

# Overview of the 2003 International Energy Conservation Code

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# Presentation Overview

- Changes Approved in the 2000 and 2001 Code Development Cycle
- Changes Proposed and Tentatively Approved during the 2002 Code Development Cycle



# International Energy Conservation Code

## Residential Provisions



# What Types of Buildings Must Comply?



- Detached one and two - family dwellings
- Previous Designation - Type A1



# What Types of Buildings Must Comply?



- Group R-2: Residential containing more than 2 dwelling units  $\leq$  3 stories
- Group R-4: Residential care/assisted living  $\leq$  3 stories
- Previous designation - Type A2



# Chapter 4: Systems Analysis

- Clarified References to Standard Design Fenestration and Wall U-factors.
  - Fenestration U-factor reference = Table 402.1.1(1)
  - Wall U-factor reference = Table 402.1.1(2)
- Glazing Orientations
  - Reduced from 8 to 4 for the Standard Design
- Production Developments
  - Uses worst possible orientation for the proposed design to represent a group of buildings



# Chapter 4: Systems Analysis

- Glazing Orientations
  - Reduced from 8 to 4 for the Standard Design
    - Requires equal orientation on North, East, South and West orientation
    - 2000 IECC required glass to be modeled on North, Northeast, East, Southeast, South, Southwest, West and Northwest orientations
- Production Development
  - Uses worst possible orientation for the proposed design to represent a group of buildings
    - Use 8 orientations to determine worst case



