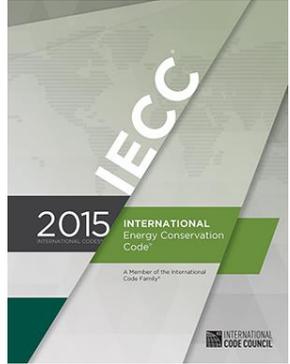


# 2015 IECC Residential Basic Principles Updates with State Amendments



**Brent Ursenbach**  
 LEED AP BD+C  
 Building Inspector  
  
 TOWNSHIPS  
 O: 385.468.6694  
 C: 801.381.1449

## Funding for Energy Code Training



Utah Office of Energy Development  
Building Talk Program



U.S. Department of Energy  
energy.codes.gov



**ROCKY MOUNTAIN POWER**  
wattsmart New Homes Program

## “NEW”

- Identifies a new requirement
- A modified requirement
- A new amendment
- An amendment was eliminated
- A change to previous code
- **Also identified with red text**



## Why all this Emphasis on Building Energy Efficiency?

- Energy codes and standards set *minimum* efficiency requirements for new and renovated buildings, assuring reductions in energy use and emissions over the life of the building. Energy codes are a subset of building codes, which establish baseline requirements and govern building construction.
- Code buildings are more comfortable and cost-effective to operate, assuring energy, economic and environmental benefits.
- What is the expected life of a home or commercial building, built today?
- The IECC does not require the latest and greatest technology- it is a *minimum code*.

What will our *grandchildren's, grandchildren* think of the building efficiency and air quality we leave for them?



## The Family of I-Codes

- ✓ International Building Code
- ✓ International Mechanical Code
- ✓ International Fuel Gas Code
- ~~✓ International Property Maintenance Code~~
- ✓ International Fire Code
- ~~✓ International Zoning Code~~
- ✓ International Plumbing Code
- ✓ International Existing Building Code - **NEW**
- ~~✓ International Private Sewage Disposal Code~~
- ~~✓ International Performance Code~~
- ✓ International Residential Code
- ✓ **International Energy Conservation Code**
  - ✓ Utah continues on the 2006
- ✓ International Wildland-Urban Interface Code



## Residential

### Relationship Between IRC & IECC

- ✓ IECC addresses only energy
- ✓ IRC addresses all topics (*structural, plumbing, etc.*)
  - Allows builder to carry only one code book
  - Chapter 11 covers energy efficiency- virtually identical to the Residential Chapters in the IECC
- ✓ In 2012, IECC consolidated with IRC energy chapter (actually a change to the IRC, not the IECC)
- ✓ IECC addresses both residential and commercial; IRC addresses subset of residential, detached one- and two-family dwellings and townhouses 3 stories or fewer



## Structure of the 2015 IECC

### Commercial Section

- Ch. 1 Scope and Application / Administrative and Enforcement
- Ch. 2 Definitions
- Ch. 3 General Requirements
- Ch. 4 Commercial Energy Efficiency
- Ch. 5 Existing Buildings - **NEW**
- Ch. 6 Referenced Standards**
- Index

### Residential Section

- Ch. 1 Scope and Application / Administrative and Enforcement
- Ch. 2 Definitions
- Ch. 3 General Requirements
- Ch. 4 Residential Energy Efficiency
- Ch. 5 Existing Buildings - **NEW**
- Ch. 6 Referenced Standards**
- Index

**Additions, alterations, existing buildings moved from Ch. 1. Includes several changes and new requirements**

## Scope

### Section R101



## IECC Residential Buildings:

(Different from IBC definition)

- ✓ One- and two-family dwellings, townhouses of any size and R-2, R-3, R-4 ≤ 3 stories – (all R's except for hotels/motels)
- ✓ *All buildings that are not “residential” by definition are “commercial”*
- ✓ R-1 Hotel/Motel
- ✓ R-2 Sleeping > than 2 units- Apartments
- ✓ R-3 Dwelling – not more than 2 units
- ✓ R-4 24 hour custodial care

**Scope** Section R101.4.1 - Mixed Occupancy  
Section R101.5 - Compliance

- ✓ Treat the residential occupancy under the applicable residential code
- ✓ Treat the commercial occupancy under the commercial code
- ✓ Code Official has final authority on alternate:
  - Compliance materials, software, worksheets



9

**NEW**

## Utah HB 316 – State Construction Codes

- The 2015 IRC will remain in place until 2021- **The 2018 IRC will not be considered**
- The IECC allows flexibility with **4 compliance options**
- **5<sup>th</sup> Compliance Option, the Utah 2012 REScheck (equipment trade-off) pass by 0% thru December 31, 2016**
  - 'loop hole' to make little, if no improvement
- Progressive 2012 Utah REScheck pass rate-
  - 3% - January 1, 2017
  - 4% - January 1, 2019
  - 5% - January 1, 2021



### Section R103 Scope/Construction Documents

- ✓ Documentation shall be prepared by a registered design professional (where required)
- ✓ Electronic media can be used
- ✓ Information required: *(This modified text in the 2015 is deleted by amendment- similar to 2012 amendment)*
  - ↪ Insulation materials and R-values
  - ↪ Fenestration U-factors, SHGC
  - ↪ Area-weighted U-factor and SHGC calculations
  - ↪ Mechanical, SWH, equipment types, sizes, and efficiencies
  - ↪ Equipment and system controls
  - ↪ Duct sealing, duct and pipe insulation and location
  - ↪ Air sealing details
- ✓ Amended to: Construction documents include all documentation required to be submitted in order to issue a building permit.

The code official decides what documents are necessary for a permit



**The building thermal envelope shall be represented on plans**

### Section R104 Inspections **NEW**

- Construction work for which a permit is required is subject to inspection by code official or designated agent
- Required inspections include: *(“energy only” inspections may be necessary)*
  - Footing and foundation- *R-value, depth, location and protection*
  - Framing and rough-in- *R-values, location, proper installation, U-factors, SHGC's, air leakage control*
  - Plumbing rough-in- *Recirculation loops, R-values, type, protection*
  - Mechanical rough-in- *Per design, sizing, controls, insulation, damper, ventilation, fan efficiency*
  - Final- *Any above items, can light sealing, LIGHTING efficacy (new requirements)*

### Section R401.3 - Certificate **NEW**

**Permanently posted on a wall in the space where the furnace is located, a utility room or an approved location inside the building**

- ✓ Don't cover or obstruct the visibility of other required labels
- ✓ Includes the following:
  - R-values of insulation installed for the thermal building envelope, including ducts outside conditioned spaces
  - U-factors and SHGC for fenestration
  - Area-weighted U-factor and SHGC calculations
  - Results from any required duct system and building envelope air leakage testing
  - HVAC efficiencies and types
  - SWH equipment
  - Duct sealing, duct and pipe insulation and location
  - Air sealing details
- ✓ Certificate lists "gas-fired unvented room heater", "electric furnace", or "baseboard electric heater"; however no listing of an efficiency for those heating types

2015 IECC Energy Efficiency Certificate	
<b>Insulation Rating (R-Value)</b>	
Above-Grade Wall	20.00
Below-Grade Wall	15.00
Floor	0.00
Ceiling / Roof	45.00
Ductwork (unconditioned spaces): _____	
<b>Glazing &amp; Door Rating (U-Factor, SHGC)</b>	
Window	0.32 0.30
Door	0.32 0.30
<b>Heating &amp; Cooling Equipment (Efficiency)</b>	
Forced Hot Air	90 AFUE
Cooling System:	_____
Water Heater:	_____
Name: _____	Date: _____
Comments _____	

### Overview of Structure

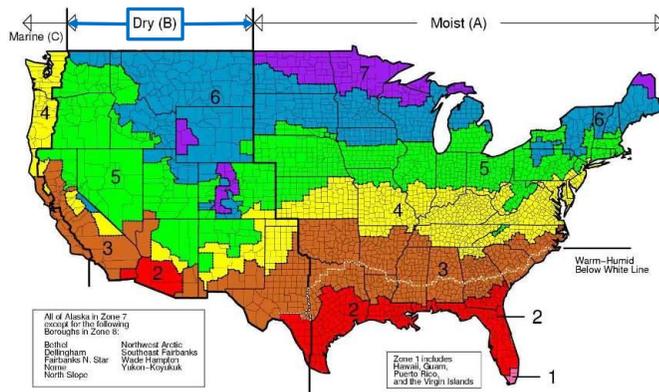
**Climate-Specific Requirements:** Many Changes- new requirements

