



## Exterior Lighting Requirements and COMcheck:

IECC 2006  
ASHRAE/IESNA 90.1-2004



**Speakers**  
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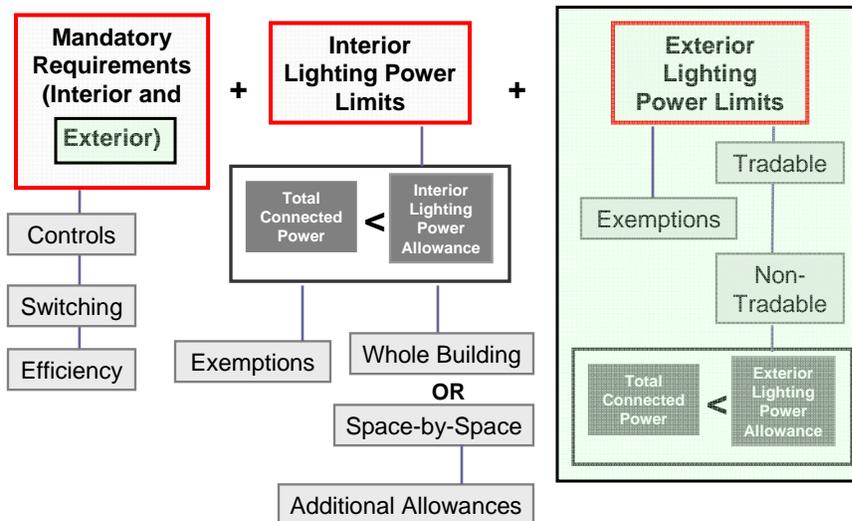
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## The Basis for Energy Requirements

- Energy Conservation and Production Act, as amended by EPCAct, requires States to adopt a commercial energy code
- .....This drives state adoption of energy codes
- DOE determines the effective stringency level to meet or exceed – currently ASHRAE/IESNA 90.1-1999
- Many code/standard versions available and currently adopted – varies by state:
  - Some adopt nationally available codes/standards (IECC, ASHRAE/IESNA 90.1)
  - Some develop state-specific codes
  - Some have no code!

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## Basic Lighting Requirements



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## Mandatory: Exterior Controls

- Photocell (for dusk-to-dawn lighting) **OR**
- Seven-day/seasonal programmable with astronomic correction and 4 hour battery backup
- **Exceptions:** (where required for safety, security, or eye adaptation)
  - Covered vehicle entrances
  - Exits from buildings or parking structures



Intent: Eliminate exterior lighting left on during the day

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## Mandatory: Lamp Efficacy

Building grounds lighting luminaires over 100 watts must have source efficacy of at least 60 lumens per watt

Light Source	Typical System Efficacy Range in LPW (varies depending on wattage and lamp type)
Incandescent	10-18
Halogen incandescent	15-20
Compact fluorescent (CFL)	35-60
Linear fluorescent	50-100
Metal halide	50-90

Exceptions:

- Controlled by motion sensor
- Any of the exterior lighting power allowance exceptions
- As approved for a historical, safety, signage, or emergency consideration

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## Exterior Lighting Power Limits

Total Connected  
Power

<

Exterior Lighting  
Power Allowance

- Calculate proposed connected lighting power
  - Exempted lighting
- Calculate exterior Lighting Power Allowance
  - Lighting power densities by exterior function
  - Additional 5% added to total allowance
- Compare Total Connected Power to Total Power Allowance

Intent of 5% adder: Allow flexibility  
in design for critical or unusual  
applications!

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## Exempted Exterior Lighting Power

- Specialized signal, directional, and marker lighting associated with transportation;
- Lighting that is integral to advertising signage or directional signage;
- Lighting that is integral to equipment or instrumentation and is installed by its manufacturer;



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## Exempted Exterior Lighting Power

- Lighting for theatrical purposes, including performance, stage, film, and video production;
- Lighting for athletic playing areas;
- Temporary lighting;
- Lighting for industrial production, material handling, transportation sites, and associated storage areas;



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## Exempted Exterior Lighting Power

- Theme elements in theme/amusement parks;
- Lighting used to highlight features of public monuments and registered historic landmark structures or buildings.



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## Exterior Lighting LPD Allowances

**Tradable:** Common exterior lighting applications where unused power can be traded where needed.

For example, wattage allowed for parking lot lighting can be “traded” and used for canopy lighting.