# Chapter 4

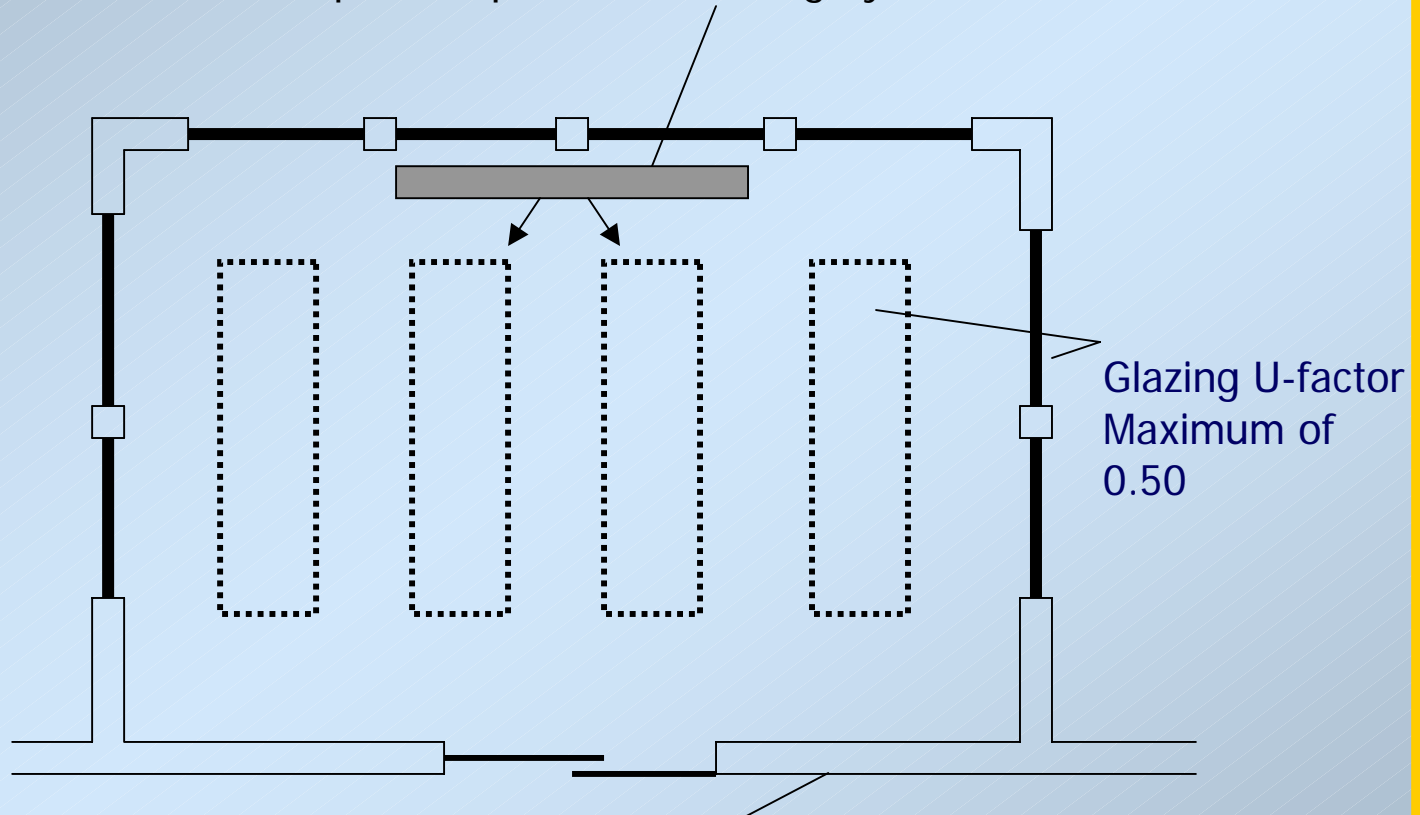
## Proposed Code Changes

- Chapter 4 - Systems Analysis
  - Requires calculation procedure to specify framing type
- Chapter 5 and 6
  - Accounts for the effects of steel framing in roof/ceiling assemblies and floor assemblies
    - New correction factors for roof and ceiling assemblies
  - Allows for area weighted averaging to meet glazing U-factor requirement in Prescriptive Specification Approach



# Sunroom Addition

Separate Space Conditioning System

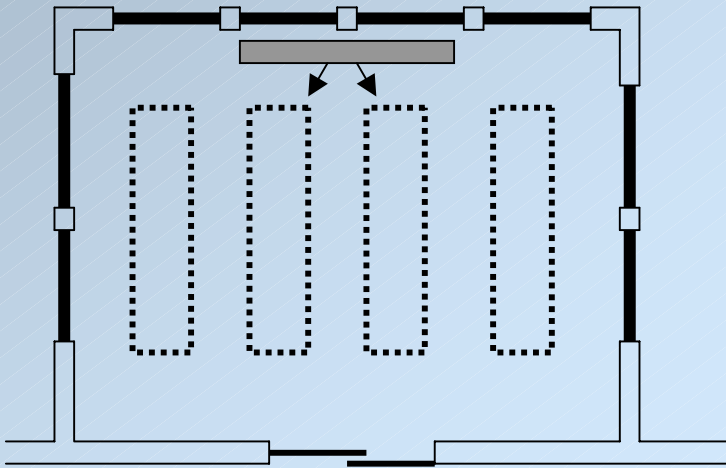


Glazing U-factor  
Maximum of  
0.50

Thermal Isolation  
Meet Table 502.2.5  
Requirements



# Sunroom Addition Proposed Changes



- U-factor maximum of 0.50 in climates with 2,000 to 12,000 HDD
- 0 - 5,999 HDD
  - Ceiling R-value = 19
  - Wall R-value = 13
- 6,000 - 12,999 HDD
  - Ceiling R-value = 24
  - Wall R-value = 13



# Chapter 5 & 6

## Proposed Code Changes

TABLE 502.2.4.18(1)  
TRUSS TYPE COLD-FORMED STEEL ROOF/CEILING  
EQUIVALENT R-VALUES<sup>a</sup>

WOOD-FRAMED ROOF/CEILING R-VALUE <sup>b</sup>	TRUSS TYPE COLD-FORMED STEEL CAVITY AND CONTINUOUS INSULATION R- VALUE, 24 IN. O.C. <sup>c</sup>
R-13	R-19, R13+R3
R-19	R-26, R-19+R-3
R-26	R-38, R-26+R-3
R-30	R-38, R-30+R-3
R-38	R-49, R-38+R-5
R-49	N/A

- This table applies to cold-formed steel truss roof framing spaced at 24 inches (609 mm) on-center and where the penetrations of the truss members through the cavity insulation do not exceed three (3) penetrations for each 4 foot (1,220 mm) length of the truss.
- As required by Section 502.2.4 and the tabular entry for "ceiling R-value" shown in Tables 502.2.4(1) through 502.2.4(9).
- The cavity R-value requirement is listed first, followed by the continuous insulation R-value requirement.

