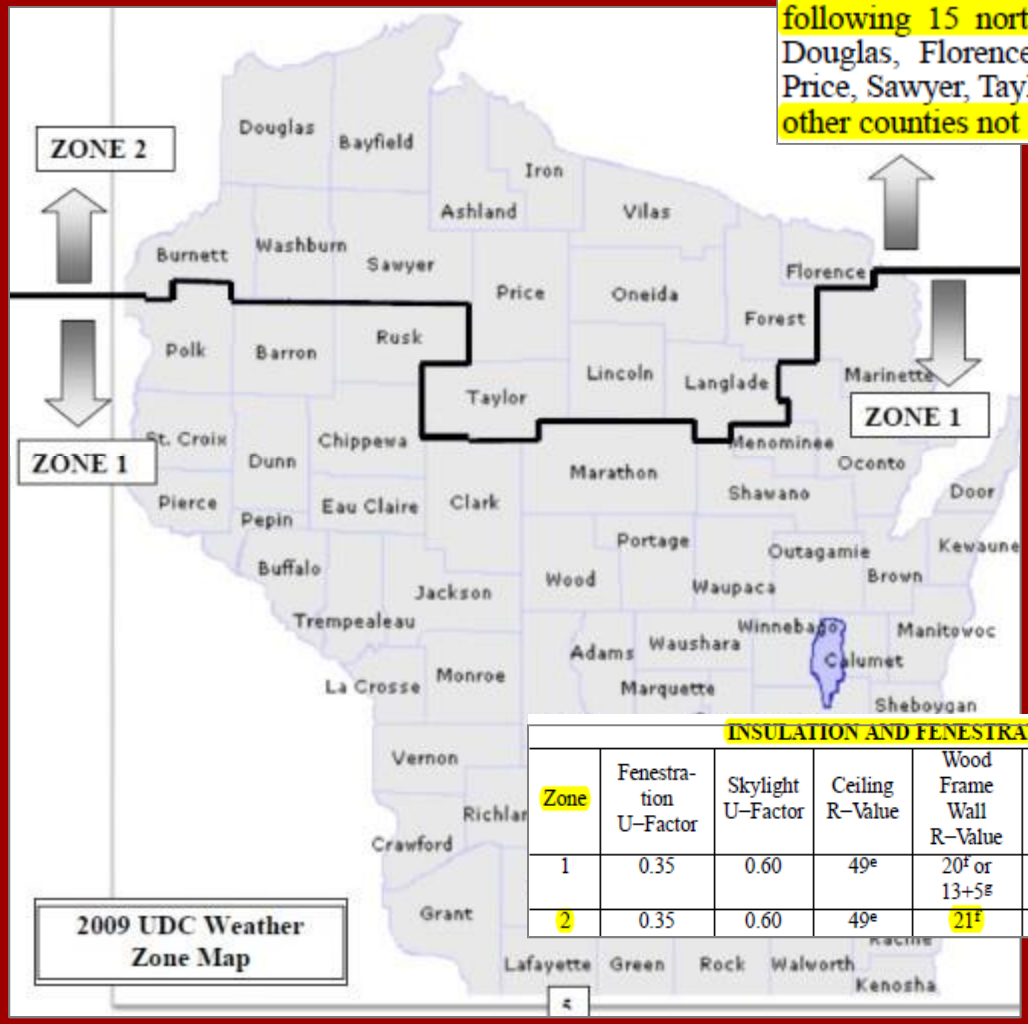
The % Better or Worse Than Code Index reflects how close to compliance the house is based on code trade-off rules.
It DOES NOT provide an estimate of energy use or cost relative to a minimum-code home.

Climate Zones—2009 IECC



UDC Weather Zone map

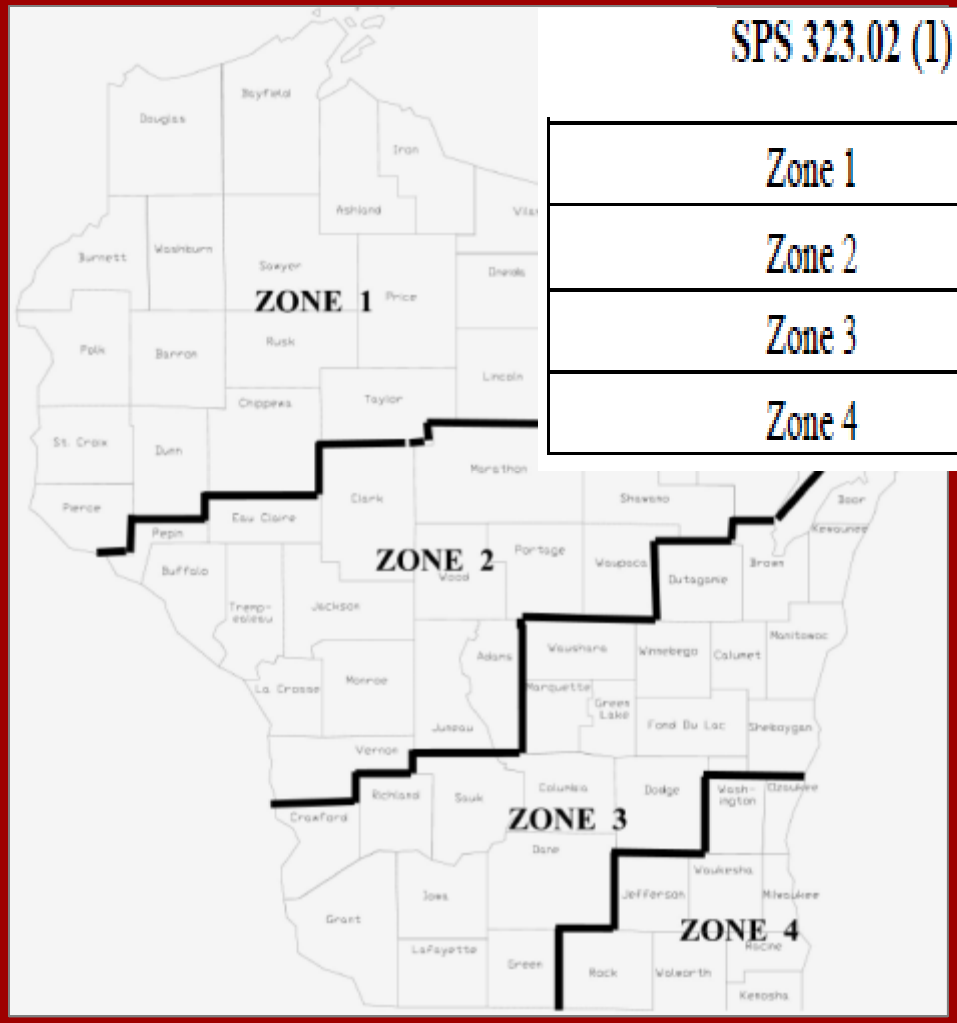
(b) In Tables 322.31−1 and 322.31−2, zone 2 consists of the following 15 northern counties: Ashland, Bayfield, Burnett, Douglas, Florence, Forest, Iron, Langlade, Lincoln, Oneida, Price, Sawyer, Taylor, Vilas and Washburn. Zone 1 consists of all other counties not included in zone 2.



INSULATION AND FENESTRATION REQUIREMENTS BY COMPONENT[a]

Zone	Fenestration U−Factor	Skylight U−Factor	Ceiling R−Value	Wood Frame Wall R−Value	Mass Wall R−Value[i]	Floor R−Value	Basement Wall R−Value[b]	Crawl Space Wall R−Value[b]	Heated Slab R−Value[c]	Unheated Slab R−Value[d]
1	0.35	0.60	49[e]	20[f] or 13+5[g]	15/19	30[h]	15/19	10/13	10/15	10
2	0.35	0.60	49[e]	21[f]	19/21	38[h]	15/19	10/13	10/15	10

UDC 'Design Zones' 1-4



SPS 323.02 (1) Outdoor Design Temperatures

Zone 1	25° below zero F
Zone 2	20° below zero F
Zone 3	15° below zero F
Zone 4	10° below zero F

REScheck Quick Reference Guide

Plan review for energy code compliance can be conducted quickly and efficiently. The U.S. Department of Energy's RES*check* Compliance Software is designed to create simplified compliance certificates that can be easily reviewed by enforcement personnel. This Quick Reference Guide will guide you, step-by-step, through a typical plan review process. There are three basic steps for conducting a building energy code plan review:

Step 1:	Verify the documentation has been correctly prepared.
Step 2:	Verify the levels of efficiency shown on the plans meet or exceed that shown in the documentation.
Step 3:	Verify all of the information to conduct a field inspection is included in the plans or documentation for the inspector to use on site.

Items to Check

REScheck Software Version 4.6.2

Compliance Certificate

Project North Meadows Development

Energy Code:	**2009 IECC**
Location:	**Abbotsford, Wisconsin**
Construction Type:	**Single-family**
Project Type:	**New Construction**
Conditioned Floor Area:	**2,000 ft2**
Glazing Area	**15%**
Climate Zone:	**6 (9125 HDD)**
Permit Date:	**3/17/00**
Permit Number:	

Construction Site: Owner/Agent: Designer/Contractor:

Compliance: Fails using UA trade-off

Compliance: **6.7% Worse Than Code** Maximum UA: **326** Your UA: **348**

The % Better or Worse Than Code Index reflects how close to compliance the house is based on code trade-off values. It DOES NOT provide an estimate of energy use or cost relative to a minimum-code home.

Envelope Assemblies

Assembly	Gross Area or Perimeter	Cavity R-Value	Cont. R-Value	U-Factor	UA
Ceiling 1: Flat Ceiling or Scissor Truss	739	38.0	0.0	0.030	22
Ceiling 2: Flat Ceiling or Scissor Truss	592	30.0	0.0	0.035	21
Wall 1: Wood Frame, 16" o.c.	1,647	13.0	6.0	0.053	71
Door 1: Glass	84			0.310	26
Window 1: Vinyl Frame, Double Pane with Low-E	204			0.320	65
Door 2: Solid	20			0.350	7
Wall 2: Wood Frame, 16" o.c.	276	13.0	0.0	0.082	21
Door 3: Solid	18			0.350	6
Floor 1: All-Wood Joist/Truss, Over Unconditioned Space	938	19.0	0.0	0.047	44
Floor 2: All-Wood Joist/Truss, Over Outside Air	32	30.0	0.0	0.033	1
Floor 3: Slab-On-Grade:Unheated Insulation depth: 2.0'	82		8.0	0.779	64

332.36 (6) Fenestration

U-Values Shown on Sticker for Doors Windows & Skylights

322.20(6)(a) A Permanent Certificate Shall be Posted on or Adjacent to the Electrical Panel

Wisconsin Energy Efficiency Certificate

Insulation Rating	R-Value	
Ceiling / Roof	49.00	
Wall	19.00	
Floor / Foundation	10.00	
Ductwork (unconditioned spaces):	_____	
Glass & Door Rating	**U-Factor**	**SHGC**
Window	0.31	0.33
Door	0.14	NA
Heating & Cooling Equipment	**Efficiency**	
Forced Hot Air Furnace	90 AFUE	
Water Heater:_____	_____	

Name: _____ Date: _____

Comments:

Completed by Owner, Builder, or Insulation Installer

Air Sealing and Insulation
SPS 322.37(6)

- **2 options to demonstrate compliance**
  - **When tested air leakage** is **< 7 ACH** when tested with a blower door at pressure of 33.5 psf
    Testing after rough in and installation of building envelope penetrations
  - **When items listed in Table 332.37,** applicable to the method of construction, are **field verified**.
    Inspector may request an approved party independent from the installer to inspect the air barrier & insulation