- ✓ Roofs
- ✓ Above grade walls
- ✓ Foundations
  - Basements
  - Slabs
  - Crawlspace
- ✓ Skylights, windows, and doors
- ✓ Solar Heat Gain Coefficient in warm climates

**Mandatory Requirements (apply everywhere):**

- ✓ Infiltration control
- ✓ Duct insulation, sealing & testing, **no-use-of-building cavities amended out**
- ✓ HVAC controls
- ✓ Piping Insulation and circulating service hot water requirements
  - ✓ **Underground service hot water piping insulation amended out NEW**
- ✓ Equipment sizing
- ✓ Dampers
- ✓ Lighting - **No longer amended out- 75% must be High Efficacy NEW**

## Climate Zones for the 2015 IECC



**New – Tropical climate zone now defined**

### Section R401.2.1 Tropical Zone – **New – but not in Utah!**

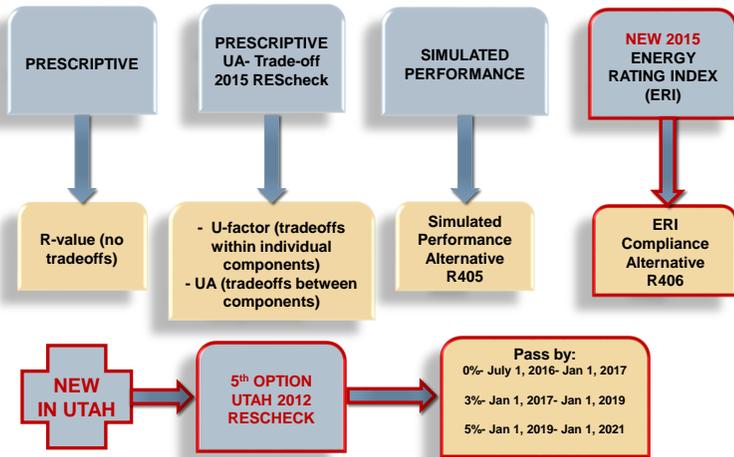
- Buildings deemed to comply at elevation < 2,400 feet above sea level where the following conditions are met:
  - < ½ space is air conditioned
  - Occupied space is not heated
  - ≥ 80% solar, wind, or other renewable energy source supplies for service water heating
  - SHGC on fenestration ≤ 0.40 or overhang projection factor ≥ 0.30
  - Lighting in accordance with R404
  - Exterior roof complies with Table C402.2.11 (commercial cool roof) or insulation of ≥ R-15, if present, attics above insulation are vented and attics below insulation unvented
  - Roof surface slope ¼ inch per foot of run
  - Operable fenestration provides ventilation ≤ 14% of floor area for each room or equivalent ventilation is provided by a ventilation fan
  - Bedrooms with 2 exterior walls facing different directions have operable fenestration
  - Interior doors to bedrooms capable of being secured open
  - Ceiling fan or rough-in provided for bedrooms and the largest space that is not used as a bedroom

**STUDY THIS IF YOU CONSIDER TAKING A JOB IN HAWAII!**



THE CODE ALLOWS ANY OF THESE COMPLIANCE OPTIONS

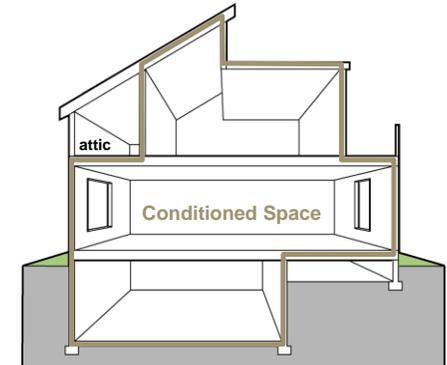
IECC Compliance - Four Options + One = 5 in Utah



Building Envelope Specific Requirements

Building Thermal Envelope consists of:

- ✓ Fenestration
- ✓ Ceilings
- ✓ Walls
  - Above grade
  - Below grade
  - Mass walls
- ✓ Floors
- ✓ Slabs
- ✓ Crawlspace



Exception:

- Low energy usage < 3.4 Btu/h/sq.ft. OR
- 1 watt/sq.ft. of floor area OR
- unconditioned spaces
- Example- 1500 watt space heater for a 1500 sq.ft. warehouse

**Insulation and Fenestration - Requirements by Climate Zone**  
 2015 Prescriptive Table - no amendments-**enclosed** values are all improvements

**TABLE R402.1.2**  
**INSULATION AND FENESTRATION REQUIREMENTS BY COMPONENT\***

CLIMATE ZONE	FENESTRATION U-FACTOR <sup>b</sup>	SKYLIGHT <sup>c</sup> U-FACTOR	GLAZED FENESTRATION SHGC <sup>b, d</sup>	CEILING R-VALUE	WOOD FRAME WALL R-VALUE	MASS WALL R-VALUE	FLOOR R-VALUE	BASEMENT <sup>e</sup> WALL R-VALUE	SLAB <sup>f</sup> R-VALUE & DEPTH	CRAWL SPACE <sup>g</sup> WALL R-VALUE
1	NR	0.75	0.25	30	13	3/4	13	0	0	0
2	0.40	0.65	0.25	38	13	4/6	13	0	0	0
3	0.35	0.55	0.25	38	20 or 13+5 <sup>h</sup>	8/13	19	5/13 <sup>i</sup>	0	5/13
4 except Marine	0.35	0.55	0.40	49	20 or 13+5 <sup>h</sup>	8/13	19	10/13	10, 2 ft	10/13
5 and Marine 4	0.32	0.55	NR	49	20 or 13+5 <sup>h</sup>	13/17	30 <sup>f</sup>	15/19	10, 2 ft	15/19
6	0.32	0.55	NR	49	20+5 or 13+10 <sup>j</sup>	15/20	30 <sup>f</sup>	15/19	10, 4 ft	15/19
7 and 8	0.32	0.55	NR	49	20+5 or 13+10 <sup>j</sup>	19/21	38 <sup>f</sup>	15/19	10, 4 ft	15/19

For SI: 1 foot = 304.8 mm.  
 a. R-values are minimums. U-factors and SHGC are maximums. When insulation is installed in a cavity which is less than the label or design thickness of the insulation, the installed R-value of the insulation shall not be less than the R-value specified in the table.  
 b. The fenestration U-factor column excludes skylights. The SHGC column applies to all glazed fenestration. Exception: Skylights may be excluded from glazed fenestration SHGC requirements in climate zones 1 through 3 where the SHGC for such skylights does not exceed 0.30.  
 c. "15/19" means R-15 continuous insulation 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 or exterior of the basement wall plus R-5 continuous insulation on the interior or exterior of the home. "10/13" means R-10 continuous insulation on the interior or exterior of the home or R-13 cavity insulation at the interior of the basement wall.  
 d. R-5 shall be added to the required slab edge R-values for heated slabs. Insulation depth shall be the depth of the footing or 2 feet, whichever is less in Climate Zones 1 through 3 for heated slabs.  
 e. There are no SHGC requirements in the Marine Zone.  
 f. Basement wall insulation is not required in warm-humid locations as defined by Figure R301.1 and Table R301.1.  
 g. Or insulation sufficient to fill the framing cavity, R-19 minimum.  
 h. The first value is cavity insulation, the second value is continuous insulation, so "13+5" means R-13 cavity insulation plus R-5 continuous insulation.  
 i. The second R-value applies when more than half the insulation is on the interior of the mass wall.  
 j. Log walls complying with ICC400 and with a minimum average wall thickness of 8" or greater shall be permitted in Zones 5-6 when overall window glazing is 0.31 U-factor or lower, minimum heating equipment efficiency is 90 AFUE (gas) or 84 AFUE (oil), and all other requirements met.

