

U.S. Department of Energy
Energy Efficiency and Renewable Energy
Building Energy Codes

IECC 2009 USING COMCheck

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Today's Presentation

Not "How to" but a "What's in it for me"

- Overview of *COMCheck*
- Changes from 2006 IECC to 2009 IECC
- Sources of Additional Information / Tools

www.energycodes.gov

U.S. Department of Energy
Energy Efficiency and Renewable Energy

Building Energy Codes Program

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The U.S. Department of Energy's Building Energy Codes Program is an information resource on national model energy codes. We work with other government agencies, state and local jurisdictions, national code organizations, and industry to promote stronger building energy codes and help states adopt, implement, and enforce those codes.

The Program recognizes that energy codes maximize energy efficiency only when they are fully embraced by users and supported through education, implementation, and enforcement.

Free Software and Technical Support

REScheck
The REScheck materials have been developed to simplify and clarify residential code compliance with the Model Energy Code (MEC), the International Energy Conservation Code (IECC), and state specific codes.
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COMcheck
The COMcheck materials have been developed to simplify and clarify commercial code compliance with the International Energy Conservation Code (IECC), ANSI/ASHRAE/IESNA Standard 90.1, and state specific codes.
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Ask an Energy Codes Expert
Need help with the software tools? Need energy codes assistance? Through the [BILLOE Expert](#) program, energy codes experts are available to answer your specific questions.

Resource Center
The Resource Center is a web-based system designed to provide users with information about energy codes and beyond code technologies. Resources are available in a variety of different media types, including articles, graphics,

ENER Information Center
ANNOUNCEMENTS
About 2009 Building Energy Codes 2009 and 2012
STATES
ANSI/ASHRAE/IESNA Standard 90.1-2009
Buildings Energy Codes News Headlines
PUBLICATIONS
January 2009 Building Energy Codes
Standard 90.1-2009
ANSI/ASHRAE/IESNA Standard 90.1-2009

COMCheck: WHAT IS IT? 

- Software Program: Simplifies analysis
- An Energy Budget: Comparison w/ Prototype
- Five Separate Comparisons
 - o 502 Budget Envelope to Proposed Envelope
 - o 503 HVAC to Proposed HVAC
 - o 504 Service Water Heating to Proposed SWH
 - o 505.5 Interior Lighting & Power to Proposed ILP
 - o 505.6 Exterior Lighting & Power to Proposed ELP
- Reports two results:
 - o Prescriptive Choices modified thru UA analysis
 - o Mandatory Requirements to be confirmed

COMCheck: WHAT'S IN IT FOR ME? 

- Designers: Avoiding errors & orphans
- Builders: Coordinate takeoffs from your CD's
- Code Officials: Making enforcement easier
- Everyone: Saves time and money; job record

Inspection Checklists 

- Mandatory
 - o Presumes you meet these requirements
- Prescriptive Input
 - o Climate Zone dependent
 - o Values based on reasonable return

<http://www.energycodes.gov/compliance/evaluation/checklists>



Inspection Checklist

1. General

2. Compliance with Energy Code Title 24, Part 2, Section 20200

3. Compliance with Energy Code Title 24, Part 2, Section 20200

4. Compliance with Energy Code Title 24, Part 2, Section 20200

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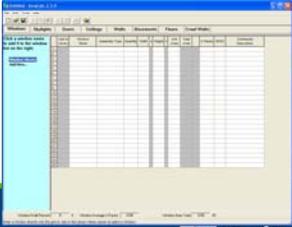
100. Compliance with Energy Code Title 24, Part 2, Section 20200

ERRORS & ORPHANS 103.2 

Entry Errors	Forgotten Orphans
<ul style="list-style-type: none">• Incorrect CODE• Wrong Assembly• Incorrect Location• Lookup Values• Wrong PLANS	<ul style="list-style-type: none">• Access doors/hatches• Interior walls/floors• Undersides of stairs• Overhangs/soffits• Transition spaces

 **HIDDEN TOOLS - AreaCalc**

- Separate from **RESCheck** desktop
- Calculates building areas / shapes
- Areas transfer only to RESCheck
- Keeps track
- Does math



COMCheck™
DOE's Commercial Compliance software

Desktop Software Tools	Web-Based Tools
 (Windows or Mac version)	 DO NOT USE THESE

No-cost, easy-to-use software that will demonstrate compliance.

www.energycodes.gov/software.stm

COMCheck Main Steps

- Select the Appropriate Code
- Enter Project Information
- Enter Building Components
- Enter Interior/Exterior Lighting
- Enter Mechanical Equipment
- View/Print Compliance Report(s)
- Save the Data File and the Report

SECTION 103.2 Information on CD's

- Insulation: Materials, R-value
- Fenestration: U-factors / SHGC
- Air sealing details
- Load calc's / equipment sizes, efficiencies
- Economizer descriptions
- Equipment & system controls
- Duct sealing / insulation / locations
- Lighting fixture schedules

COMCheck Project Tab: 2009 IECC

Screen Operations - Colors

- Blue** - Looking for data
- Green** - Passes
- Red** - Info? Error? Failing?