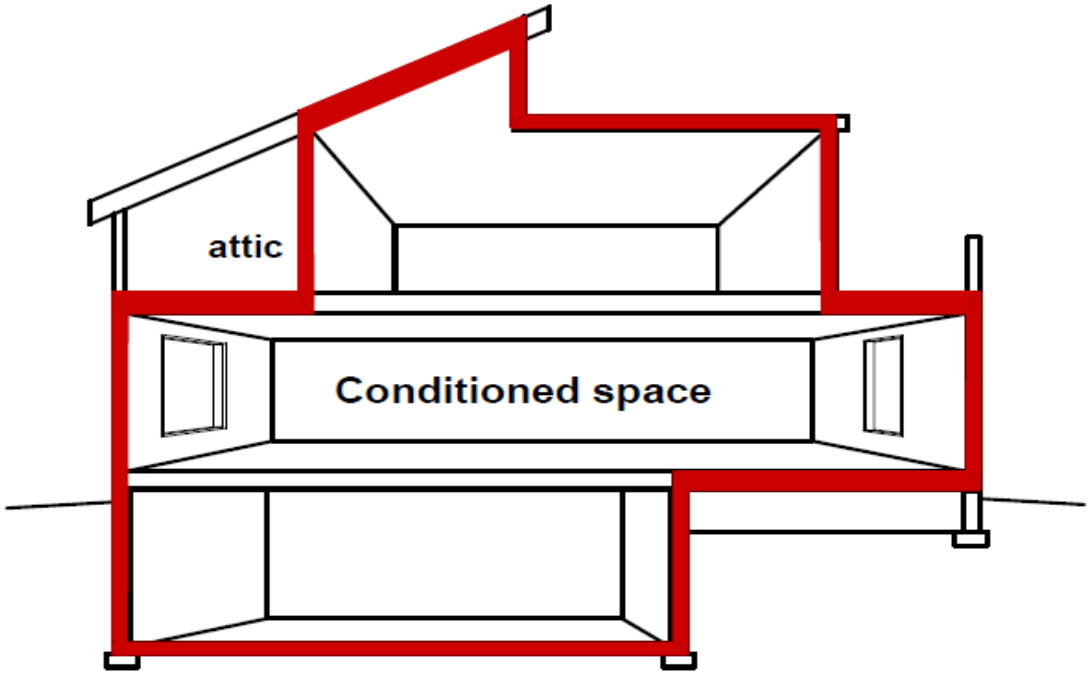
Table 332.37 Visual Inspection Criteria

Narrow cavities	Batts in narrow cavities are cut to fit, or narrow cavities are filled by sprayed/blown insulation.
Garage separation	Air sealing is provided between the garage and conditioned spaces.
Recessed lighting	Recessed light fixtures are air tight, IC rated, and sealed to drywall. Exception–fixtures in conditioned space.
Plumbing and wiring	Insulation is placed between outside and pipes. Batt insulation is cut to fit around wiring and plumbing, or sprayed/blown insulation extends behind piping and wiring.
Shower/tub on exterior wall	Showers and tubs on exterior walls have insulation and an air barrier separating them from the exterior wall.
Electrical/phone box on exterior walls	Air barrier extends behind boxes or air sealed–type boxes are installed.
Common wall	Air barrier is installed in common wall between dwelling units.
HVAC register boots	HVAC register boots that penetrate building envelope are sealed to subfloor or drywall.
Fireplace	Fireplace walls include an air barrier.

(3) "Conditioned space" means space within the dwelling thermal envelope which is provided with heated air or surfaces to provide a heated space capable of maintaining the temperature of the space to at least 50°F at design conditions.

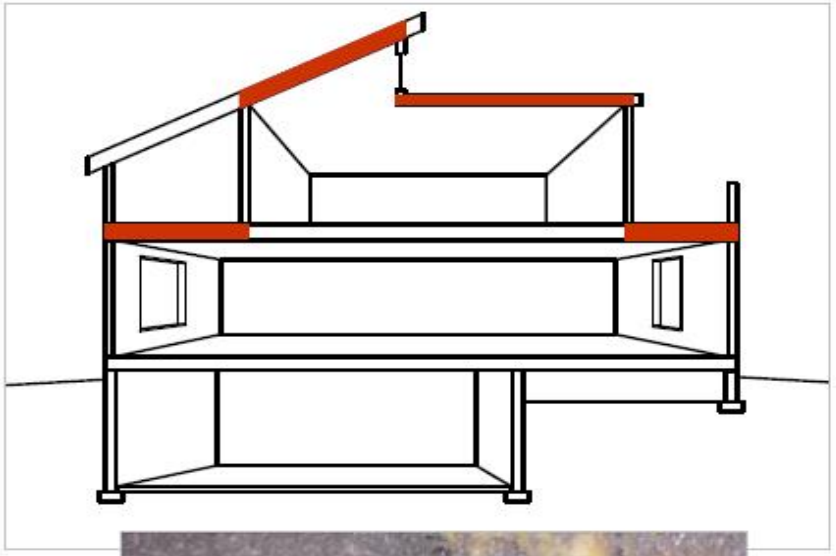
Building Envelope Specific Requirements

- Building Envelope consists of:
  - Fenestration
  - Ceilings
  - Walls
    - Above grade
    - Below grade
    - Mass walls
  - Floors
  - Slab
  - Crawl space



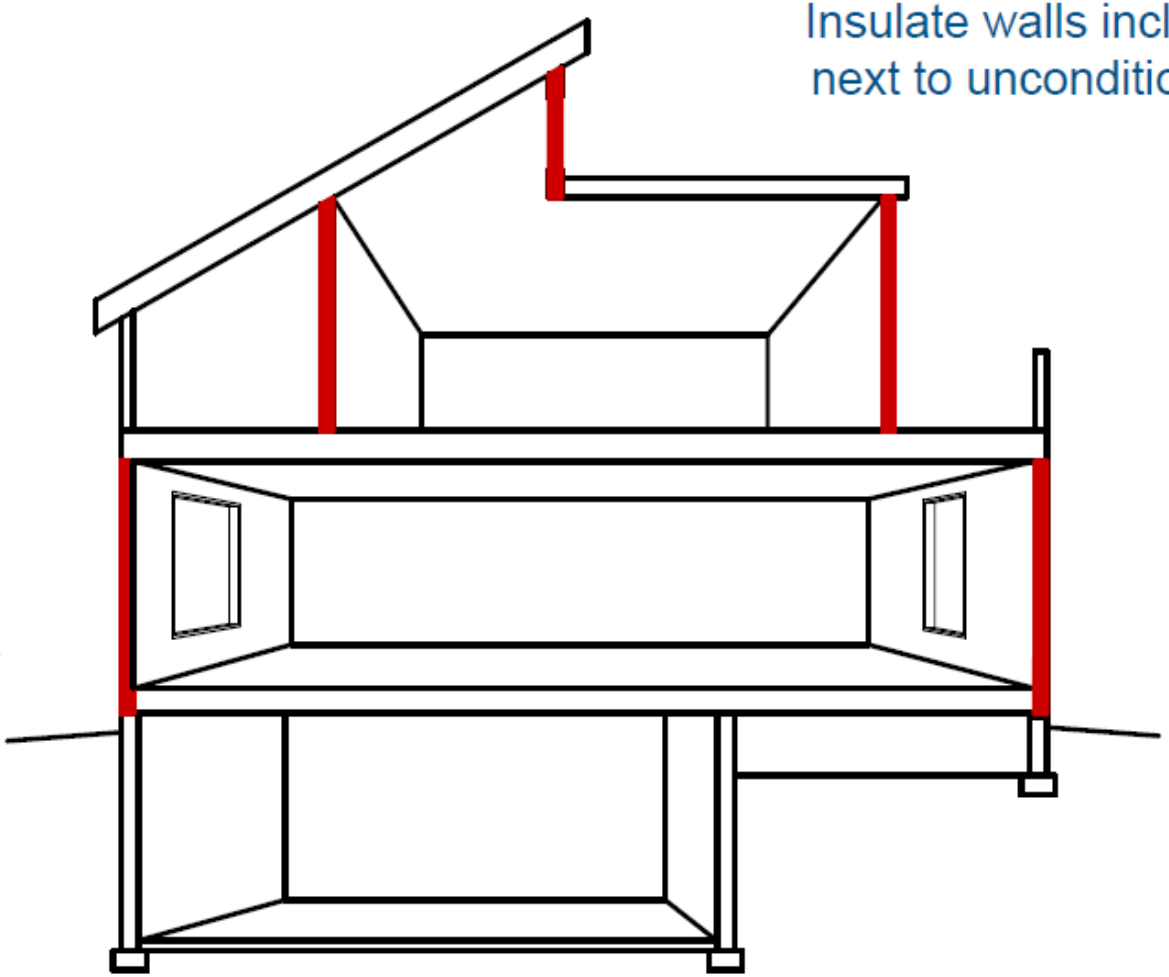
Ceilings

- Requirements based on
  - Assembly type
  - Continuous insulation
  - Insulation between framing
- Meet or exceed R-values



Above Grade Walls

Insulate walls including those next to unconditioned spaces

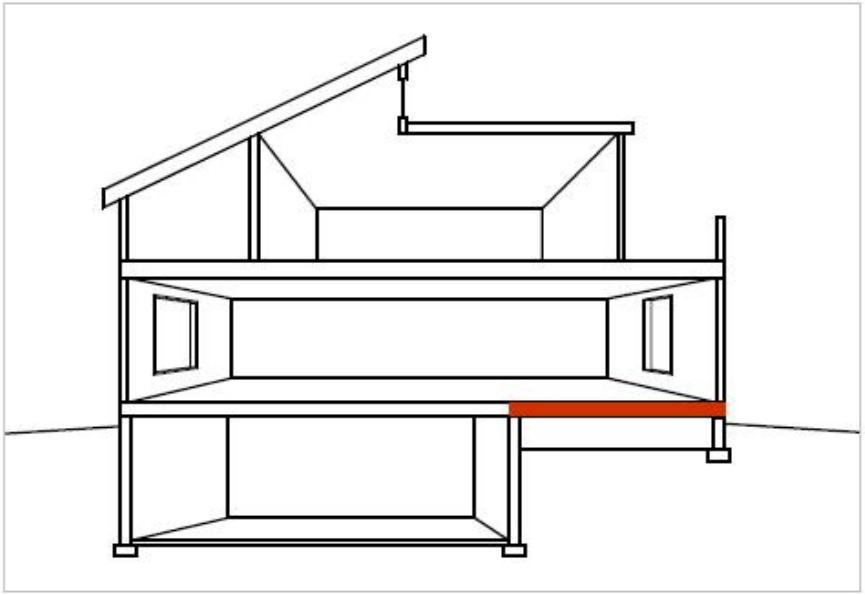


Don't forget to insulate rim joists

Floors over Unconditioned Space

- Space can be unheated basement or a crawlspace or outdoor air

Climate Zones	R-Value
1-2	13
3-4ab	19
4c-6	30*
7-8	38*



- Insulation must maintain permanent contact with underside of subfloor

*Exception:

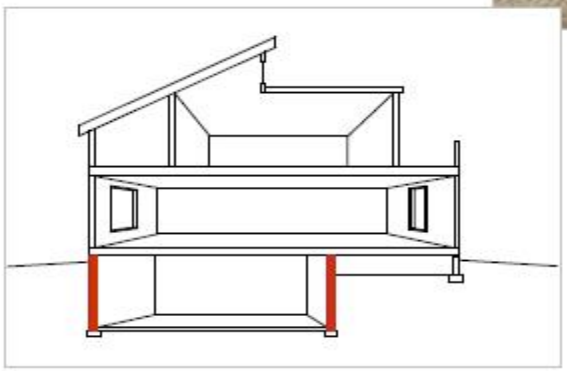
Climate Zones 4c-8
R-19 permitted if cavity completely filled