**Fenestration**

**Exterior**

- Windows
- Doors: Opaque & Glass
  - U-factor & SHGC CZ 3
  - U-factor CZ 5 & 6
- Skylights
  - U-factor & SHGC CZ 3, 5 & 6



## Fenestration

Sections R303.1.3/R402.3

### Doors and windows

- ✓ NFRC rating or default table
  - If no labeled U-factor and SHGC, use default table
- ✓ No glass area limits with the prescriptive path
- ✓ Exemptions (*prescriptive path-only*)
  - Up to 15 ft<sup>2</sup> of glazing per dwelling unit (Section R402.3.3)
  - One side-hinged opaque door assembly up to 24 ft<sup>2</sup> (Section R402.3.4)

*State Amendment allows exemption for any method /path used*



## Fenestration

Sections R402.3.1/R402.3.2 - Area-weighted Average



- ✓ Can be used to satisfy U-factor and SHGC requirements
- ✓ Subject to hard limits, even in trade-offs

### ✓ Example Area Weighted Calculation:

-4-	5X5 0.38 U-factor windows:	25ft <sup>2</sup> X 4 = 100ft <sup>2</sup> ,	100 X 0.38 = 38 UA
-5-	3X4 0.35 U-factor windows:	12ft <sup>2</sup> X 5 = 60ft <sup>2</sup> ,	60 X 0.35 = 21 UA
-1-	6X8 0.48 U-factor patio door:	48ft <sup>2</sup> X 1 = 48ft <sup>2</sup> ,	48 X 0.48 = 23 UA
-2-	3X8 0.16 Ins. opaque doors:	24ft <sup>2</sup> X 2 = 48ft <sup>2</sup> ,	48 X 0.16 = 8 UA
-3-	3X3 0.33 U-factor windows:	9ft <sup>2</sup> X 3 = 27ft <sup>2</sup> ,	27 X 0.33 = 9 UA
		TOTALS 283ft <sup>2</sup>	99 UA

Area Weighted Average (AWA) = Total UA ÷ Total A

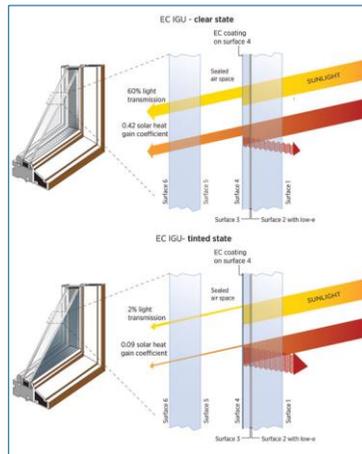
$$AWA = 99 \div 283 = 0.35$$

Doors are fenestration- significant impact on the AWA

## Fenestration

### Section R402.3.2 – Dynamic Glazing

- ✓ Dynamic glazing (New)
  - ✓ Ratio of higher to lower labeled SHGC  $\geq 2.4$
  - ✓ Automatically controlled to modulate amount of solar gain into space in multiple steps
  - ✓ May be used for privacy
  - ✓ Shall be considered separately from other fenestration (area weighted average)
  - ✓ Exception – not required to comply when both high and low rated SHGC meet Table R402.1.2



## Section R303.1 Ceilings

R-values are to be printed on the batt insulation or rigid foam board.

Blown-in insulation must have an insulation certificate at or near the opening of the attic.

The certificate should include:

- ✓ R-value of installed thickness
- ✓ Initial installed thickness
- ✓ Installed density
- ✓ Settled thickness/settled R-value
- ✓ Coverage area
- ✓ Number of bags installed



Insulation markers must be installed every 300 square feet and be marked with the minimum installed thickness and affixed to the trusses or joists.

## Ceilings

### NEW R-values

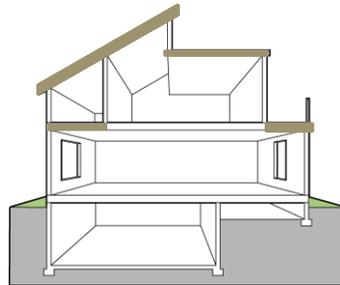
Requirements based on

- ✓ Assembly type
- ✓ Continuous insulation
- ✓ Insulation between framing (cavity insulation)

Meet or exceed R-values

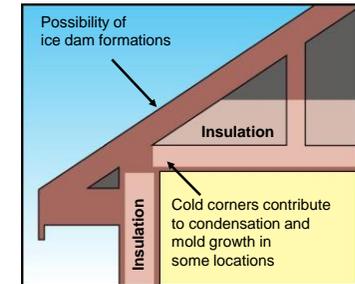
**Continuous insulation may only be penetrated by fasteners**

**Insulation blown in attics is cavity- not continuous- penetrated by framing members**

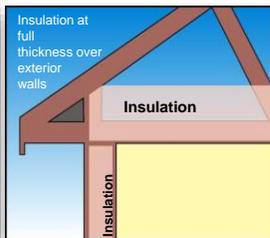


## Section R402.2.1 Ceilings with Attics

Ceiling insulation requirements in R-value table assume standard truss systems



### Section R402.2.1 - Ceilings with Attics, Cont'd. (not vaulted/no attic)



Prescriptive R-value path encourages raised heel truss (aka, energy truss)

- ✓ If insulation is full height **uncompressed** over exterior wall top plate, covering 100% of ceiling area
  - R-30 complies where R-38 is required
  - R-38 complies where R-49 is required

*Note: This reduction ONLY applies to the R-value prescriptive path, not the U-factor or Total UA alternatives. State Amendment allows this with any method.*

### Section R402.2.2 - (vaulted) Ceilings without Attic Spaces

- ✓ R-30 allowed for up to 500 ft<sup>2</sup> or 20% total insulated ceiling area, whichever is less, where
  - ✓ Required insulation levels exceed R-30
  - ✓ Design of roof/ceiling assembly does not provide sufficient amount of space to meet higher levels
  - ✓ *NOTE: The IRC has requirements for unvented attics-*

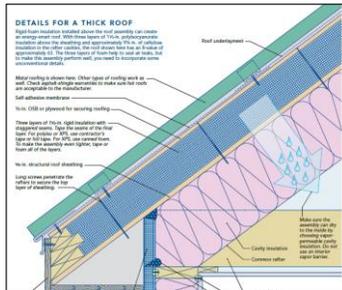


*Note: This reduction ONLY applies to the R-value prescriptive path, not the U-factor or Total UA alternatives. State Amendment allows this with any method.*

## Ceilings without Attic Spaces - continued

### **IRC R806.5 Unvented attic and unvented enclosed rafter assemblies**

- ✓ Air impermeable insulation requirement for ceilings without attics or ventilation-
- ✓ Closed cell foam or other method required for condensation control



### **Section R402.2.3 Eave Baffle**

*For air permeable insulations in vented attics, a baffle shall be installed*

- ✓ Adjacent to soffit and eave vents
- ✓ To maintain an opening  $\geq$  size of vent
- ✓ To extend over top of attic insulation
- ✓ May be of any solid material



### Section R402.2.4- Prescriptive Access Hatches and Doors

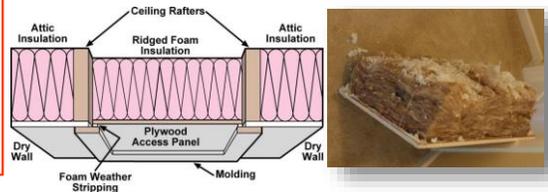
Weather-strip and insulate doors from conditioned spaces to unconditioned spaces (e.g., attics and crawl spaces)

- ✓ Insulate to level equivalent to surrounding surfaces
- e.g., required ceiling insulation = R-38, then attic hatch must be insulated to R-38

Provide access to all equipment that prevents damaging or compressing the insulation

Install a wood framed or equivalent baffle or retainer when loose fill insulation is installed

**Exception:**  
Vertical doors that provide access can meet Table 402.1.2  
**NEW**



### Steel-Frame Assemblies Section R402.2.6

Table R402.2.6  
Steel-Frame Ceiling, Wall and Floor Insulation  
(R-Value)