**Non-Tradable:** Less common exterior lighting needs that **cannot** be traded. These applications have more specific security or task illuminance needs.



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## Exterior LPDs

Applications	Lighting Power Densities
<b>Tradable Surfaces</b> (Lighting Power Densities for open parking areas, building grounds, building entrances and exits, canopies and overhangs, and outdoor sales areas may be traded)	
<b>Uncovered Parking Areas</b>	
Parking lots and drives	0.15 W/ft <sup>2</sup>
<b>Building Grounds</b>	
Walkways less than 10 feet wide	1.0 W/linear foot
Walkways 10 feet wide or greater, Plaza areas and Special feature areas	0.2 W/ft <sup>2</sup>
Stairways	1.0 W/ft <sup>2</sup>

Note: Covered parking areas and interior stairways are included in the interior LPD table

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## Exterior LPDs (Continued)

Applications	Lighting Power Densities
<a href="#">More Tradable Surfaces...</a>	
<b>Building Entrances and Exits</b>	
Main entries	30 W/linear foot of door width
Other doors	20 W/linear foot of door width
<b>Canopies and Overhangs</b>	
Canopies (free standing & attached) and overhangs	1.25 W/ft <sup>2</sup>
<b>Outdoor Sales</b>	
Open areas (including vehicle sales lots)	0.5 W/ft <sup>2</sup>
Street frontage for vehicle sales lots in addition to "open area" allowance	20 W/linear foot

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## Exterior LPDs (Continued)

Applications	Lighting Power Densities
<b>Non-Tradable Surfaces</b> (Lighting Power Density calculations for the following applications can only be used for the specific application and cannot be traded between surfaces or with other exterior lighting. The following allowances are in addition to any allowance otherwise permitted in the Tradable Surfaces section of this table.)	
Building facades	0.2 W/ft <sup>2</sup> for each illuminated wall or surface or 5.0 W/linear foot for each illuminated wall or surface length
Automated teller machines & night depositories	270 W per location plus 90 watts per additional ATM per location
Entrances and gatehouse inspection stations at guarded facilities	1.25 W/ft <sup>2</sup> of uncovered area (covered areas are included in the Canopies and Overhangs section of Tradable Surfaces)

Note: two methods for façade calculation – use one or the other but not both.

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## Exterior LPDs (Continued)

Applications	Lighting Power Densities
<b>Non-Tradable Surfaces</b>	
Loading areas for law enforcement, fire, ambulance and other emergency service vehicles	0.5 W/ft <sup>2</sup> of uncovered area (covered areas are included in the Canopies and Overhangs section of Tradable Surfaces)
Drive-up windows at fast food restaurants	400 W per drive through
Parking near 24-hour retail entrances	800 W per main entry

Note: Drive-up allowance applies to any type of drive-up including pharmacy, bank, etc.

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## What if My Design Does Not Comply?

### Check calculations

- Appropriate exterior applications used?
- Actual lighting equipment wattages used?
- Applicable exemptions taken?

### ...and design

- Reasonable illuminance levels provided?
- Efficient light sources used?

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# BECP Commercial Code Compliance Tools

## Prescriptive Approach

- Simple, fast and easy
- Generally most stringent
- Requires minimum input
- Based on climate and WWR
- Uses a prototype building



## Trade-off Approach

- Trade-off between components
- Provides design flexibility
- Requires area & U/R-factors