This Condition No Longer Allowed

Below-Grade Walls

- ≥ 50% below grade

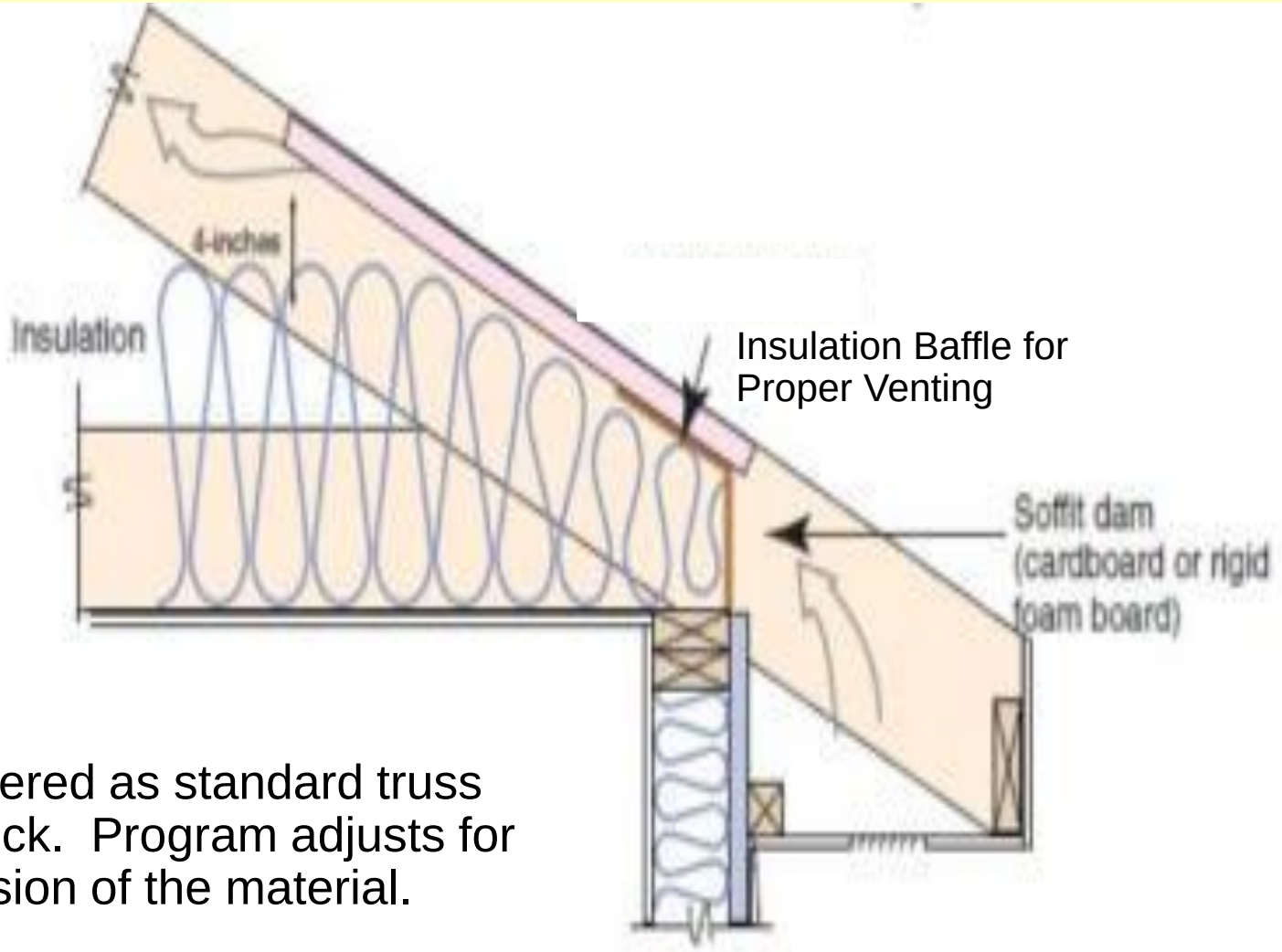
Climate Zones	R-Value
1-2	0
3	5/13
4-5	10/13
6-8	15/19



Insulated from top of basement wall down to 10 ft below grade or basement floor, whichever is less

[b] "15/19" means R−15 continuous insulated sheathing on the interior or exterior of the home or R−19 cavity insulation at the interior of the basement wall. "15/19" shall be permitted to be met with R−13 cavity insulation on the interior of the basement wall plus R−5 continuous insulated sheathing on the interior or exterior of the home. "10/13" means R−10 continuous insulated sheathing on the interior or exterior of the home or R−13 cavity insulation at the interior of the basement wall.

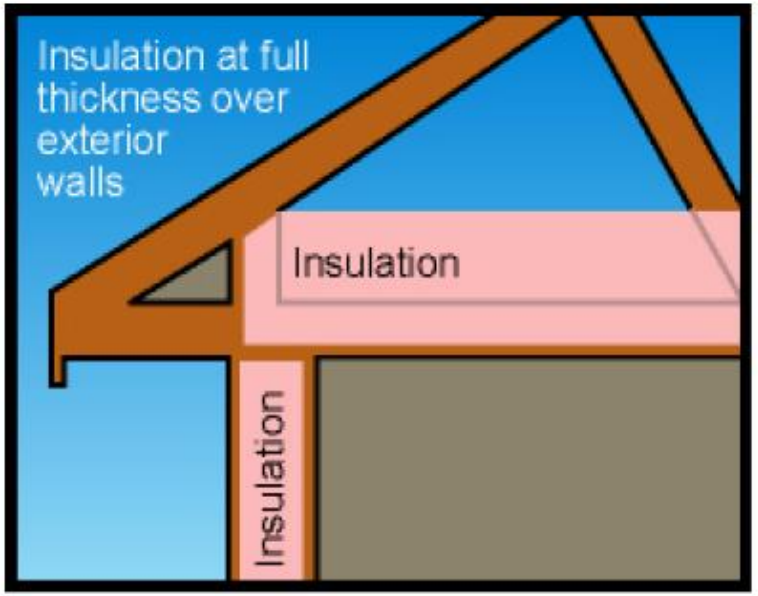
Standard Truss With Soffit Dam and Ventilation Baffle



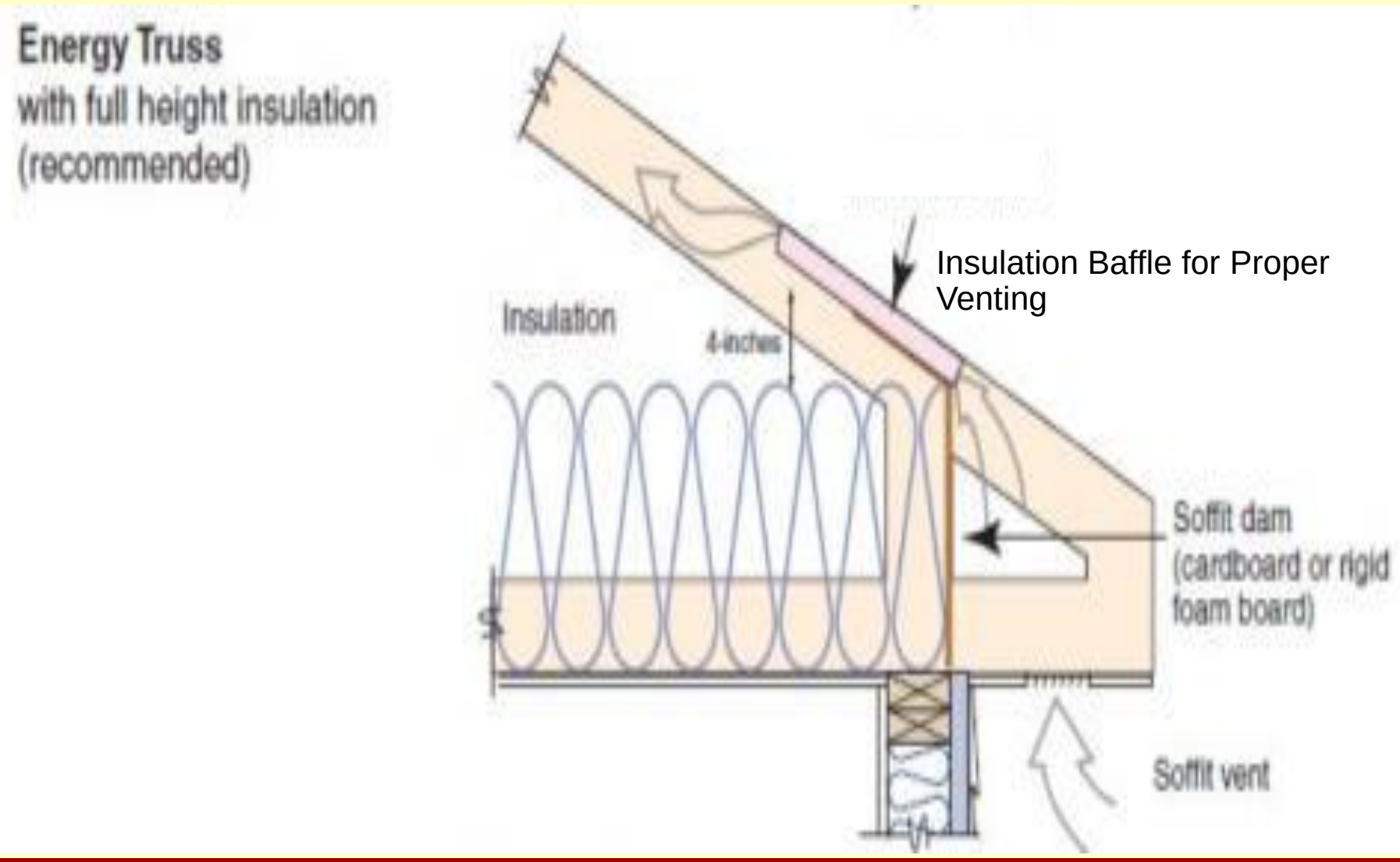
R-Values entered as standard truss into RESCheck. Program adjusts for the compression of the material.

Raised Heel Truss

- Raised Heel/Energy Truss credit if insulation is full height over exterior wall (*Prescriptive*)
  - R-30 instead of R-38 No Attic
  - R-38 instead of R-49 Attic



Energy Truss With Soffit Dam and Ventilation Baffle



Attic-Access Cover to be Insulated - Weatherstripped SPS 322.32(1)(b)