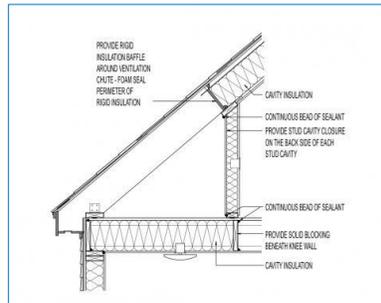
Table keys on the wood-frame requirement for the corresponding building component

WOOD FRAME R-VALUE REQUIREMENT	COLD-FORMED STEEL EQUIVALENT R-VALUE <sup>a</sup>
Steel-Framed Wall, 16" on center	
R-13	R-13 + 4.2 or R-19 + 2.1 or R-21 + 2.8 or R-0 + 9.3 or R-15 + 3.8 or R-21 + 3.1
R-13 + 3	R-0 + 11.2 or R-13 + 6.1 or R-15 + 5.7 or R-19 + 5.0 or R-21 + 4.7
R-20	R-0 + 14.0 or R-13 + 8.9 or R-15 + 8.5 or R-19 + 7.8 or R-19 + 6.2 or R-21 + 7.5
R-20 + 5	R-13 + 12.7 or R-15 + 12.3 or R-19 + 11.6 or R-21 + 11.3 or R-25 + 10.9
R-21	R-0 + 14.6 or R-13 + 9.5 or R-15 + 9.1 or R-19 + 8.4 or R-21 + 8.1 or R-25 + 7.7

- ✓ "R-X + R-Y" means R-X cavity plus R-Y continuous
- ✓ In ceilings, insulation that exceeds the height of the framing must cover the framing

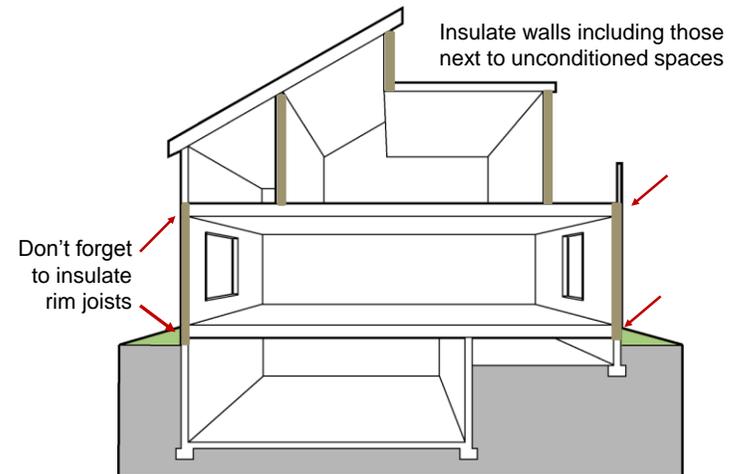
Notice 14.6 continuous with empty cavity = 21 in a 2X6 wall

## Walls Covered by IECC



- ✓ Exterior above-grade walls
- ✓ Attic knee-walls
- ✓ Skylight shaft walls
- ✓ Perimeter joists/rim joist
- ✓ Basement walls
- ✓ Possibly Crawlspace walls
- ✓ Garage walls (*shared with conditioned space*)

## Above Grade Walls



### Section R402 - Wood-Frame Walls

Table R402.1.2  
INSULATION AND FENESTRATION REQUIREMENTS BY COMPONENT

CLIMATE ZONE	FENESTRATION U-FACTOR <sup>b</sup>	SKYLIGHT <sup>c</sup> U-FACTOR	GLAZED FENESTRATION SHGC <sup>b, e</sup>	CEILING R-VALUE	WOOD FRAME WALL R-VALUE
1	NR	0.75	0.25	30	13
2	0.40	0.65	0.25	38	13
3	0.35	0.55	0.25	38	20 or 13+5 <sup>h</sup>
4 except Marine	0.35	0.55	0.40	49	20 or 13+5 <sup>h</sup>
5 and Marine 4	0.32	0.55	NR	49	20 or 13+5 <sup>h</sup>
6	0.32	0.55	NR	49	20+5 or 13+10 <sup>h</sup>
7 and 8	0.32	0.55	NR	49	20+5 or 13+10 <sup>h</sup>

Utah  
2012

15

19 or 13+5

19 or 13+5

### Section R303.1 Walls – Insulated Siding NEW

- R-value labeled on product package
- Listed on certification
- Installer signature and date
- Posted on site in conspicuous location
- Thermal resistance (R-value) determined in accordance with ASTM C 1363



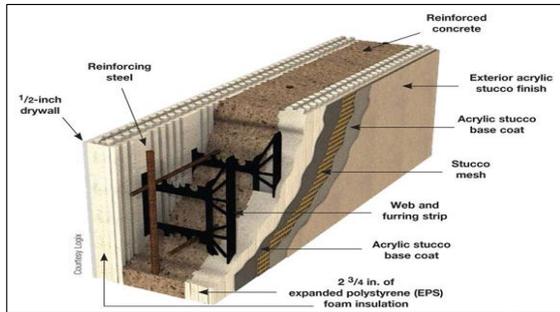
### Section R402.2.5 - Mass Walls

What type

- ✓ Concrete block, concrete, insulated concrete form (ICF), masonry cavity, brick (other than brick veneer), earth, and solid timber/logs
- ✓ Any other walls having a heat capacity  $\geq 6$  Btu/ft.<sup>2</sup>/°F **NEW**

Provisions

- ✓ Are assumed to be above grade walls



### Section R402.2.5 - Mass Wall Requirements

Table R402.1.2  
INSULATION AND FENESTRATION REQUIREMENTS BY COMPONENT

CLIMATE ZONE	FENESTRATION U-FACTOR <sup>b</sup>	SKYLIGHT <sup>b</sup> U-FACTOR	GLAZED FENESTRATION SHGC <sup>b, c</sup>	CEILING R-VALUE	WOOD FRAME WALL R-VALUE	MASS WALL R-VALUE <sup>d</sup>
1	NR	0.75	0.25	30	13	3/4
2	0.40	0.65	0.25	38	13	4/6
3	0.35	0.55	0.25	38	20 or 13+5 <sup>h</sup>	8/13
4 except Marine	0.35	0.55	0.40	49	20 or 13+5 <sup>h</sup>	8/13
5 and Marine 4	<div style="background-color: #cccccc; padding: 5px;">                     Second (higher) number applies when more than half the R-value is on the interior of the mass (i.e., when the thermal mass is insulated from the conditioned space)                 </div>				20 or 13+5 <sup>h</sup>	13/17
6					20+5 or 13+10 <sup>h</sup>	15/20
7 and 8					20+5 or 13+10 <sup>h</sup>	19/21

Utah 2012

5

13/15

13/15

Moved from Prescriptive Table Footnote

### Section R402.2.7- Walls with Partial Structural Sheathing

*If structural sheathing covers  $\leq 40\%$  of gross wall area* the continuous insulation R-value can be reduced enough to result in a consistent total sheathing thickness (but not reduced more than R-3) on areas of walls covered by structural sheathing.

This reduction does not apply to the U-factor alternative or Total UA alternative approach

*Received several calls on this....does not apply in Utah where the entire exterior is sheathed with OSB or Plywood*

### Section R402.2.8 - Floors Over Unconditioned Space



**Exception:** If framing members are too small to accommodate R-30, insulation that fills the framing cavity, not less than R-19, complies

Table R402.1.2  
INSULATION AND FENESTRATION REQUIREMENTS BY COMPONENT

CLIMATE ZONE	...	FLOOR R-VALUE	Utah 2012
1		13	
2		13	
3		19	19
4 except Marine		19	
5 and Marine 4		30 <sup>a</sup>	30
6		30 <sup>a</sup>	30
7 and 8		38 <sup>a</sup>	

### Section 402.2.8 Floors (Over Unconditioned Space)

Unconditioned space includes unheated basement, vented crawlspace, or outdoor air

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

Exception: Floor cavity insulation is permitted to be in contact with the topside of sheathing OR continuous insulation on bottom side of floor framing where combined with insulation that meets or exceeds Table R402.1.2 and extends Wood frame wall that extends from bottom to top line of all perimeter floor framing members.