- Steel framing factors - Roof/Ceiling Assemblies



# Chapter 5 & 6

## Proposed Code Changes

TABLE 502.2.4.18(2)  
C-SHAPED COLD-FORMED STEEL ROOF/CEILING EQUIVALENT  $U_R$ -FACTORS<sup>a</sup>

Framing <sup>b</sup>	Spacing	R-13 <sup>c</sup>	R-19 <sup>c</sup>	R-26 <sup>c</sup>	R-30 <sup>c</sup>	R-38 <sup>c</sup>	R-49 <sup>c</sup>
Wood	16 in. o.c.	0.0773	0.0537	0.0405	0.0355	0.0285	0.0223
Steel							
2 x 4	16 in. o.c.	0.1328	0.0530	0.0387	0.0336	0.0265	0.0206
2 x 6	16 in. o.c.	0.1328	0.0667	0.0456	0.0386	0.0295	0.0223
2 x 8	16 in. o.c.	0.1328	0.1208	0.0585	0.0475	0.0345	0.0251
2 x 10	16 in. o.c.	0.1328	0.1208	0.1094	0.1037	0.0398	0.0277
2 x 12	16 in. o.c.	0.1328	0.1208	0.1094	0.1037	0.0471	0.0311
Wood	24 in. o.c.	0.0742	0.0519	0.0390	0.0342	0.0274	0.0215
Steel							
2 x 4	24 in. o.c.	0.1129	0.0510	0.0376	0.0327	0.0260	0.0202
2 x 6	24 in. o.c.	0.1129	0.0610	0.0428	0.0366	0.0284	0.0216
2 x 8	24 in. o.c.	0.1129	0.0994	0.0517	0.0429	0.0320	0.0237
2 x 10	24 in. o.c.	0.1129	0.0994	0.0873	0.0816	0.0357	0.0257
2 x 12	24 in. o.c.	0.1129	0.0994	0.0873	0.0816	0.0403	0.0280

For SI: 1 inch = 25.4 mm

- a. Linear interpolation for determining U-Factors which are intermediate between those given in the table is permitted.
- b. Applies to steel framing up to a maximum thickness of 0.064 inches (16 gage.)
- c. As required by Section 502.2.4 and the tabular entry for "ceiling R-value" shown in Tables 502.2.4(1) through 502.2.4(9).



# Chapter 5 & 6

## Proposed Code Changes

- Steel framing factors - Floor Assemblies

TABLE 502.2.4.19  
C-SHAPED COLD-FORMED STEEL FLOOR EQUIVALENT  $U_f$ -FACTORS<sup>a</sup>

Framing <sup>b</sup>	Spacing	R-11 <sup>c</sup>	R-13 <sup>c</sup>	R-15 <sup>c</sup>	R-19 <sup>c</sup>	R-21 <sup>c</sup>	R-25 <sup>c</sup>
Wood	16 in. o.c.	0.0725	0.0652	0.0595	0.0477	0.0452	0.0382
Steel							
2 x 6	16 in. o.c.	0.1058	0.1031	0.1005	0.0583	0.0523	NA
2 x 8	16 in. o.c.	0.1058	0.1031	0.1005	0.0957	0.0935	0.0548
2 x 10	16 in. o.c.	0.1058	0.1031	0.1005	0.0957	0.0935	0.0894
2 x 12	16 in. o.c.	0.1058	0.1031	0.1005	0.0957	0.0935	0.0894
Wood	24 in. o.c.	0.0708	0.0633	0.0574	0.0464	0.0436	0.0370
Steel							
2 x 6	24 in. o.c.	0.0941	0.0907	0.0875	0.0538	0.0486	NA
2 x 8	24 in. o.c.	0.0941	0.0907	0.0875	0.0818	0.0792	0.0488
2 x 10	24 in. o.c.	0.0941	0.0907	0.0875	0.0818	0.0792	0.0745
2 x 12	24 in. o.c.	0.0941	0.0907	0.0875	0.0818	0.0792	0.0745

For SI: 1 inch = 25.4 mm

a. Linear interpolation for determining U-Factors which are intermediate between those given in the table is permitted.

b. Applies to steel framing up to a maximum thickness of 0.064 inches (16 gage.)

c. As required by Section 502.2.4 and the tabular entry for "floor R-value" shown in Tables 502.2.4(1) through 502.2.4(9).



# Duct Insulation Requirements

	Insulation R-values (h•ft <sup>2</sup> •°F)/Btu <sup>d</sup>			
	Ducts in unconditioned attics or outside building		Ducts in unconditioned basements, crawl spaces, garages and other unconditioned spaces	
	Supply	Return	Supply	Return
Annual Heating Degree Days				
Below 1,500	8	4	4	0
1,500 to 3,500	8	4	6	2
3,501 to 7,500	8	4	8	2
Above 7,500	11	6	11	2



# Chapter 5 & 6

## Proposed Code Changes

- Prescriptive Specification Approach
  - Area weighted averaging allowed to meet glazing U-factor requirement



# Chapter 6: Simplified Prescriptive Clean-up

- References IECC Section 502.1.1 for Moisture Control
  - Vapor retarders required