Enter R-Value in RESCheck

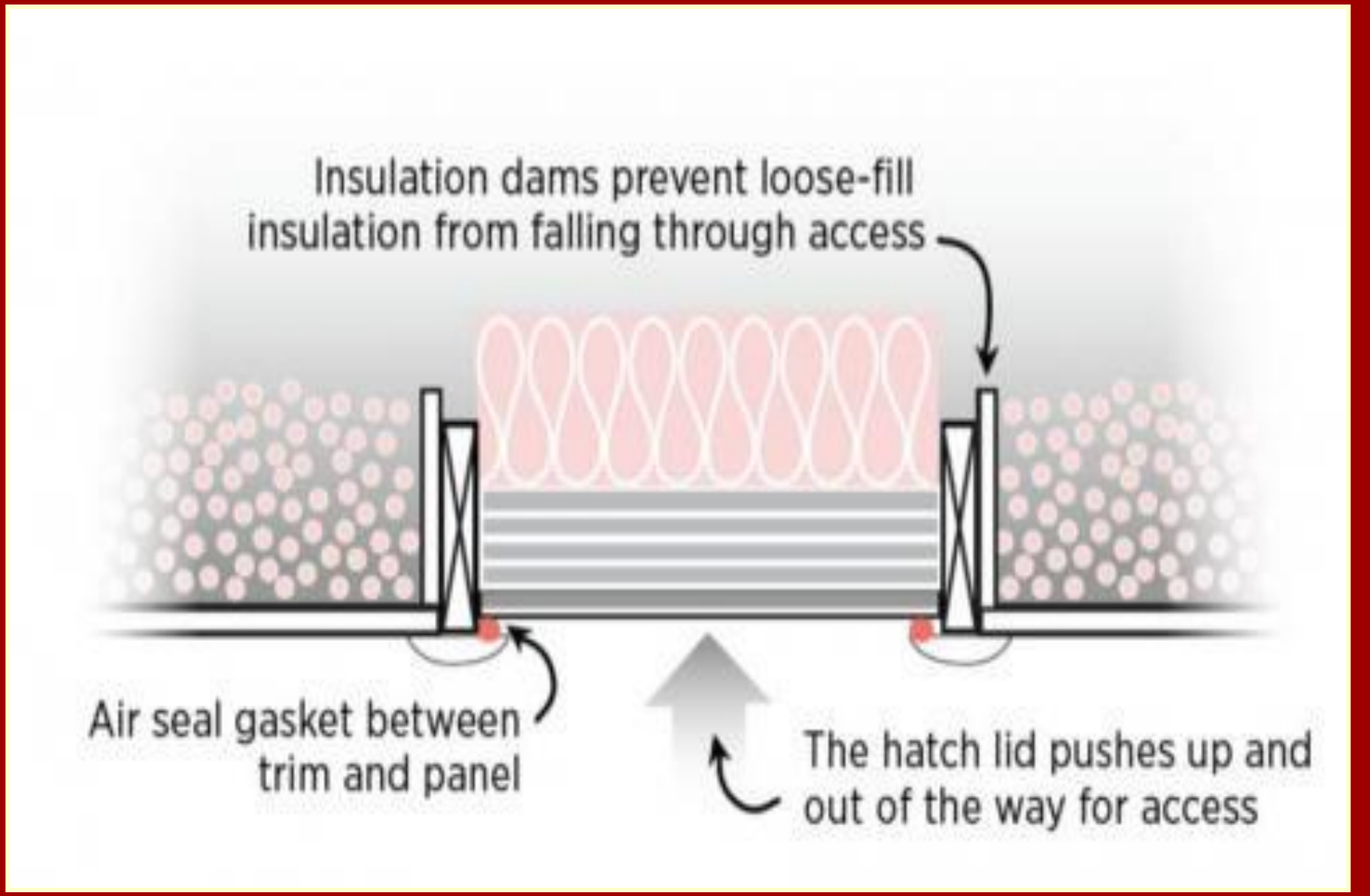
Independently From Ceiling

Use Square Footage of Hatch Perimeter

As Separate Entry

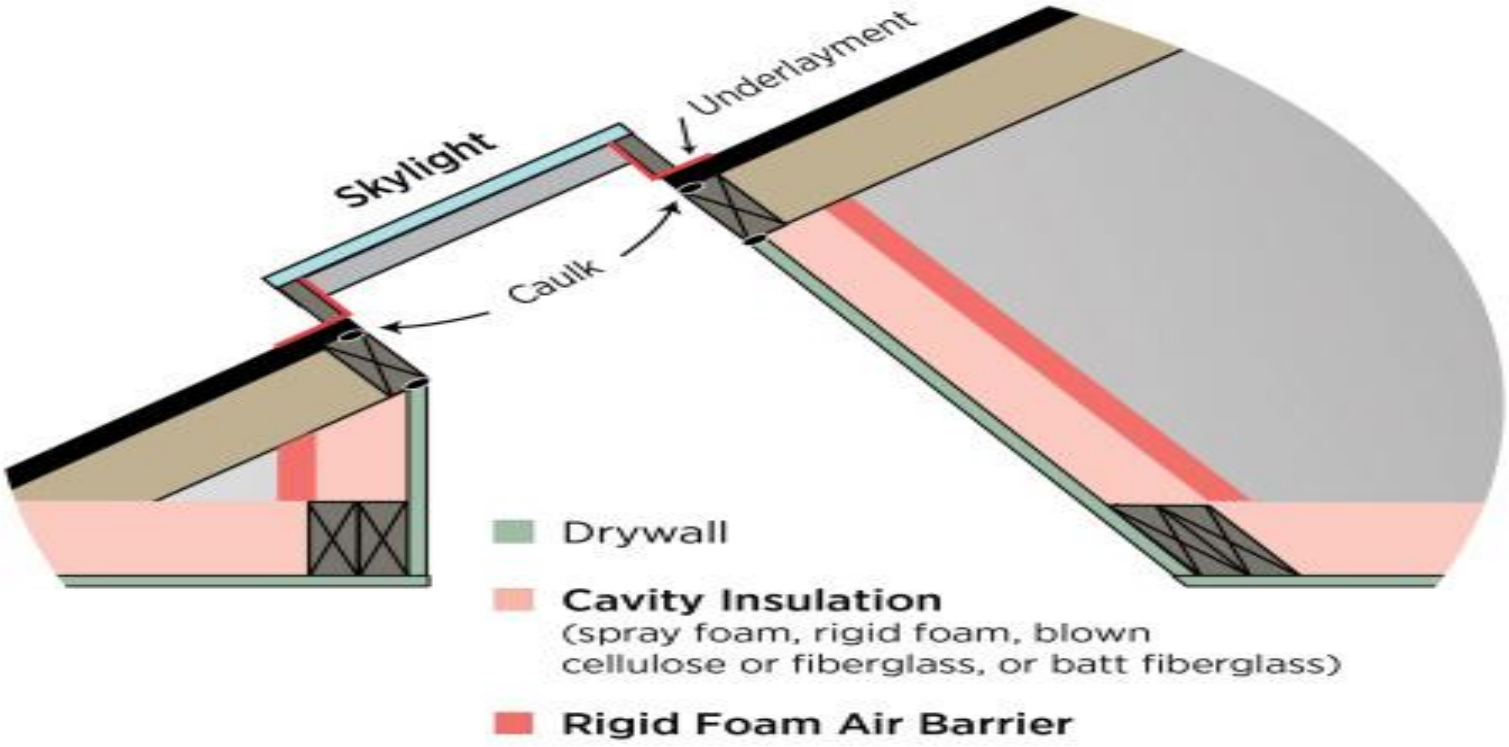
- Attic-Access Cover to be Insulated - Weatherstripped SPS 322.32(1)(b)

SPS 322.32(1)(b)


Insulation dams prevent loose-fill insulation from falling through access
Air seal gasket between trim and panel
The hatch lid pushes up and out of the way for access

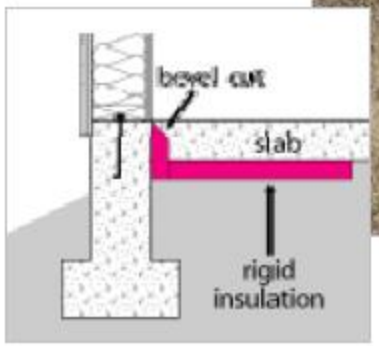
322.32(1)(b) Uninsulated Drop - Down Stair Assembly

SPS 322.32 (9)(b)
Wall Insulation



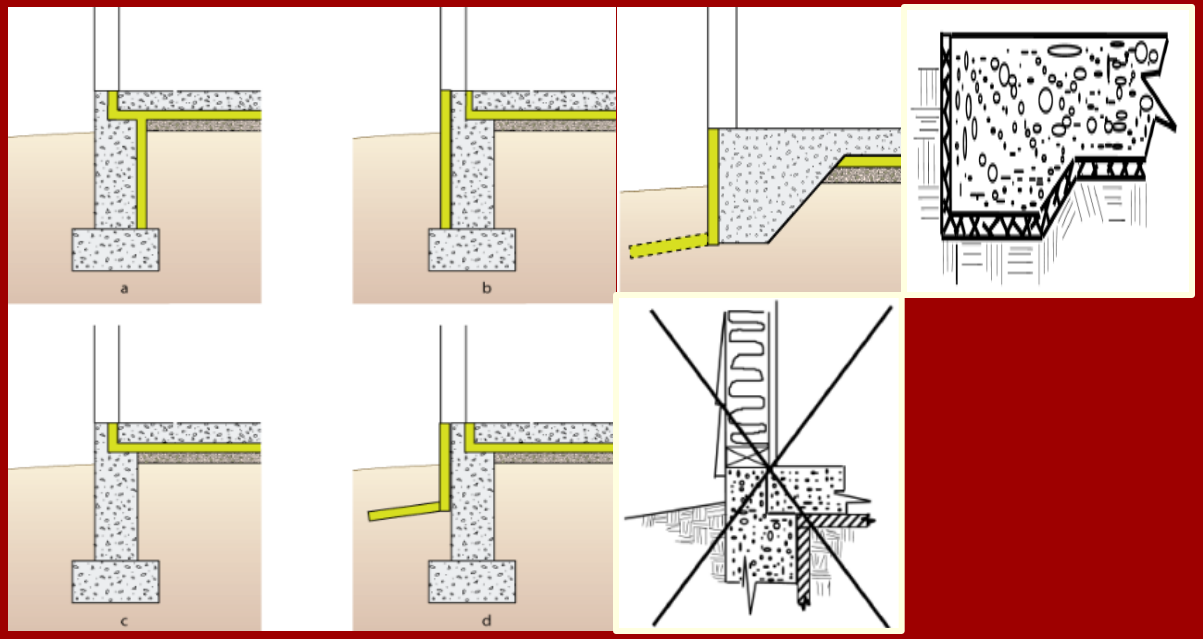
Tube skylights shall be insulated per manufacturer's recommendations

Slab Edge Insulation



Slab on Grade Insulation Req't SPS 322.33(1)(a)

- Any heated or unheated slab floor, the bottom of which is < 12" below adjacent grade, shall be provided with perimeter insulation in accordance with Table 322.31-1 or Table 322.31-4, except as provided in par. (b).



Don't Forget

SPS 321.16

Frost Protected Shallow Foundations

Slab Edge Insulation

- Slabs with a floor surface < 12 inches below grade
  - R-10 (typically 2 inches) insulation in Zones 4 and above
  - Downward from top of slab a minimum of 48" (zones 6,7, 8)
  - Insulation can be vertical or extend horizontally under the slab or out from the building (must be under 10 inches of soil)

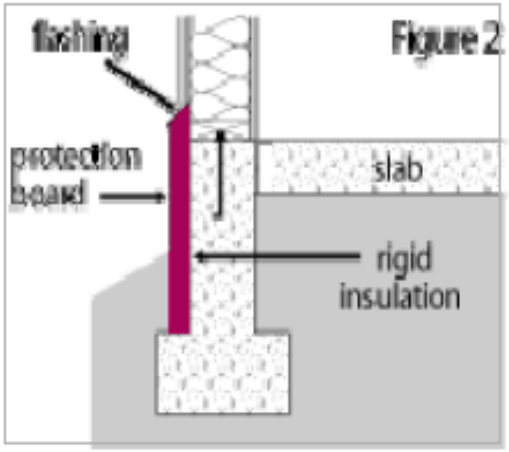


Figure 2

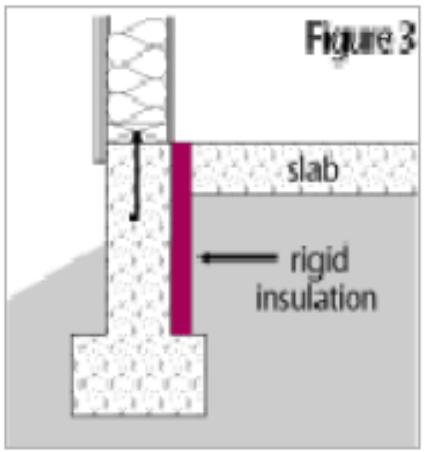


Figure 3

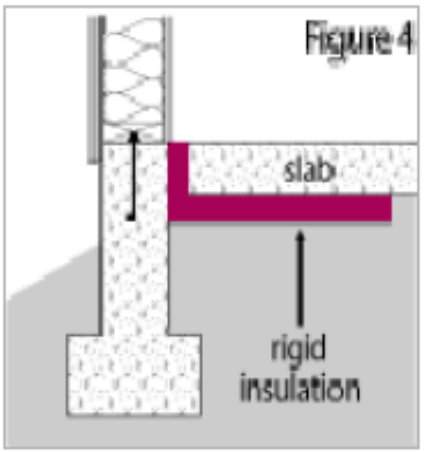


Figure 4

Foundation Insulation Continuity
SPS 322.33(3)(c) (added 2016)

- **Insulation on a foundation wall for a basement may be interrupted at the junction with a foundation wall.**

Vapor Retarder At the Foundation Wall
SPS 322.34(2)(d)

- The edges of the vapor retarder shall extend at least 6 inches up the foundation wall and shall be attached and sealed to the foundation wall or insulation.