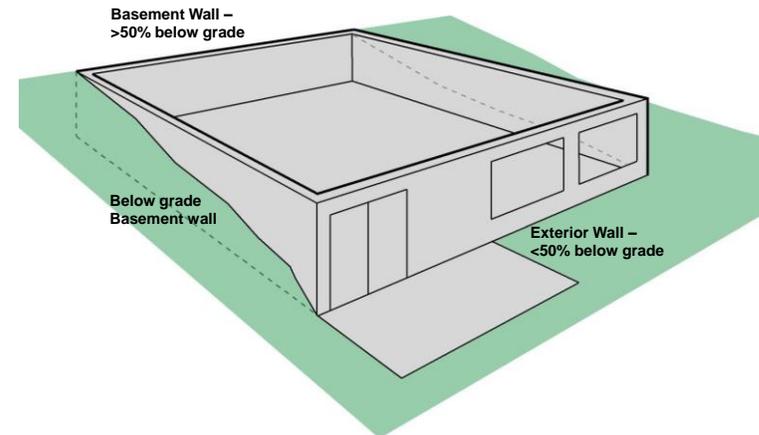


Insulation must maintain permanent contact with underside of subfloor

• **Exception:**

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

### Defining Below-Grade Walls



**Section R402.2.2.9–  
Below-Grade Walls**

Table R402.1.2  
INSULATION AND FENESTRATION REQUIREMENTS BY COMPONENT

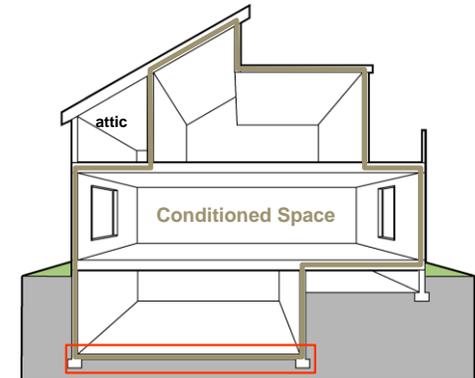
- “X/Y” means R-X continuous or R-Y cavity
- 15/19 requirement can be met with R-13 cavity (interior) plus R-5 continuous (exterior)
- In zone 3, no insulation required in warm-humid counties (footnote f)

CLIMATE ZONE	...	FLOOR R-VALUE	BASEMENT <sup>c</sup> WALL R-VALUE	Utah 2012
1		13	0	Utah 2012
2		13	0	
3		19	5/13 <sup>f</sup>	0
4 except Marine		19	10/13	
5 and Marine 4		30 <sup>a</sup>	15/19	10/13
6		30 <sup>a</sup>	15/19	10/13
7 and 8		38 <sup>a</sup>	15/19	

**Building Envelope Specific Requirements**

Building Envelope consists of:

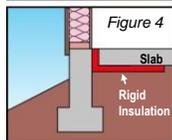
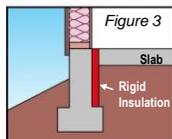
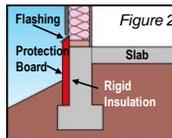
- ✓ Fenestration
  - ✓ Ceilings
  - ✓ Walls
    - Above grade
    - Below grade
    - Mass walls
  - ✓ Floors
  - ✓ Crawlspace
  - ✓ **Slabs may require insulation**
    - ✓ Slab on grade
    - ✓ Basement floor
    - ✓ Both if Heated require additional insulation
- See mechanical sections



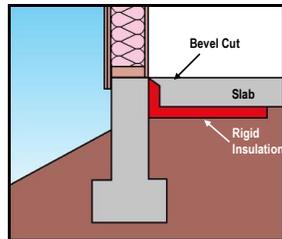
## Section R402.2.10 - Slab Edge Insulation

Applies to slabs with a floor surface < 12 inches below grade

- ✓ R-10 (typically 2 inches) insulation in Zones 4 and above
- ✓ Must extend downward from top of slab a minimum of 24" (Zones 4 and 5) or 48" (Zones 6, 7, and 8)
- ✓ Insulation can be vertical or extend horizontally under the slab or out from the building
- ✓ Insulation extending outward must be under 10 inches of soil or pavement
  - An additional R-5 is required for heated slabs
  - Insulation to depth of the footing or 2 feet, whichever is less in Zones 1-3 for heated slabs



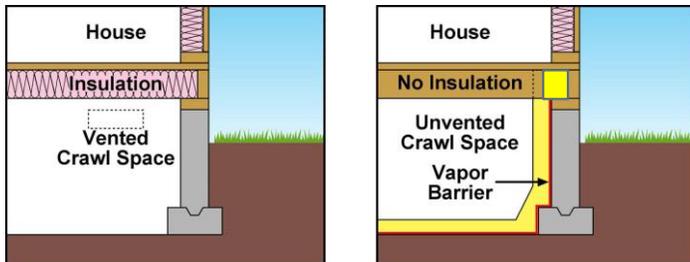
## Section R402.2.10 – Slab Edge Insulation



### Section R402.2.11 - Crawlspace Wall Insulation

Implies an unvented crawlspace (*aka, conditioned crawlspace*)

- ✓ Space must be mechanically vented or receive minimal supply air (*Refer to IRC*)
- ✓ Exposed earth must be covered with a continuous Class I vapor retarder



### Section R402.2.11 - Vented & Unvented Crawlspaces

#### Vented Crawlspace Requirements:

- ✓ The raised floor over the crawlspace must be insulated.
- ✓ A vapor retarder may be required as part of the floor assembly.
- ✓ Ventilation openings must exist that are equal to at least 1 square foot for each 150 square feet of crawlspace area and be placed to provide cross-flow (*IRC 408.1, may be less if ground vapor retarder is installed*).
- ✓ Ducts in crawlspace must be sealed and have R-6 insulation.
- ✓ Duct blaster testing may be required

#### Unvented Crawlspace Requirements:

- ✓ The crawlspace ground surface must be covered with an approved vapor retarder (*e.g., plastic sheeting*). 6" overlap-Taped/sealed
- ✓ Crawlspace walls must be insulated to the R-value requirements specific for crawlspace walls (*IECC Table R402.1.2*).
- ✓ Crawlspaces must be mechanically vented or conditioned (*heated and cooled as part of the building envelope*) (*1 cfm exhaust per 50 square feet*)
- ✓ Ducts are inside conditioned space and therefore don't need to be insulated.

Example - Unvented- mechanically vented or conditioned at 1 CFM /50 ft<sup>2</sup> 400 ft<sup>2</sup> crawlspace

$400 \div 50 = 8 \text{ CFM}$  This is a continuous value - a 4" pipe at 40 CFM intermittent easily complies

## Requirements by Climate Zone - U-Factor Table

### U-factor Alternative

- ✓ Similar to Prescriptive R-Value but uses U-factors instead
  - Allows for innovative or less common construction techniques such as structural insulated panels or advanced framing
  - Allows no trade-offs between building components

### Total UA Alternative

- ✓ Same as U-factor alternative but allows trade-offs across all envelope components
  - Primary approach used in REScheck software
  - UA – U-factor x area of assembly

TABLE R402.1.4  
EQUIVALENT U-FACTORS\*

CLIMATE ZONE	FENESTRATION U-FACTOR	SKYLIGHT U-FACTOR	CEILING U-FACTOR	FRAME WALL U-FACTOR	MASS WALL U-FACTOR <sup>b</sup>	FLOOR U-FACTOR	BASEMENT WALL U-FACTOR	CRAWL SPACE WALL U-FACTOR
1	0.50	0.75	0.035	0.084	0.197	0.064	0.360	0.477
2	0.40	0.65	0.030	0.084	0.165	0.064	0.360	0.477
3	0.35	0.55	0.030	0.060	0.098	0.047	0.091 <sup>c</sup>	0.136
4 except Marine	0.35	0.55	0.026	0.060	0.098	0.047	0.059	0.065
5 and Marine 4	0.32	0.55	0.026	0.060	0.082	0.033	0.050	0.055
6	0.32	0.55	0.026	0.045	0.060	0.033	0.050	0.055
7 and 8	0.32	0.55	0.026	0.045	0.057	0.028	0.050	0.055

- a. Nonfenestration U-factors shall be obtained from measurement, calculation or an approved source.  
 b. When more than half the insulation is on the interior, the mass wall U-factors shall be a maximum of 0.17 in Climate Zone 1, 0.14 in Climate Zone 2, 0.12 in Climate Zone 3, 0.087 in Climate Zone 4 except Marine, 0.065 in Climate Zone 5 and Marine 4, and 0.057 in Climate Zones 6 through 8.  
 c. Basement wall U-factor of 0.360 in warm-humid locations as defined by Figure R301.1 and Table R301.1.