- References IECC Section 502.1.3 for recessed lighting fixtures
  - Air tight, IC rated recessed can lights required



# Proposed Code Changes

- Chapter 5
  - Electrical metering required for dwelling units in all buildings (also applies to Chapter 8).
    - Includes one- and two-family residential
    - R2 and R4 occupancies
    - Dwelling units in 4 story and above “commercial” buildings



# International Energy Conservation Code

## Commercial Provisions



# Structure of the IECC

- **Chapter 1 Administrative & Enforcement**
- **Chapter 2 Definitions**
- **Chapter 3 Design Conditions**
- **Chapter 4 Residential - Systems Analysis**
- **Chapter 5 Residential - Component Performance**
- **Chapter 6 Simplified Prescriptive Requirements**
- **Chapter 7 ASHRAE 90.1-1999 Energy Code Reference**
- **Chapter 8 Design by Acceptable Practice for Commercial Buildings**
- **Chapter 9 Referenced Standards**



# Structure of the IECC - Proposed

- **Chapter 1 Administrative & Enforcement**
- **Chapter 2 Definitions**
- **Chapter 3 Design Conditions**
- **Chapter 4 Residential - Systems Analysis**
- **Chapter 5 Residential - Component Performance**
- **Chapter 6 Simplified Prescriptive Requirements**
- **Chapter 7 ASHRAE 90.1-2001 Energy Code Reference**
- **Chapter 8 Design by Acceptable Practice for Commercial Buildings**
- **Chapter 9 Referenced Standards**



# Chapter 8 Changes

- Air Tight Recessed Fixtures



# Vestibules

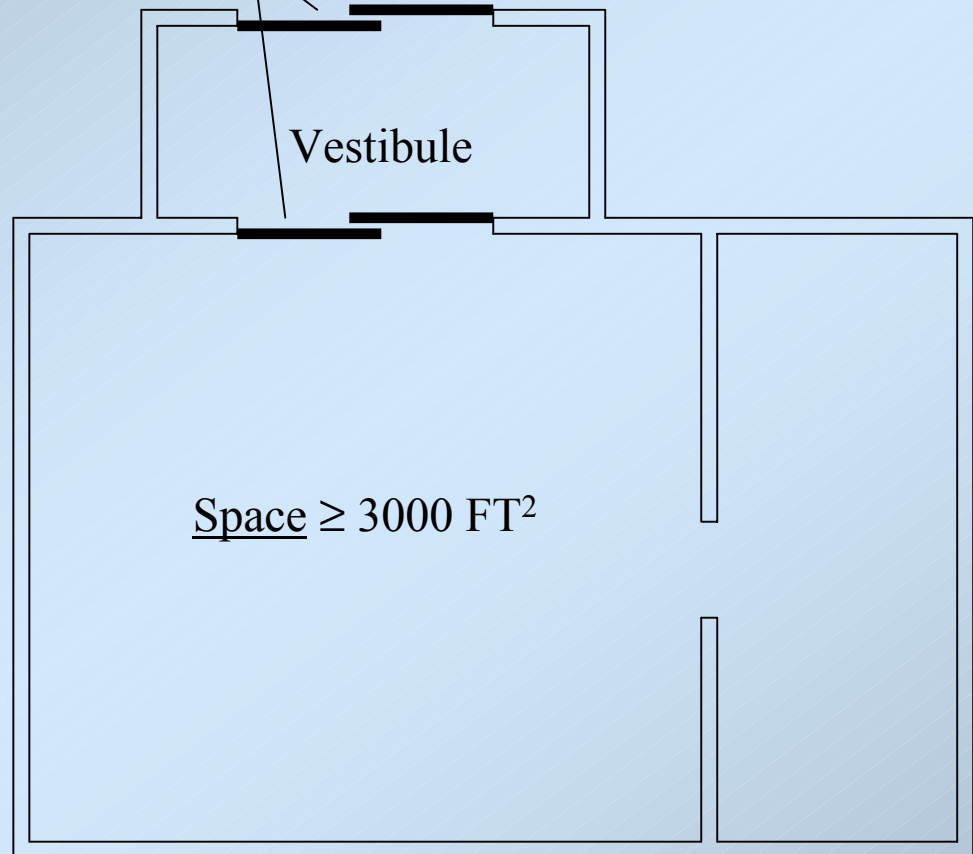
Self Closing Doors

## Enclosed Vestibule Required for:

- Spaces  $\geq 3,000$  Ft<sup>2</sup>
- Entrance doors
- Must have self-closing devices