322.38(2) Vapor Retarder required on all frame assemblies (warm in winter side)

Vapor Retarder Installation
SPS 322.38(1)(b)

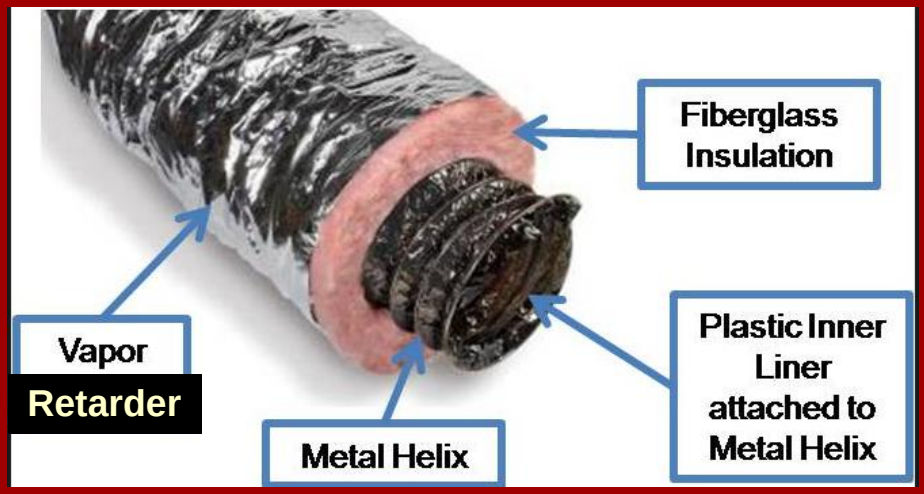
- Vapor retarder shall be continuous.
  - Except as provided in subd. 2.
- Seams that are not over a framing member shall be taped or sealed.

322.32(7) Box Sill and Rim Joists Insulated to the Required Wall R-Value

321.11(1)(c) Exempt From Thermal and Vapor Barrier Requirements

Vapor Retarder Insulation & Installation SPS 322.42 (1) & (1m)

- Heating and Cooling Supply Ducts that pass through unconditioned spaces (attics, garages) to be provided w/min. R-8 insulation.
- Cooling Supply Ducts: Exterior of the insulation shall be covered w/vapor retarder that meets the requirements in SPS 322.38(1)



Vapor Retarder Insulation & Installation SPS 322.42 (1) & (1m)

Requires Complete Coverage Top and Bottom

Vapor Retarder Insulation & Installation SPS 322.42 (1) & (1m)

Requires Complete Coverage Top and Bottom

What's All This About Duct Tightness Testing?

Duct Tightness Tests 322.43 Duct Sealing

Mandatory Requirements

Duct Systems with Joints Not Located Entirely Within the Conditioned Space

- Duct tightness shall be verified *by either* –
  - Post construction test
    - Leakage to outdoors: ≤8 cfm/per 100 ft² of conditioned floor area **or**
    - Total leakage: ≤12 cfm/per 100 ft² of conditioned floor area
      - tested at a pressure differential of 0.1 in w.g. (25Pa) across entire system, including manufacturer's air handler enclosure
    - All register boots taped or otherwise sealed

OR

  - Rough-in test
    - Total leakage ≤6 cfm/per 100 ft² of conditioned floor area
      - tested at a pressure differential of 0.1 in w.g. (25Pa) across roughed-in system, including manufacturer's air handler enclosure
      - all register boots taped or otherwise sealed
      - if air handler not installed at time of test
        - Total air leakage ≤4 cfm/per 100 ft² **(If furnace not yet installed)**

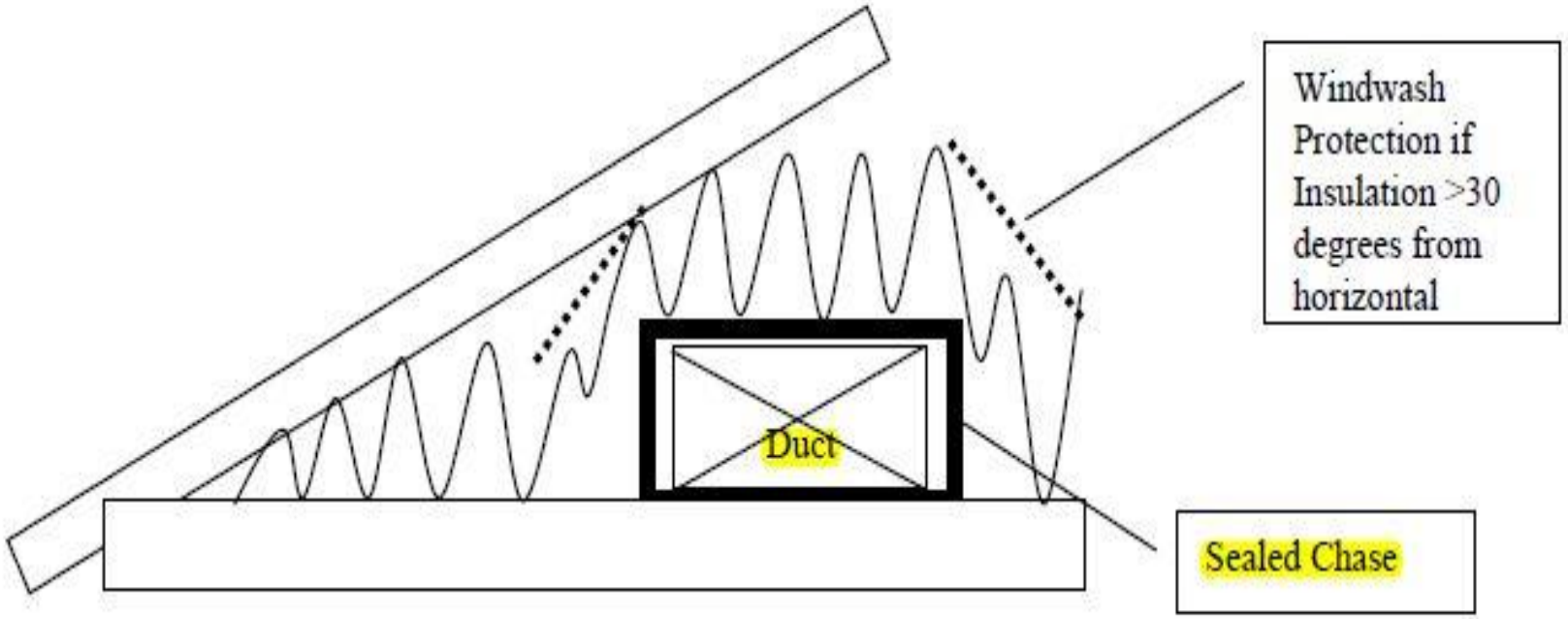
Exceptions: Duct tightness test is not required if the air handler and all ducts are located within conditioned space

Raised ceiling chase sealed with drywall mud

Extends conditioned space above ceiling for ductwork

Duct Insulated per Surrounding Area
If Ceiling R-38 Provide R-38 Around Ductwork

- In attics, a sealed chase would be accepted as keeping the ducts within the conditioned space. If the sides of the chase are insulated with air permeable insulation exposed to the attic at more than 30 degrees from horizontal, then that insulation requires windwash protection per SPS 322.21(2).



Unheated Slab On-Grade Figure 1.

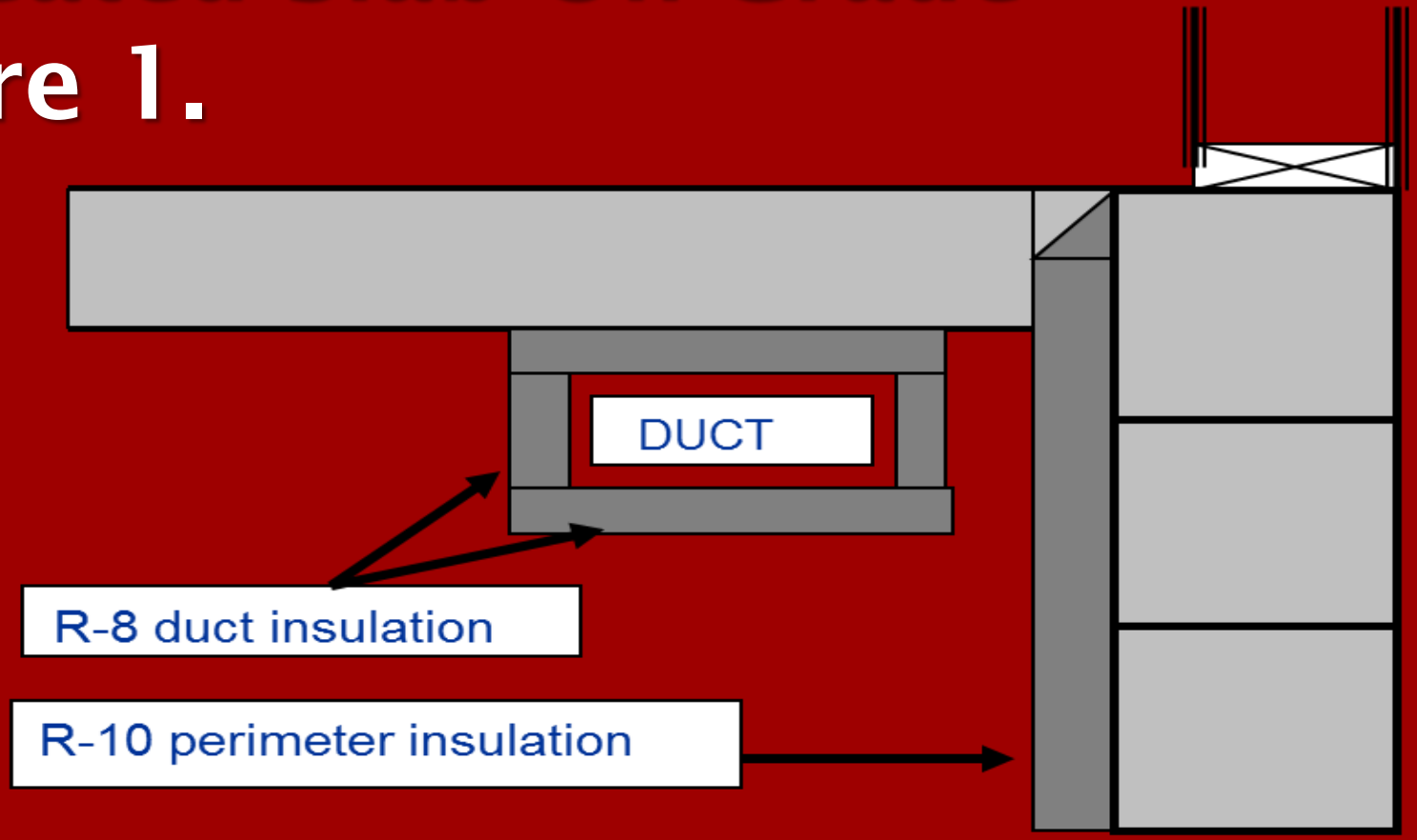
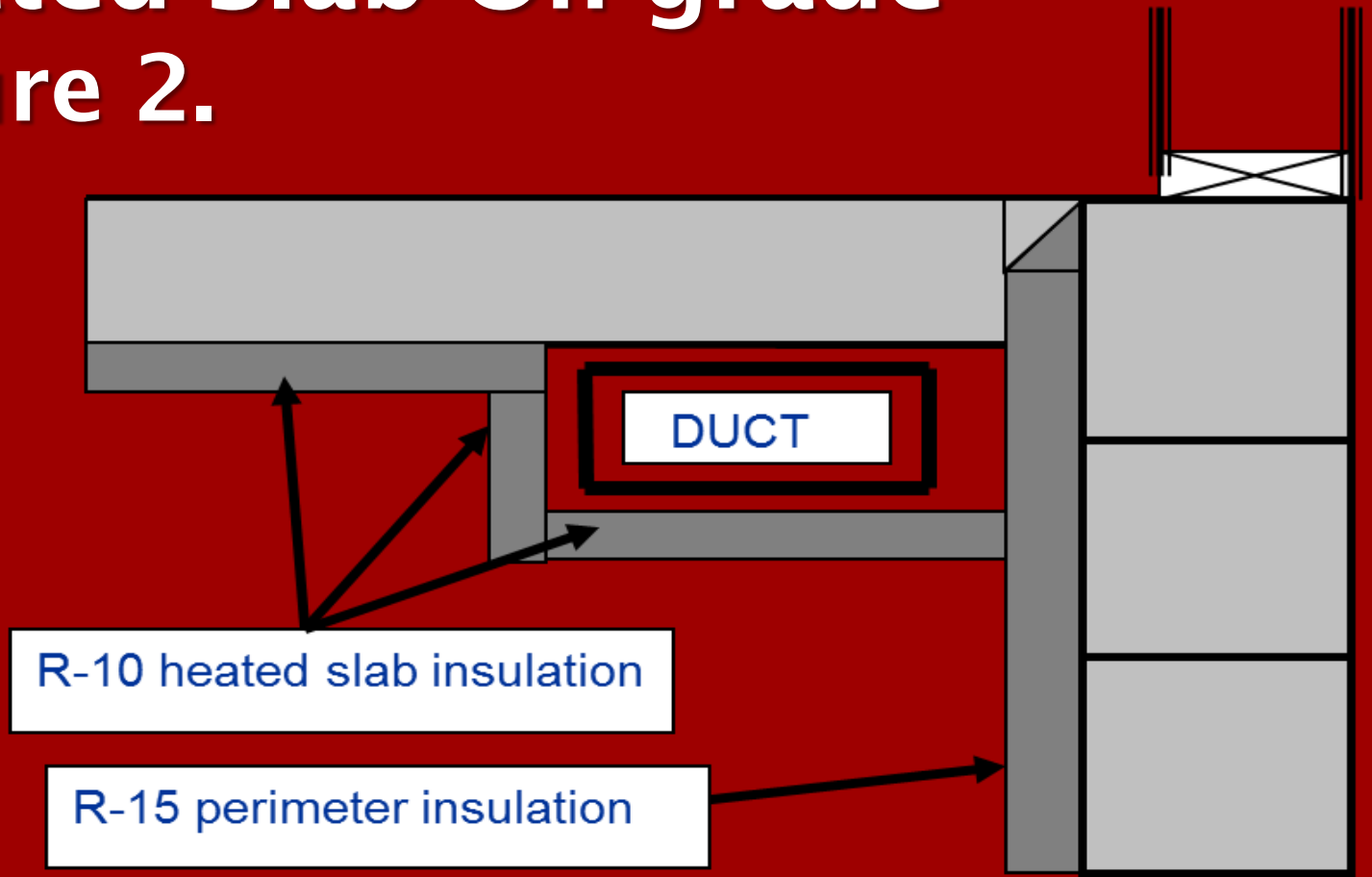