## Section R402.5 - Fenestration Trade-off Limits

Hard limits on U-factor in northern U.S. (cannot be exceeded, even in trade-offs)

Climate Zones	U-Factor Maximum
4-5	0.48
6-8	0.40

- ✓ U-0.75 for skylights in **Zones 4-8**
- ✓ U-factors of individual windows or skylights can be higher if maximum area-weighted average is below these limits.

## Sunrooms

Less stringent insulation  
R-value and glazing  
U-factor requirements

Sunroom definition:

- ✓ One story structure
- ✓ Glazing area >40% glazing of gross exterior wall and roof area
- ✓ Separate heating or cooling system or zone
- ✓ Must be thermally isolated (both HVAC and physical separation—closeable doors or windows between sunroom and rest of the house)
- ✓ Can always meet Table R402.1.2 requirements with unlimited glass



## Sunroom Requirements

Section R402.2.13

### ✓ Ceiling Insulation

- Zones 1-4 R-19
- Zones 5-8 R-24

### ✓ Wall Insulation

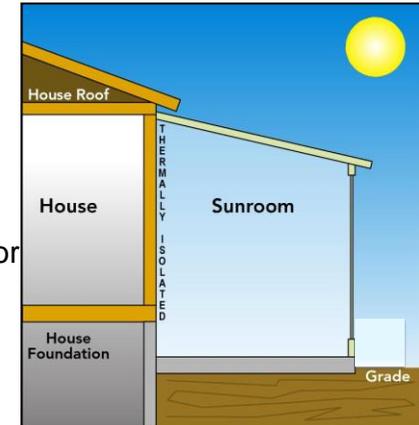
- All zones R-13

### ✓ Fenestration U-Factor

- Zones 4-8 0.45

### ✓ Skylight U-Factor

- Zones 4-8 0.70



### Section R405 - Simulated Performance Alternative

- Proposed design to be shown to have an annual energy cost that is less than or equal to the annual energy cost of the standard reference design
- Specifications for standard reference and proposed design are in Table R504.5.2(1)
- **NEW – Several weakening amendments from the 2012 adoption have been eliminated**
  - Includes new/changed specifications

### Simulated Performance Alternative

- ✓ Requires computer software with specified capabilities (local official may approve other tools)
- ✓ Includes both envelope and some systems
  - Equipment treated equally in standard and proposed design
- ✓ Allows greatest flexibility
  - Can trade off tight duct systems
- ✓ Defines compliance based on equivalency of calculated energy cost or source energy
- ✓ Section R405 specifies “ground rules”
  - These will generally be “hidden” in compliance software calculation algorithms
  - Similar ground rules are used in home federal tax credits and ENERGY STAR Home guidelines

### Section R406 - Energy Rating Index - NEW OPTION

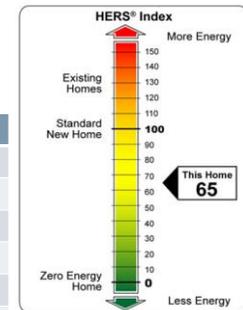
- Requires mandatory provisions be met
- Building thermal envelope shall be  $\geq$  levels of efficiency and SHGC in Table 402.1.2 or 402.1.4 in 2009 IECC
  - Exception
    - Supply and return ducts not completely inside building thermal envelope be insulated to a minimum R-6
- Compliance with this method must be completed by an approved third party and documentation including compliance reports must be reviewed by the code official
- Compliance is demonstrated if the calculated ERI is  $\leq$  a defined threshold for the zone in which the building is located

### Section R406 - Energy Rating Index

Table R406.4

Maximum Energy Rating Index

Climate Zone	ERI
1	52
2	52
3	65
4	54
5	69
6	68
7	53
8	53



State Amendments raise the ERI's-weakening amendment

## Energy Rating Index

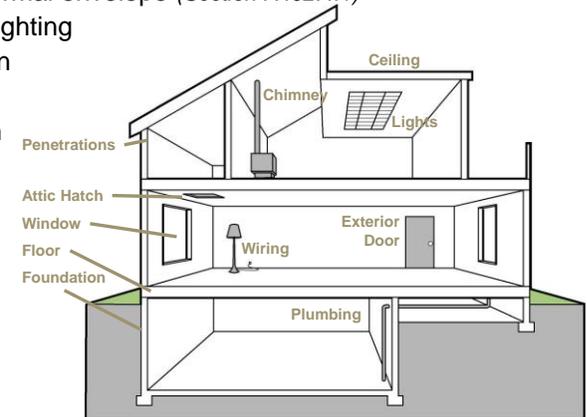
### Section R406

- ERI is defined much like the RESNET HERS Index:
  - Integer value
  - 100 corresponds to an “ERI reference design”
  - 0 corresponds to a net zero energy home
  - Each integer value represents a one percent change in the total energy use of the rated design relative to the reference design
  - ERI considers all energy used in the residence
- ERI differs from traditional performance path
  - ERI considers all energy used in the residence, whereas the performance path includes only heating, cooling, lighting, and water heating (excludes appliances and other uses)
  - Equipment and appliance efficiencies can be involved in trade-offs
  - Credit toward compliance may be available for renewable energy

## Mandatory Requirements

### Section R402.4 - Air Leakage

- ✓ Building thermal envelope (*Section R402.4.1*)
- ✓ Recessed lighting
- ✓ Fenestration
- ✓ Fireplaces
- ✓ Rooms with fuel burning appliances



## Air Leakage Control

### Section R402.4.1



## Building Thermal Envelope

### Section R402.4.1 – Air Leakage

Code requires BOTH:

- ✓ Whole-house pressure test

Air Leakage Rate	Climate Zone	Test Pressure
≤ 5 ACH	1-2	50 Pascals
≤ 3 ACH	3-8	50 Pascals

- Testing may occur any time after creation of all building envelope penetrations
- ✓ Field verification of items listed in Table R402.5.1.1
  - State amendment continues to allow either the blower door test OR
  - the field verification

**Building Thermal Envelope**  
Section R402.4.1 – Air Leakage

Two options to demonstrate compliance

- ✓ Whole-house pressure test
  - By State Amendment, all climate zones test to 5 ACH @ 50 pa
    - January 1, 2019- 3.5 ACH @ 50 pa
    - January 1, 2021- 3.0 ACH @ 50 pa
  - Testing may be by any certified testing- including contractors and sub contractors
  - Testing may occur any time after creation of all building envelope penetrations
- OR
- ✓ Field verification of items listed in Table R402.4.1.1



**NEW**

**Table R402.4.1.1 - new format – separate columns**

Component	Air Barrier Criteria	Insulation Installation Criteria
General requirements	A continuous air barrier shall be installed in the building envelope. The exterior thermal envelope contains a continuous air barrier. Breaks or joints in the air barrier shall be sealed.	Air-permeable insulation shall not be used as a sealing material.
Ceiling/attic	The air barrier in any dropped ceiling/soffit shall be aligned with the insulation and any gaps in the air barrier sealed. Access openings, drop down stair or knee wall doors to unconditioned attic spaces shall be sealed.	The insulation in any dropped ceiling/soffit shall be aligned with the air barrier.
Walls	The junction of the foundation and sill plate shall be sealed. The junction of the top plate and the top of exterior walls shall be sealed. Knee walls shall be sealed.	Cavities within corners and headers of frame walls shall be insulated by completely filling the cavity with a material having a thermal resistance of R-3 per inch minimum. Exterior thermal envelope insulation for framed walls shall be installed in substantial contact and continuous alignment with the air barrier.
Windows, skylights and doors	The space between window/door jambs and framing and skylights and framing shall be sealed.	