## Exceptions

- Doors from guest room or dwelling unit
- Revolving doors
- Doors used primarily for vehicular movement, material handling and adjacent personnel doors



# Other Infiltration Controls

## Dampers Integral to Building Envelope



- Motorized dampers required on vents for
  - Stairs
  - Elevator shafts
  - Other dampers
- Gravity dampers permitted on buildings  
< 3 stories



# Loading Dock Weather seals

- Equip cargo doors and loading dock doors with weather seals
  - Restrict infiltration



# Equipment Efficiency

- New Efficiency Requirements Listed in Table 803.2.2, 803.3.2 and 803.3.3
- Took effect as of 10/29/01



# Economizers

## Simple Systems

- Air economizers required on systems
- Cooling capacity > 65,000 Btu/h
- Not required to be *integrated*
- Not required for <135,000 Btu/h in climate zones 3c, 5b, 7, 13b and 14
- Equipment efficiency trade-off



# Economizers

## Complex Systems

- Air or water economizers required on systems
- Cooling capacity > 65,000 Btu/h
- Not required to be *integrated*
- Not required for <135,000 Btu/h in climate zones 3c, 5b, 7, 13b and 14



# Heat Rejection Equipment Fan Speed Control

- Fan Motors  $\geq 7 \frac{1}{2}$  HP
  - Capability to Operate Fan at Two-Thirds of Full Speed or Less, and
  - Controls that Automatically Change the Fan Speed to Control the Leaving Fluid Temperature or Condensing Temperature/Pressure of Heat Rejection Device



# Switching Requirements

- First Requirement
  - Each space to have manual control
- Second Requirement
  - Area  $< 250 \text{ ft}^2$ 
    - 2<sup>nd</sup> Control to reduce lighting load by 50%
  - Area  $> 250 \text{ ft}^2$  in buildings larger than  $5000 \text{ ft}^2$ 
    - Automatic control device
      - Scheduled basis to control areas  $\leq 25,000 \text{ ft}^2$  or no more than one floor
      - Unscheduled basis by occupant intervention



# Proposed Code Changes

- Chapter 8
  - Requires all spaces in buildings to have bi-level switching
  - Requires automatic lighting shut-off in all areas of buildings greater than 5,000 ft<sup>2</sup>



# Proposed Code Changes

- Chapter 8
  - Added occupancies to Interior Lighting Power Table

TABLE 805.5.2  
INTERIOR LIGHTING POWER

BUILDING OR AREA TYPE	ENTIRE BUILDING (W/ft <sup>2</sup> )	TENANT AREA OR PORTION OF BUILDING (W/ft <sup>2</sup> )
<u>Automotive Facility</u>	<u>1.5</u>	<u>NA</u>
Convention, conference or meeting center <sup>a</sup>	<del>NA</del> <u>1.4</u>	1.5
<u>Court House/Town Hall</u>	<u>1.4</u>	<u>NA</u>
<u>Dormitory</u>	<u>1.5</u>	<u>NA</u>
Hotel function <sup>a</sup>	<del>NA</del> <u>1.7</u>	2.4
<u>Motel</u>	<u>2.0</u>	<u>NA</u>
<u>Multi-Family</u>	<u>1.0</u>	<u>NA</u>
<u>Parking Garage</u>	<u>0.3</u>	<u>NA</u>
<u>Penitentiary</u>	<u>1.2</u>	<u>NA</u>
<u>Police/Fire Station</u>	<u>1.3</u>	<u>NA</u>
<u>Post Office</u>	<u>1.6</u>	<u>NA</u>
<u>Transportation</u>	<u>1.2</u>	<u>NA</u>



# Proposed Code Changes

- Chapter 8
  - Clarified duct insulation requirement for ducts in unconditioned space vs. ducts outside the building
  - **803.2.8 (Supp) Duct and plenum insulation and sealing.**

“All supply and return air ducts and plenums shall be insulated with a minimum of R-5 insulation when located in unconditioned spaces and with a minimum of R-8 insulation when located outside the building [envelope]. When located within a building envelope assembly, the duct or plenum shall be separated from the building exterior or unconditioned or exempt spaces by a minimum of R-8 insulation.”



# Proposed Code Changes

- Chapter 8
  - Hydronic system reset controls proposed for systems greater than 300,000 Btu/h
  - Provides criteria for VAV systems before reheat/recool or temperature mixing take place.
    1. 30 percent of the maximum supply air to each zone
    2. 300 cfm or less where the maximum flow rate is less than 10 percent of the total fan system supply airflow rate
    3. The minimum ventilation requirements of Chapter 4 of the *International Mechanical Code*