Windows version or  
Mac version

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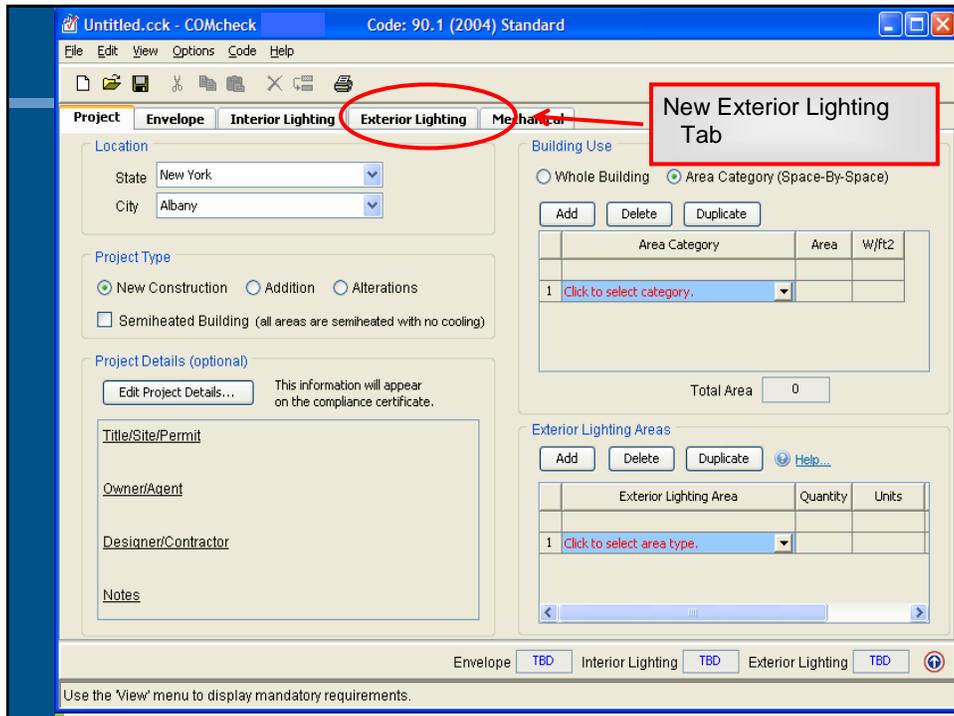
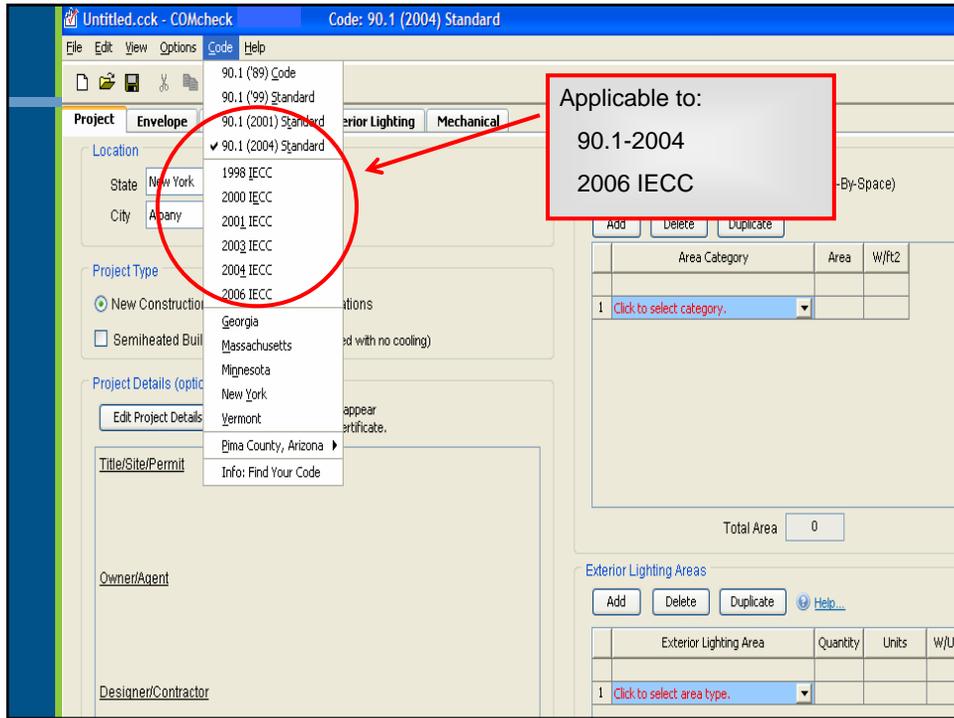