(partial table)

## Fireplaces

### Section R402.4.2

- New wood-burning fireplaces shall have tight fitting flue dampers or doors, and outdoor combustion air
- Tight fitting doors on fireplaces that are:
  - Factory built – listed and labeled per UL 127
  - Masonry – listed and labeled per UL 907



## Rooms Containing Fuel-burning Appliances - OPEN COMBUSTION AIR

Both Residential and Commercial Buildings- IECC Requirement

- Appliances and combustion air openings to be located outside the building thermal envelope or enclosed in a room isolated from inside the thermal envelope in Climate Zones 3-8- ALL of Utah
- Where open combustion air ducts provide combustion air to open combustion *fuel-burning appliances*
  - *Furnaces, boilers, water heaters*
- Rooms to be sealed and insulated per envelope requirements
- Doors into the rooms fully gasketed
- Water lines and ducts insulated
- Combustion air ducts that pass through conditioned space, insulated to  $\geq R-8$
- Does not apply if combustion air is drawn from inside the home



### Exceptions:

- Direct Vent
- Fireplaces
- Stoves

**Section R402.4.5 - Recessed Lighting Fixtures**

- ✓ 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 (Amended out in 2012- required in 2015 Code)

**Section R403 - Mandatory Requirements Systems**

- Controls
  - ✓ Heat pump supplementary heat
  - ✓ Hot water boiler outdoor temperature setback
- ✓ Ducts
  - Sealing (Mandatory)
  - Insulation (Prescriptive)
- ✓ HVAC piping insulation
- ✓ Hot water systems
- ✓ Ventilation
  - Dampers
- ✓ Equipment sizing
- ✓ Systems serving multiple dwelling units
- ✓ Snow melt controls
- ✓ Pools and in-ground permanently installed spas

### Section R403.1.1 – Controls - Programmable Thermostat

- ✓ At least one programmable thermostat controlling the primary heating/cooling per dwelling unit
- ✓ Capability to set back or temporarily operate the system to maintain zone temperatures
  - down to 55°F (13°C) or
  - up to 85°F (29°C)
- ✓ Initially programmed by manufacturer with:
  - heating temperature set point no higher than 70°F (21°C) and
  - cooling temperature set point no lower than 78°F (26°C)

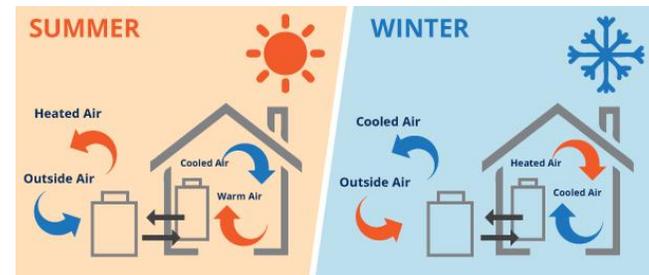


### Section R403.1.2 - Controls - Heat Pump Supplementary Heat

Prevent supplementary electric-resistance heat when heat pump can meet the heating load

#### Exception

- ✓ During defrost



### Section R403.2 - Hot Water Boiler Outdoor Temp. Setback

- One- or two-pipe heating systems have an outdoor setback control to lower boiler temperature based on outdoor temperature.



### Section R403.3.1 - Prescriptive - Duct Insulation

- ✓ Supply and return ducts in **attics**: R-8 where  $\geq 3$ " diameter, R-6 if  $< 3$ "
- ✓ Other areas: R-6 where  $\geq 3$ " diameter, R-4.2 if  $< 3$ "

#### Examples

Location	Duct Diameter $\geq 3$ " or $< 3$ "
Attic	R-8 or R-6
Conditioned Space	NR
Vented Crawlspace	R-6 or R-4.2
Conditioned Crawlspace	NR
Basement – Conditioned	NR
Basement – Unconditioned	R-6 or R-4.2
Exterior Walls	R-6 or R-4.2

## Duct Sealing

### Section R403.3.2 - Mandatory

#### ✓ Sealing (Mandatory)

- Joints and seams to comply with IMC or IRC
- All ducts, air handlers, and filter boxes to be sealed (Section R403.3.2.1)



#### • **Exceptions**

- No additional joint seals required for air-impermeable spray foam products
- Continuously welded and locking-type joints and seams **other than snap-lock and button-lock types and ducts** having static pressures < 2 in. w.c. pressure classification don't require additional closure systems

### Section R403.3.3- Mandatory - Duct Testing

- Ducts shall be pressure tested to determine air leakage by either of the following:
  - Rough-in test
    - Total leakage measured with a pressure differential of 0.1 inch w.g. (25 Pa) across the system including manufacturer's air handler enclosure
      - All registers taped or otherwise sealed
  - Postconstruction test
    - Total leakage measured with a pressure differential of 0.1 inch w.g. (25 Pa) across the entire system including manufacturer's air handler enclosure
      - All registers taped or otherwise sealed
- Exception
  - Duct air leakage test not required where ducts and air handlers are **partially** within the building thermal envelope
  - **50% inside- July 1, 2016 to Dec 31, 2017**
  - **65% inside- Beginning January 1, 2017**
  - **75% inside- Beginning January 1, 2019**
  - **80% inside- Beginning January 1, 2021**
- A written report of results of test signed by the party conducting test and provided to code official

## Duct Leakage

### Section R403.3.4 - Prescriptive

Total leakage of ducts, where measured in accordance with Section 403.3.3 shall be as follows:

- ✓ Rough-in test
  - Total leakage  $\leq$  ~~4~~ 8 cfm/per 100 ft<sup>2</sup> of conditioned floor area (Currently 10 CFM)
    - if air handler not installed at time of test
      - Total air leakage  $\leq$  ~~3-6~~ cfm/per 100 ft<sup>2</sup> (Currently 7.5 CFM)
- ✓ Postconstruction test Total leakage  $\leq$  ~~4~~ 8 cfm/per 100 ft<sup>2</sup> of conditioned floor area (Currently 10 CFM)

#### Phase In

8 CFM beginning January 1, 2017

7 CFM beginning January 1, 2019

6 CFM beginning January 1, 2021



## Building Cavities

### Section R403.3.5 - Mandatory

Framing cavities cannot be used as ducts ~~or plenums~~

State amendment allows panning

Difficult to pass a duct test if panned



## Mechanical System Piping Insulation

### Section R403.4 - Mandatory

#### ✓ R-3 required on

– HVAC systems

- Exception: Piping that conveys fluids between 55 and 105°F

#### • If exposed to weather,

– protect from damage, including

- Sunlight
- Moisture
- Equipment maintenance
- Wind

– Provide shielding from solar radiation that can cause degradation of material

– Adhesive tape is not allowed



**NEW**

76

## Heated Water Circulation and Temp. Maintenance Systems

### Section R403.5.1 - Mandatory

#### • Heated water circulation systems

- provided with circulation pump
- return pipe must be a dedicated return pipe or a cold water supply pipe
- gravity and thermo-syphon circulation systems are prohibited

#### • Controls shall

- start the pump based on identification of the demand for hot water within the occupancy
- automatically turn off pump when water in the loop is at desired temperature and there is no demand for hot water

#### • Automatic controls, temperature sensors, and pumps shall be accessible

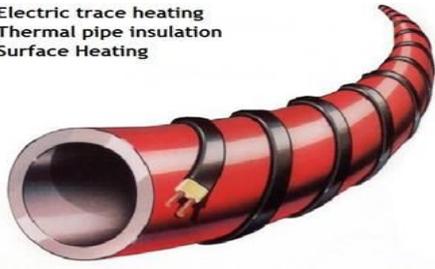
#### • Manual controls shall be readily accessible



### Section R403.5.1.2 - Heat Trace Systems

- Electric heat trace systems shall comply with IEEE 515.1 or UL 515
- Controls shall automatically adjust the energy input to the heat tracing to maintain the desired water temperature in the piping in accordance with the times when heated water is used in the occupancy