The screenshot shows the COMCheck software interface. At the top, there are status bars: "Envelope T10 Interior Lighting T10" and "Envelope PASSED: Design 5% better than Code Envelope +5% Interior Lighting +20%". Below is a menu bar (File, Edit, View, Options, Code, Help) and a toolbar. The main window has tabs for Project, Envelope, Interior Lighting, Exterior Lighting, and Mechanical. Under the Envelope tab, there are sub-tabs for Roof, Skylight, Ext. Wall, Int. Wall, Window, Door, Basement, and Floor. A table is displayed with columns: Component, Assembly, Construction Details, Gross Area, Cavity Insulation R-value, Continuous Insulation R-value, U-Factor, SHGC, and Protection Factor. The first row is for "Building" and the first column is "Roof 1". A red circle highlights the "U-Factor" cell for "Roof 1".

Addition of Residential Occupancies

Changes to 2009 IECC

- A separate set of occupancy requirements for Group R was added to the R-value and U-factor tables for opaque assemblies
- All other commercial occupancies use "All other" requirements

How handled in COMCheck

- COMCheck already asks the building type for use in the lighting calculations. The building type is used to select the correct Use Group opaque envelope requirements

COMCheck Envelope Tab: 2009 IECC

The screenshot shows the COMCheck software interface with the Envelope tab selected. The table has columns: Component, Assembly, Construction Details, Gross Area, Cavity Insulation R-value, Continuous Insulation R-value, U-Factor, SHGC, and Protection Factor. The first row is for "Building". Below the table, there are instructions: "THESE ARE ENTERED FOR EACH COMPONENT", "CLICK / DRAG & DROP FOR MOVING ENTRIES", and "Use the building assembly buttons above the column headers to create a description of your building." At the bottom, there are status bars: "Envelope T10 Interior Lighting T10 Exterior Lighting T10" and "Building use categories must be specified in the project screen." A small number "5" is in the bottom right corner.

Envelope Efficiency Changes - Roofs 

Changes to 2009 IECC	How handled in COMCheck
<ul style="list-style-type: none"> • Metal building roofs CZ5: double layer insulation required • Attic roofs CZ5: R-value increases: R-30 to R-38 	<ul style="list-style-type: none"> • COMCheck updated to read the appropriate roof baseline U-factors from U-factor tables in IECC

Envelope Efficiency Changes - Walls 

Changes to 2009 IECC	How handled in COMCheck
<ul style="list-style-type: none"> • Mass walls R-value increased across all climate zones • Metal building walls R-value decrease for second layer of insulation from R-13 to R-5.6 in CZ5 • Metal framed walls continuous R-value increases to R-7.5 from R-3.8 in CZ5 • Wood framed walls continuous insulation requirement added in CZ5 	<ul style="list-style-type: none"> • COMCheck updated to read the appropriate wall baseline U-factors from U-factor tables in IECC

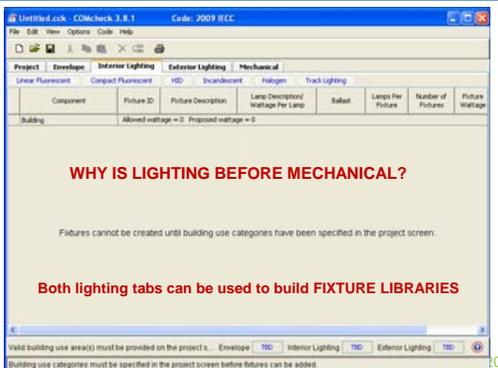
Addition of U-factor Table 502.1.2 

Changes to 2009 IECC	How handled in COMCheck
<ul style="list-style-type: none"> • Table 502.1.2 Opaque Assembly U-factor requirements added, making it clear that assemblies other than those listed in the prescriptive R-value tables may be used 	<ul style="list-style-type: none"> • COMCheck utilizes these U-factor tables from IECC

Envelope Efficiency Changes - Fenestration

Changes to 2009 IECC	How handled in COMcheck
<ul style="list-style-type: none"> • Skylights – one set of requirements for both plastic and glass skylights based on the previous glass skylight requirements 	<ul style="list-style-type: none"> • COMcheck has been updated to read the appropriate baseline U-factor for windows and skylights from the U-factor tables in IECC

COMCheck Interior Lighting: 2009 IECC



WHY IS LIGHTING BEFORE MECHANICAL?

Fixtures cannot be created until building use categories have been specified in the project screen.