Fig. 1 - Acceptable design for insulated duct outside building thermal envelope of an unheated slab on grade design

Heated Slab On-grade
Figure 2.



Acceptable design for heated slab on-grade design as duct is within building thermal envelope

Ductwork Under Slab Insulated per Fig. 2. Considered Within Conditioned Space if Joints are Taped and Sealed

Duct work installed below a concrete slab on grade also needs a minimum or R-8 insulation and here 2" extruded foam has been added to the sides and under the plastic ductwork.

322.37(3) Joint and Penetration Sealing

Unsealed Gaps

322.37(3) Joint and Penetration Sealing

Fibrous insulation is not an air barrier and cannot be used to air seal openings

322.37(3) Joint and Penetration Sealing

Insulated Sheathing Serving As Air Barrier and Drainage Plane

Cuts and Seams Must Be Taped or Sealed

322.37(3)
Joint and Penetration Sealing

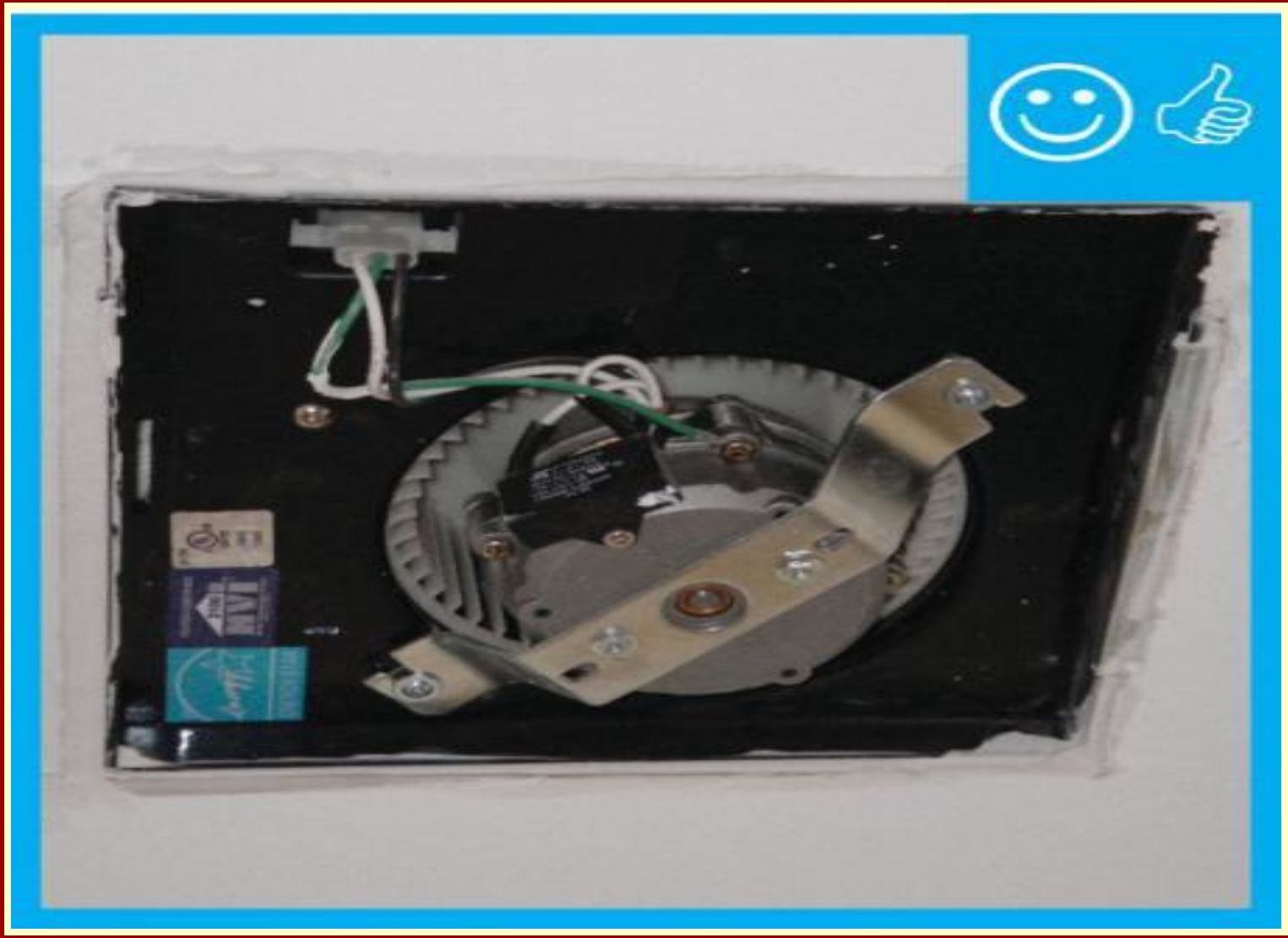
Electrical Boxes

Whole House Fan Not Properly Sealed Nor Insulated

322.37(5) Fan Housing

Hole Cut Too Large, Difficult to Seal

322.37(5) Fan Housing EXHAUST Fan Properly Sealed



322.37(3) Joint and Penetration Sealing

Kitchen Exhaust Duct Penetration Not Sealed

322.37(3) Joint and Penetration Sealing

Kitchen Exhaust Duct Penetration Not Sealed