Electric trace heating  
Thermal pipe insulation  
Surface Heating



### Section R403.5.2 - Demand Recirculation Systems



- Systems having  $\geq 1$  recirculation pumps pumping heated water from supply pipe back to heated water source through cold water supply pipe
  - Shall be a demand recirculation water system
  - Pumps shall have controls that start pump upon:
    - receiving a signal from action of user of a fixture or appliance
    - sensing the presence of a user of a fixture or
    - sensing the flow of hot or tempered water to a fixture fitting or appliance
    - Controls shall limit the temperature of water entering cold water pipe to 104°F
  - Sends cool water, normally ran down the drain, back to the water heater

**NEW**

**Section R403.5.3 – Prescriptive - Hot Water Pipe Insulation**

- R-3 required on
  - Piping  $\geq \frac{3}{4}$  in. nominal diameter
  - Piping serving more than one dwelling unit
  - Piping located outside the conditioned space
  - Piping from the water heater to a distribution manifold
  - ~~Piping under a floor slab~~ state amendment
  - Buried piping
  - Supply and return piping in recirculating systems other than demand recirculation systems



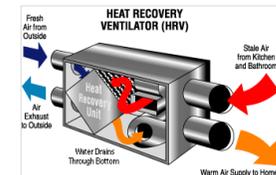
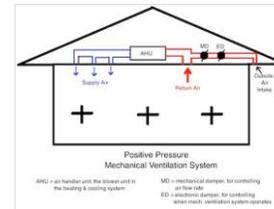
Image courtesy of Ken Baker, K energy

**NEW**

**Section R403.6 - Mechanical Ventilation**

**Required (IRC) if tested tighter than 3 ACH@50pa (State amended from 5 ACH@50pa)**

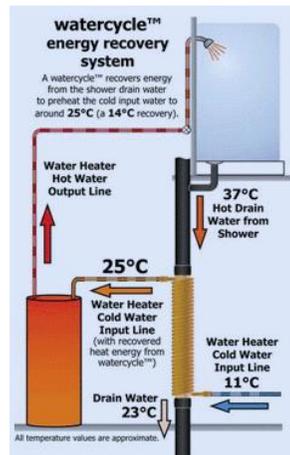
- ✓ Ventilation
  - Building to have ventilation meeting IRC or IMC or with other approved means (previously deleted by the 2012 amendments)
  - Outdoor air intakes and exhausts shall have automatic or gravity dampers that close when the ventilation system is not operating
- ✓ Whole-house mechanical ventilation system fans to meet efficacy in Table R403.6.1
  - ✓ **Exception**
    - ✓ When fans are integral to tested and listed HVAC equipment, they shall be powered by an electronically commutated motor



## Drain Water Heat Recovery Units

### Section R403.5.4

- When Installed
- Comply with CSA B55.2 and tested in accordance with CSA B55.1
- Portable water-side pressure loss of drain water heat recovery units shall be < 3 psi for individual units connected to 1 or 2 showers
  - < 2 psi if connected to  $\geq 3$  showers



## Section R403.7 - Equipment Sizing and Efficiency Rating

### ✓ Equipment Sizing

- Load calculations determine the proper capacity (size) of equipment
  - Goal is big enough to ensure comfort but no bigger
- Sizing shall be performed in accordance with ACCA Manual S based on loads calculated in accordance with ACCA Manual J (other approved methods)

### ✓ Efficiency Rating

- New or replacement heating/cooling equipment shall have an efficacy rating equal to or greater than minimum required by federal law for geographic location of installation



## Snow Melt System Controls

### Section R403.9

#### Snow- and ice-melting system controls

- ✓ Automatic shutoff when pavement temperature is > 50°F and no precipitation is falling
- ✓ Automatic or manual shutoff when outdoor temperature is > 40°F



## POOLS and Permanent Spa Energy Consumption

### Section R403.10 - Mandatory

- ✓ Pools and spas in accordance with APSP-145
- ✓ Heaters
  - with a readily accessible on-off switch that is integral part of heater mounted on the exterior of heater or external to within 3 feet of heater
  - Switch shall not change the setting of heater thermostat
  - Switches shall be in addition to the circuit breaker for the power to the heater
  - fired by natural gas not allowed to have continuously burning pilot lights
- ✓ Time switches (or other control method) to automatically turn off and on heaters and pumps according to a preset schedule installed on all heaters and pump motors
- ✓ Note: heaters, pumps, and motors with built-in timers meet the requirement
  - Exceptions
    - Public health standards requiring 24-hour pump operation
    - Pumps operating pools with solar and waste-heat recovery heating systems



## Covers

### Section R403.10.4

On outdoor heated pools and outdoor permanently installed spas

- ✓ Vapor-retardant cover OR
- ✓ Other approved vapor retarder means

### **Exception:**

- ✓ If >70% of energy from site-recovered energy



## Portable Spas

### Section R403.11 - Mandatory

- Energy consumption of electric-powered portable spas shall be controlled by the requirements of APSP-14



## Systems

### Section R403.8

Systems serving multiple dwelling units shall comply with Sections C403 and C404 in lieu of Section R403



## Lighting Equipment

### Section R404.1 - Mandatory

A minimum of **75 percent** of the lamps in permanently installed lighting fixtures shall be high-efficacy lamps or 75% of permanently installed lighting fixtures shall contain only high efficacy lamps

#### **Exception:**

- ✓ Low-voltage lighting



## Lighting Equipment

### Section R404.1.1 - Mandatory

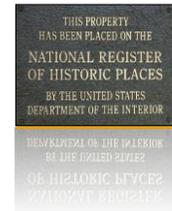
Fuel gas lighting systems can't have continuously burning pilot lights



## Existing Building Chapter 5 – NEW CHAPTER

### Section R501 - General

- ✓ Additions, alterations, or repairs
- ✓ Existing buildings
- ✓ Maintenance
- ✓ Compliance
- ✓ New and replacement materials
- ✓ Buildings designated as historic
  - ✓ *Must show IECC requirements will threaten, degrade or destroy the historic form, fabric or function of the building.*



## Existing Buildings

### Section R502 - Additions

- ✓ Additions must meet the prescriptive requirements in Table 402.1.2 or 402.1.4 (*R-value computation or U-factor or total UA alternatives*)



## Existing Buildings

### Section R502 - Additions

- ✓ Additions comply if any of the following is demonstrated
  - ✓ The addition alone complies with the provisions of this code
  - ✓ The existing building and addition together comply as a single building
  - ✓ The existing building and addition together use no more energy than the existing building



### Section R503 - Alterations - Existing Buildings

#### Building Envelope

##### Exceptions:

- ✓ Storm windows over existing fenestration
- ✓ Surface-applied window film installed on existing single pane
- ✓ Exposed, existing ceiling, wall or floor cavities if already filled with insulation
- ✓ Where existing roof, wall or floor cavity isn't exposed
- ✓ Roof recover
- ✓ Roofs without cavity insulation and neither sheathing nor insulation is exposed during the reroofing
  - Insulate either above or below the sheathing

#### Lighting

##### Exceptions:

- ✓ <50% of luminaries in a space are replaced
- ✓ Only bulbs and ballasts within existing luminaries are replaced (provided installed interior lighting power isn't increased)

### Section R503 - Alterations - Existing Buildings

#### • Heating and Cooling

- New HVAC systems and duct systems that are part of the alteration to comply with Section 403.1, R403.2, R403.3 and R403.6
  - Exception: Where duct from an existing HVAC system are extended, duct systems with < 40 linear feet in unconditioned spaces are not required to be tested in accordance with Section R403.3.3

#### • Service hot water (SHW) systems

- New SHW systems that are part of the alteration to comply with R403.4

#### Repairs

- Work on non-damaged components necessary for the required repair or damaged components shall be considered part of the repair and are not subject to the alterations requirements
- Repairs considered part of the code
  - Glass-only replacements in an existing sash and frame
  - Roof repairs
  - Repairs where only the bulb and/or ballast within the existing luminaires in a space are replaced provided the replacement does not increase the installed interior lighting power

## Thank You!

- Questions/comments may be addressed to me at:
- Brent Ursenbach
- Salt Lake County
- [bursenbach@slco.org](mailto:bursenbach@slco.org)
- [bursenbach@yahoo.com](mailto:bursenbach@yahoo.com)
- 385-468-6694
- 801-381-1449

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