Both lighting tabs can be used to build FIXTURE LIBRARIES

Daylight Zone Control

Changes to 2009 IECC	How handled in COMCheck
<ul style="list-style-type: none"> • Section 505.2.2.3 daylight zone controls required for all daylight zones • Daylight zones include areas adjacent to vertical fenestration and areas under skylights 	<ul style="list-style-type: none"> • This requirement added to the checklist items

Allowable Fan Floor Horsepower

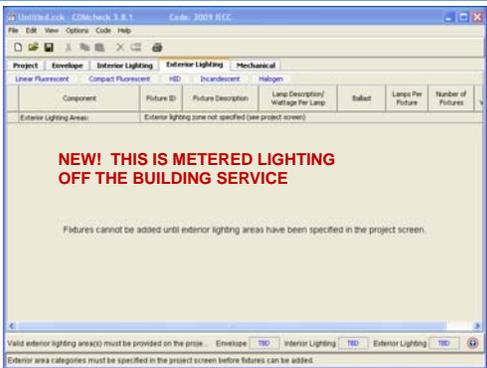
Changes to 2009 IECC

- Section 503.2.10.1 now limits the fan system nameplate motor HP, or fan system braking HP

How handled in COMcheck

- This requirement added to the checklist items

COMCheck Exterior Lighting: 2009 IECC



NEW! THIS IS METERED LIGHTING OFF THE BUILDING SERVICE

Fixtures cannot be added until exterior lighting areas have been specified in the project screen.

Valid exterior lighting area(s) must be provided on the project. Envelope | TID | Interior Lighting | TID | Exterior Lighting | TID

Exterior area categories must be specified in the project screen before fixtures can be added.

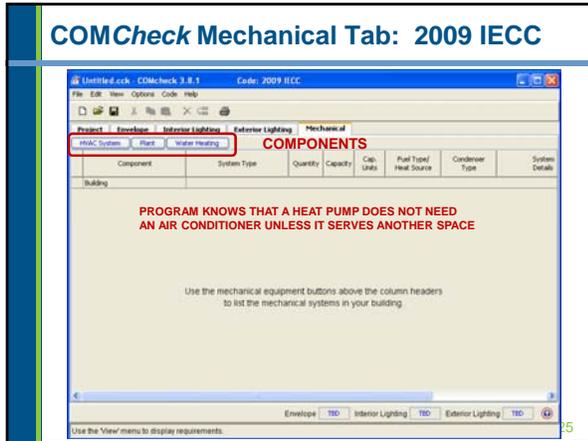
New Exterior Lighting Zones

Changes to 2009 IECC

- Implements a new series of exterior lighting power requirements in Section 505.6.2 based on types of exterior environment: parks; residential neighborhoods; other areas; high-activity commercial districts

How handled in COMCheck

- COMCheck now asks for the exterior environment type and applies the appropriate baseline requirements for the type



Demand Control Ventilation

- Changes to 2009 IECC**
 - Now requires demand controlled ventilation in Section 503.2.5.1 for spaces over 500 ft² with an average occupant load of 40 people per 1000 ft²
- How handled in COMcheck**
 - This requirement added to the checklist items

HELP!

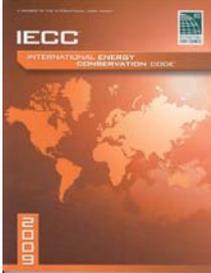
The 2009 IECC - WHAT'S DIFFERENT?

NEW

- Air Barriers 502.4.9
- DC Ventilation 503.2.5.1
- Fan Power 503.2.10
- Hot Gas Bypass 503.4.7
- Daylighting 505.2.2.3

REVISED

- Economizers 503.3.1
- Duct Insulation 503.2.7
- ILPA Exceptions: (+15)



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The 2009 IECC - NEW DEFINITIONS (202)

- Air barrier
- C-Factor
- F-Factor
- Entrance Door
- Storefront
- Daylight Zone
- Demand Control Ventilation
- Fan Systems definitions
- High-Efficacy Lamps
- Listed & Labeled

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The 2009 IECC - WHAT MOVED

RELOCATED

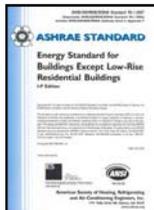
- Moisture Control - 502.5
Now in IBC:
 - 202 Definitions
 - 719 Insulation facings
 - 1203.3.2 Exc. #4 for crawl spaces
 - 1405.3 Frame Walls
 - 1502 Roofs (not specific)
 - 1910.1 Floor Slabs

MOVED

- 102 changes to 303

Referenced Standards

- ASHRAE Fundamentals
- ASHRAE HVAC Systems



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Changes in Commercial Requirements