322.37(3) Joint and Penetration Sealing

Fenestration Properly Sealed

322.37(4) (a), (b) & (c) IC Rated (Insulation Contact) Recessed Lighting

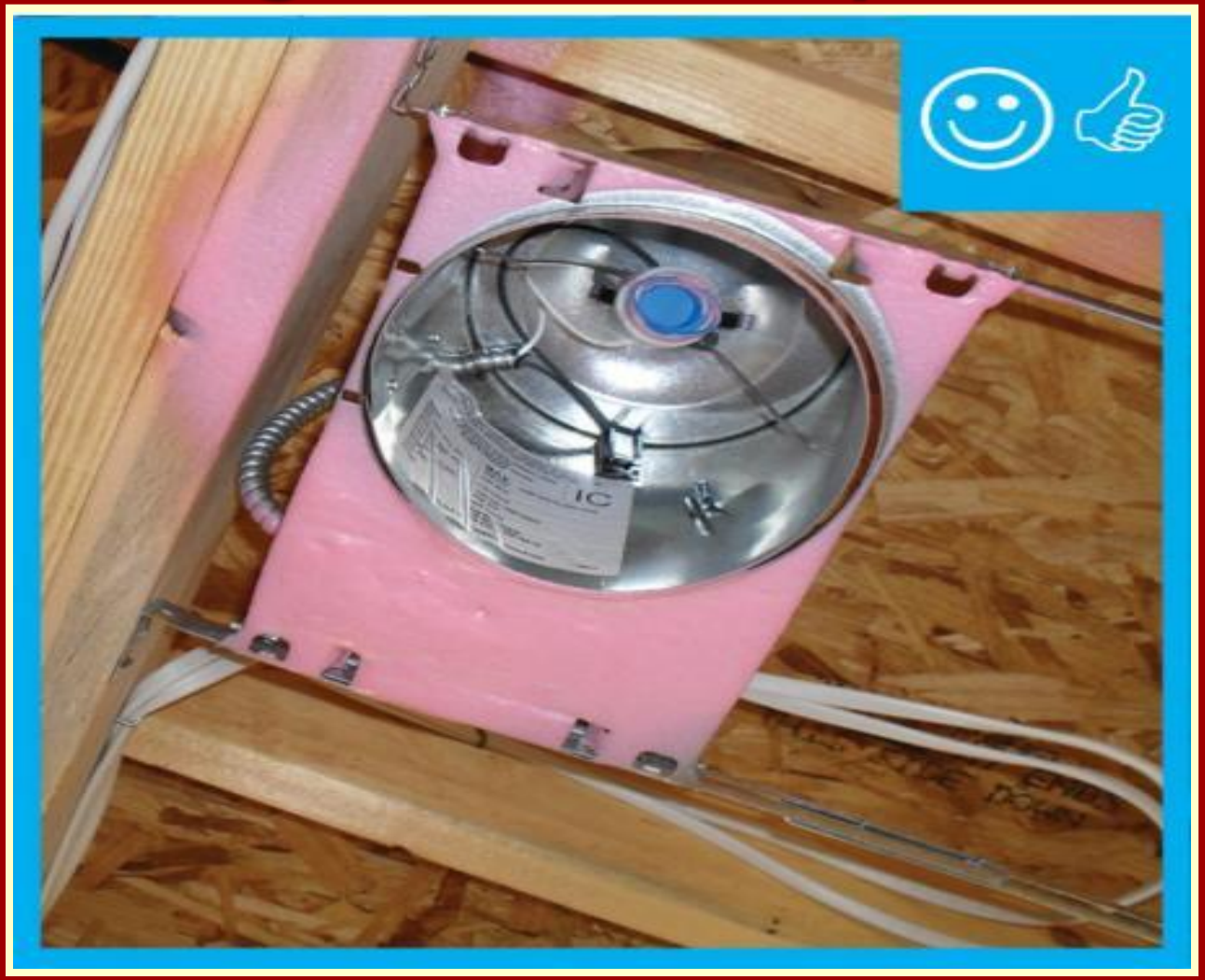
Recessed Lighting Fixtures

Mandatory Requirements

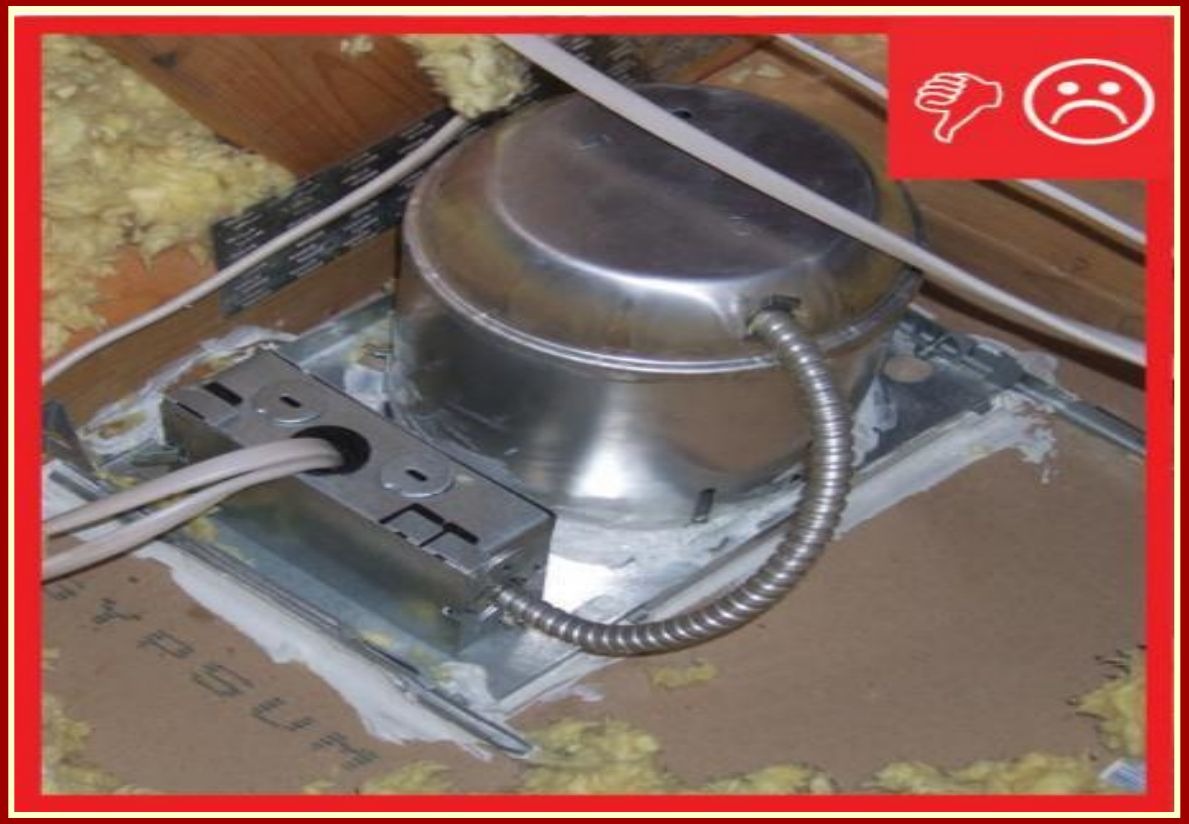
- Type IC rated and labeled in a sealed or gasketed enclosure
- Type IC rated and labeled as meeting ASTM E 283 when tested at 1.57 psf (75 Pa) pressure differential with no more than 2.0 cfm of air movement
- Sealed with a gasket or caulk between the housing and interior wall or ceiling covering

322.37(4)(c)2. IC (Insulation Contact) labeled recessed light with trim kit installed

IC Rated recessed light sprayed with foam to act as gasket against the drywall



322.37(4)(c)2. Non IC Rated Recessed Lighting ?



Note: The department will accept cement board, drywall, and other materials that exhibit flame spread and smoke developed indices of 10 or less when tested in accordance with ASTM E-84.

322.37(3) Foam Gasket Properly Installed

Between Treated Sill Plate and Foundation

322.37(3) Redundant Sealing of Duct With Caulk, Tape, and Flashing

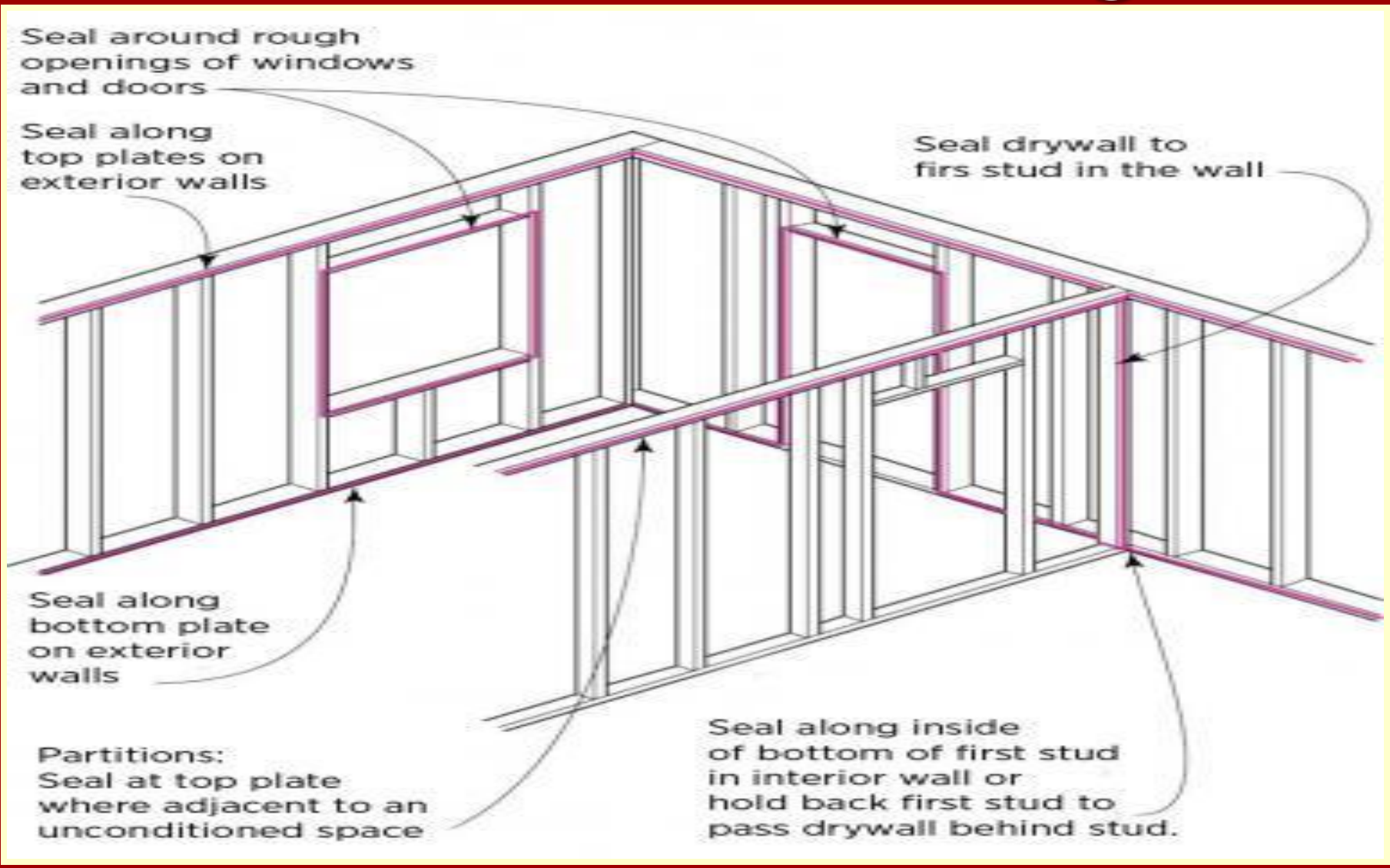
322.37(3) Joint and Penetration Sealings

322.37 (3) Chase Capped with Rigid Air Barrier and Duct Work Penetrations Properly Sealed

322.37 (3) Visible Light Around Door

Lack of Weatherstripping

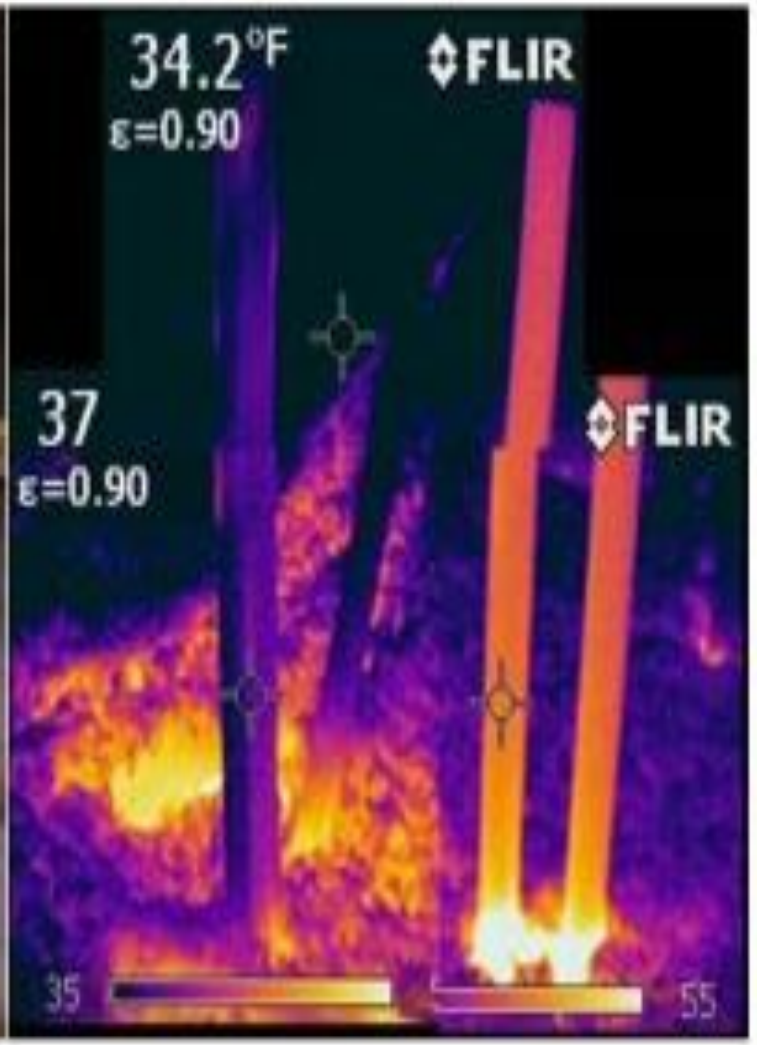
322.37(3) Joint and Penetration Sealing



IR photo showing effectively spray foam insulated/air sealed attic kneewall

And Floor Cavities Under Kneewall

Conditioned Air Leaks Around Unsealed HVAC Flue Pipes Through Fiberglass



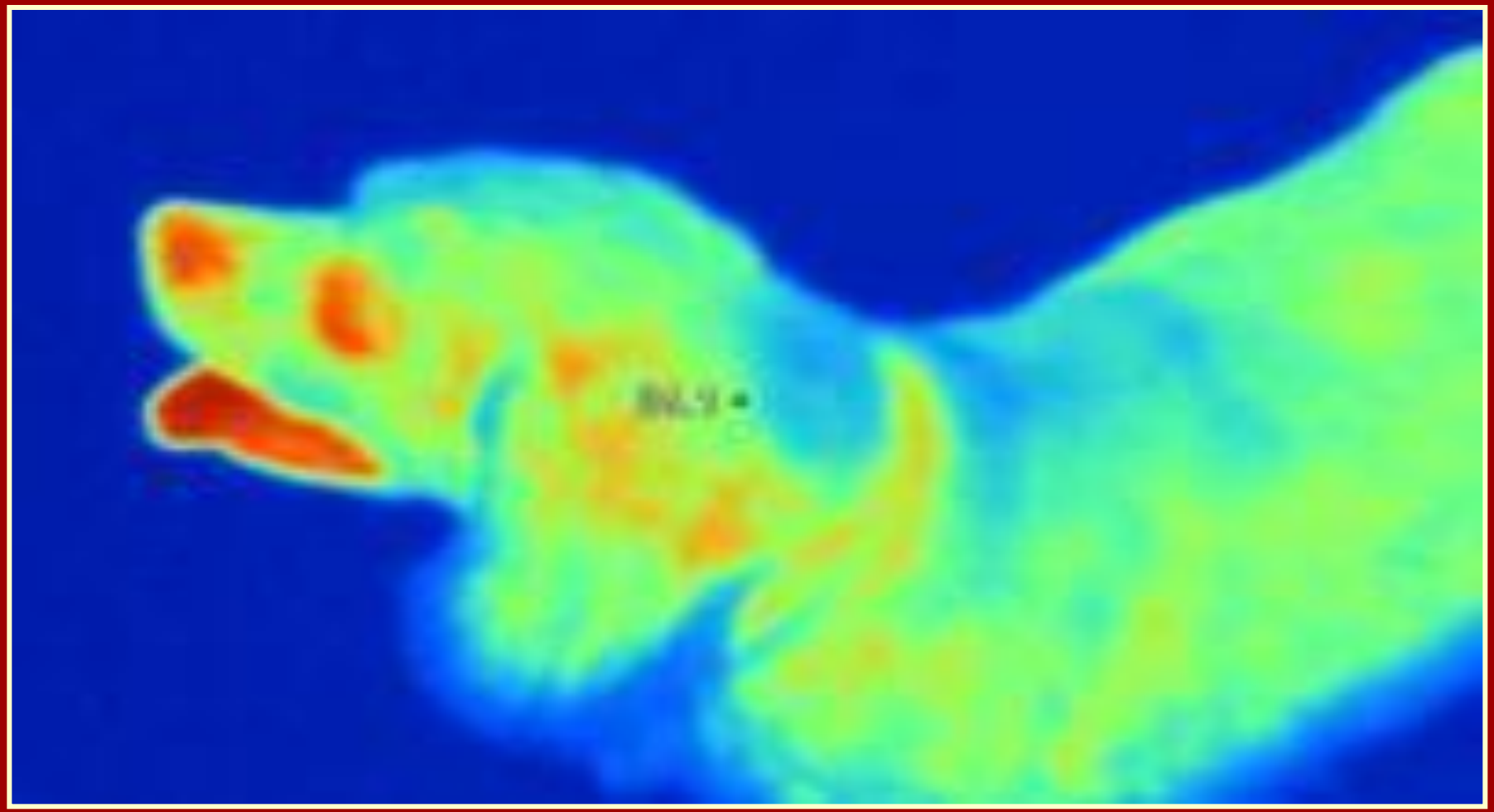
Infrared Thermography During Depressurization Testing

Reveals Air Leakage at Corner of Spray Foam-insulated Room

Incongruity in Attic Insulation Revealed

Infrared Thermography

Undetermined Object Within Wall Enclosure



Infrared Thermography

322.20(4) General Installation

Must be Properly Installed Per Manufacturer's Instructions

322.20(4) General Installation

Spray foam installed with voids

322.20(4) General Installation

Insulation Poorly Installed (Compressed w/ gaps)

322.20(4) General Installation

SPS 322.21 Protection of insulation. (1) BLANKET INSULATION. Insulating blankets or batts shall be held in place with a covering or other means of mechanical or adhesive fastening.

Batt Insulation - Properly Installed
To Be Covered With
Vapor Retarder and Drywall

Note: If the insulation is on a below-grade wall, s. SPS 322.38 (4) may prohibit the use of vapor retarder material used as the covering.

322.20(4) General Installation

Closed Cell Foam Insulation Properly Installed Per Manufacturer's Instructions

322.20(5)(b) Requires Markers Showing Insul. Depth 1 per 300ft²

322.39 (2)(a)
Ventilation and Moisture Control

Insulation Shall Not Block the Free Flow of Air

2. At least 50% of the net free ventilating area shall be distributed at the high sides of the roof.

3. The remainder of the net free ventilating area shall be distributed in the lower half of the roof or attic area.

SPS 322.44 Piping Insulation

- Minimum *R-3* required on
  - HVAC systems
    - Exception: Piping that conveys fluids between 55 & 105°F
- Minimum *R-2* required on
  - All circulating domestic hot water systems
    - Systems also require a readily accessible manual switch

321.24(3) Flashing properly installed
Creates complete drainage system

With continuous rigid insulation sheathing / siding

321.24(3) Corners Not Properly Flashed

Leaves a vulnerable area in the drainage system

322.21(3) Protection of Foam Insulation

Protect from Physical Damage and UV Light with Permanent Opaque Weather Resistant Covering

322.33(2) R-10 Continuous Insulation Beneath Heated Slab Per Prescriptive Table

322.38(3) Min. 6 Mil. Vapor Retarder Required Beneath Slab

Properly Sealed Sump Crock

Not in code per se: But… 322.38(3)

Requires Vapor Retarder

Beneath Concrete Floors

321.11(1)(b) Foam plastic insulation Must be Separated from the Interior of the Dwelling by a Thermal Barrier

321.11(1)(b) Products must be tested And rated as a thermal barrier

1 PRODUCT NAME
THERMAX™ Sheathing

2 Manufacturer

The Dow Chemical Company
Building Solutions
200 Larkin
Midland, MI 48674
1-866-583-BLUE (2583)
Fax 1-989-832-1465
www.dowbuildingsolutions.com

3 Product Description

THERMAX™ Sheathing is a non-structural, rigid board insulation consisting of a glass-fiber-reinforced polyisocyanurate foam core laminated between 1.0 mil smooth, reflective aluminum foil facers on both sides. The glass-fiber reinforcement, along with chemical modifications, contributes to improved fire performance and dimensional stability. THERMAX Sheathing can be installed exposed to the interior without a thermal barrier.

BASIC USE

THERMAX™ Sheathing is specially designed to have a Class A fire rating and can be used in a range of concealed and exposed applications, above and below grade. Because of its improved fire performance, THERMAX Sheathing is especially appropriate for hourly rated assemblies. THERMAX Sheathing also has approval in exterior multistory steel stud walls with brick cladding. See IBC Section 2603.5.

SIZES

Width and length:
4' x 8', 4' x 9', 4' x 10'
Edge treatments:
Square edge, shiplap

Product thicknesses and R-values are shown in Table 1. Not all products are available in all parts of the country. Additional product sizes are available by custom order.

TABLE 1

THERMAX™ Sheathing R-Values	
Nominal Foam Thickness, in.	Stabilized R-Value[1,2]
0.5	2.3
0.75	3.0
1.0	4.5

Consult your Dow representative about other sizes and lead-time requirements.

4 Technical Data

APPLICABLE STANDARDS

THERMAX™ Sheathing meets ASTM C1289 – Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board, Type I, Class 2, which includes:

- C203 – Standard Test Methods for Breaking Load and Flexural Properties of Block-Type Thermal Insulation
- C209 – Standard Test Methods for Cellulosic Fiber Insulating Board
- C518 – Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus
- D1621 – Standard Test Method for Compressive Properties of Rigid Cellular Plastics
- D2126 – Standard Test Method for Response of Rigid Cellular Plastics to Thermal and Humid Aging
- E96 – Standard Test Method

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ESR-1659

Reissued 04/2016

This report is subject to renewal 04/2018.

DIVISION: 07 00 00—THERMAL AND MOISTURE PROTECTION

SECTION: 07 21 00—THERMAL INSULATION

SECTION: 07 22 00—ROOF AND DECK INSULATION

SECTION: 07 25 00—WATER-RESISTIVE BARRIERS / WEATHER BARRIERS

SECTION: 07 27 00—AIR BARRIERS

REPORT HOLDER:

THE DOW CHEMICAL COMPANY

200 LARKIN CENTER

Done
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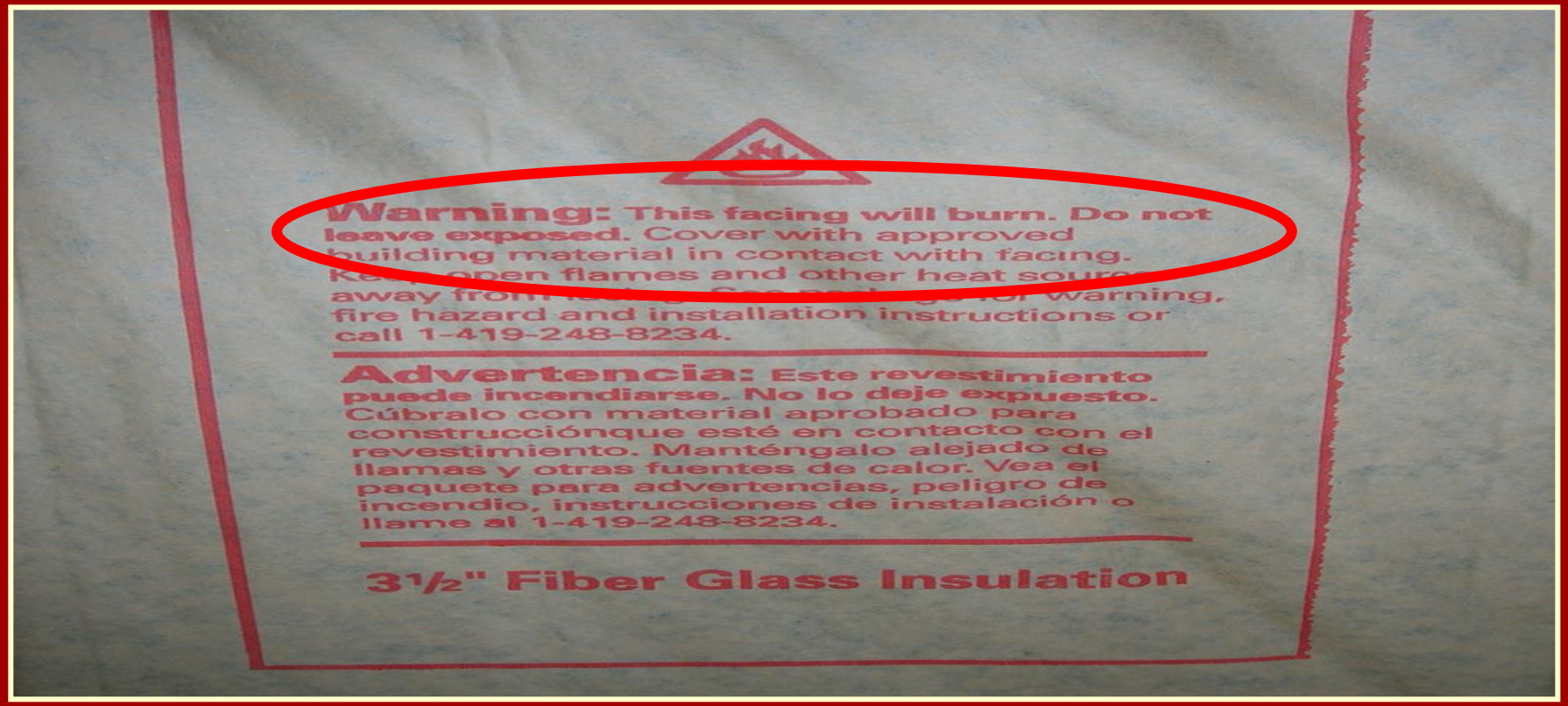
11/17/2016

322.20(4)(b) …. Shall Be Installed Per Manufacturer's Instruction



Code Change - June 2016
Crawl Spaces Must Be Insulated

322.34 (3) Uninsulated and Vented Crawl Spaces
Removed by Emergency Rule June 1, 2016

322.34 (2) & (3) Vapor Retarders Insulation Reqs. Thermal Barriers

R-10 Continuous: Interior or Exterior

R-13 Cavity: on Interior

322.34(2)(d)… Shall extend at least 6 inches up the wall and be attached and sealed

322.34 (2) & (3) Vapor Retarders Insulation Reqs. Thermal Barriers

Exposed Foam OK If: No Heat Source Present

And…Crawl Space is Separated From Living Space

Crawl Spaces: You Never Know What You Might Find In There

Thank You

Lenny Kanter

UDC Engineering Consultant

Department of Safety and Professional Services

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608 267 9723 fax

robert.kanter@wi.gov