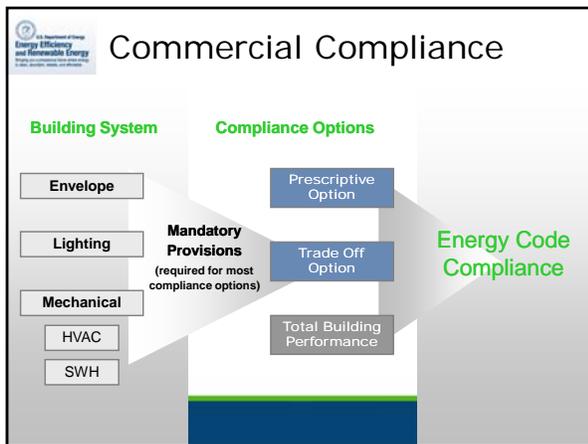
- Envelope
 - Addition of U-factor table
 - Stringency – some key differences
 - Addition of residential occupancy
- Lighting
 - Daylight zone control
 - New exterior lighting zones
- Mechanical
 - Snow melt system controls
 - Demand control ventilation
 - Allowable fan bhp or nameplate horsepower

Major Changes to Envelope Requirements



- **Opaque Envelope** - Tables 502.2(1) & 502.2(2)
 - Residential / All Others
 - C- Factor & F- Factor*
 - Thermal Blocks (Note "a")
- **Fenestration** -Table 502.3
 - No changes to vertical glazing
 - Glass/plastic skylights now have same U-factors

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Air Barriers Required (502.4.9) 

- Continuous, joints made airtight
- Permeability: <math><0.004\text{ cfm/sf}@0.3\text{wg}</math>
- Withstand pressures: wind, fan, stack loads
- Flexible connections between dissimilar materials/systems

Provide sealing of:

- Foundations/walls
- Walls to windows/doors
- Different materials
- Walls to roofs
- Unconditioned spaces
- All joints & penetrations

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HVAC PRIORITIES

Load Evaluations

- Integrated Part Load

Equipment Choices

- Modulation/purging
- Multi-function
- Multiplexing

Systems Choices

- Technology

Controls

- T.O.D; 8760 hr.



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Section 503 Building Mechanical Systems

Simplified Information Into Four Sections:

- 1) How Provisions Apply (503.1 - Scoping)
- 2) Mandatory Provisions (503.2) for all systems
- 3) Simple HVAC Systems and Equipment (503.3)
- 4) Complex HVAC Systems and Equipment (503.4)

Lots of Exceptions to read



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LIGHT & POWER PRIORITIES

- Lighting Controls**
 - General Lighting/
 - Specialized Lighting
- Lighting Power Allowances**
 - Interior Spaces
 - Exemptions & Exceptions
 - Exterior Spaces
 - Efficacies & Ground Rules
 - Tradeable Limitations
- Equipment Motors & Circuit Load Limits**



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Commercial Lighting Requirements

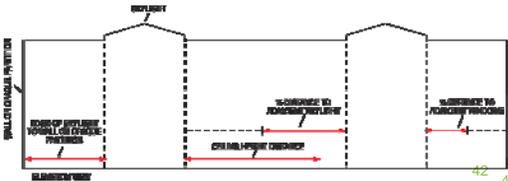
- Commercial provisions contained in Chapter... use ASHRAE 90.1-2007 only if envelope/mechanical are also selected – no pick-n-choose
- Covers lighting controls, power allowances for interior and exterior and exterior lighting densities
 - Exception: Lighting in dwelling units
- Major changes in the 2009 version
 - Daylight zone control
 - New exterior lighting allowances in Table 505.6.2(2), and calculation methods in table notes
 - Exterior lighting power limits




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Daylight Zone Definition – At Windows; Under Skylights

- The area under skylights whose horizontal dimension, in each direction, is equal to the skylight dimension plus the smaller of:
 - The floor-to-ceiling height, or
 - The distance to a ceiling height opaque partition, or
 - One-half the distance to adjacent skylights or windows



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Exterior Lighting Controls (505.2.4 - NEW)

- For dusk-to-dawn lighting: astronomical time switch or photosensor
- For all other: astronomical time switch OR photosensor plus time switch
- All time switches must have 10 hour battery backup



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Tradable Surfaces

- Uncovered parking lots and areas
- Walkways (both under and over 10 feet wide)
- Stairways
- Pedestrian tunnels
- Main building entrances
- Other doors
- Entry canopies
- Free-standing and attached sales canopies
- Open sales areas
- Street frontage sales areas



Nontradable Surfaces

- Building facades
- Automated teller machines and night depositories
- Entrances and gatehouse inspection stations at guarded facilities
- Loading areas for law enforcement, fire, ambulance and other emergency vehicles
- Drive-up windows/doors
- Parking near 24-hour retail entrances



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