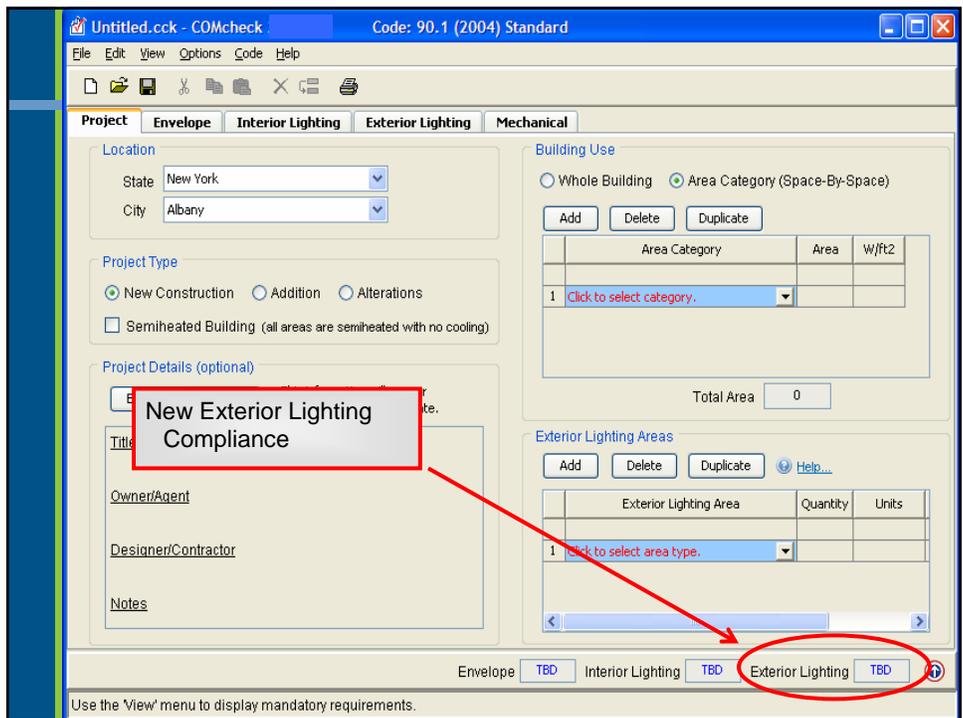
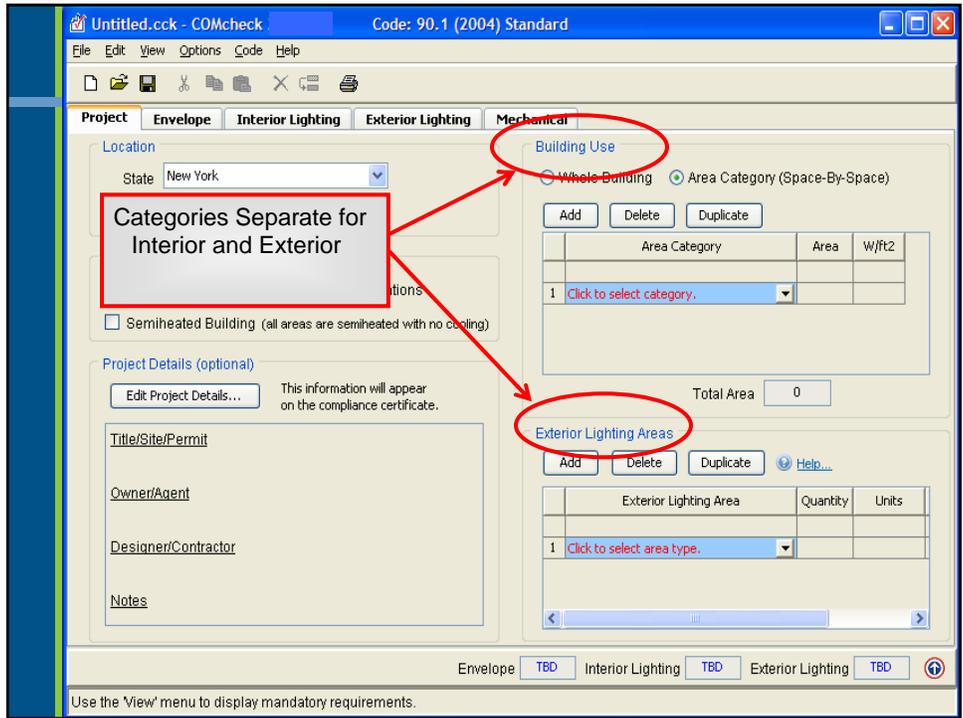
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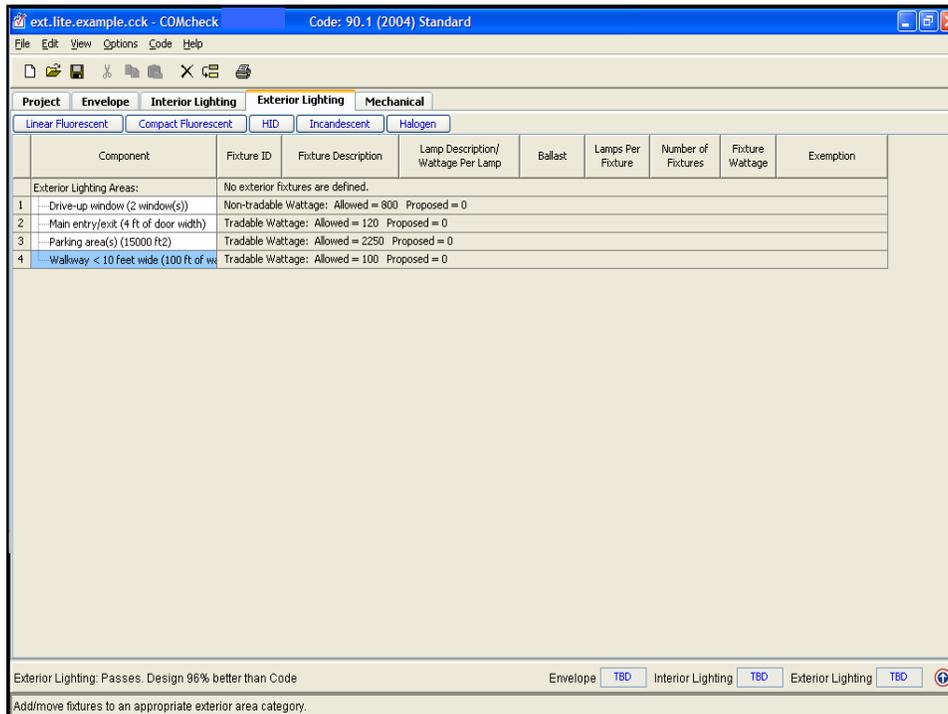
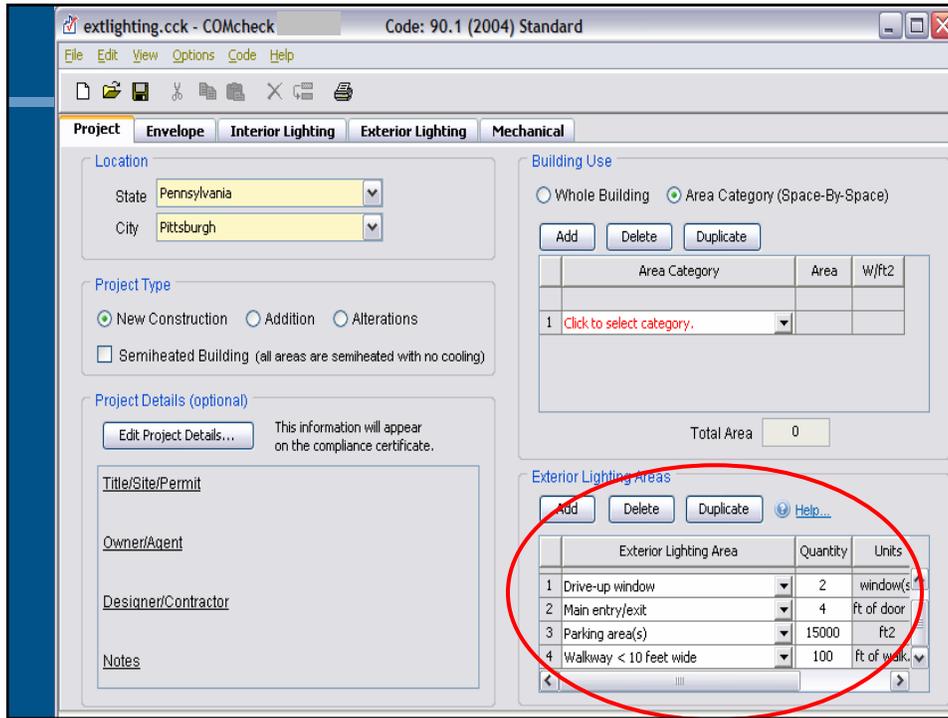


All COMcheck tools available from [www.energycodes.gov](http://www.energycodes.gov)









extlighting.cck - COMcheck Code: 90.1 (2004) Standard

File Edit View Options Code Help

Project Envelope Interior Lighting Exterior Lighting Mechanical

Linear Fluorescent Compact Fluorescent HID Incandescent Halogen

Component	Fixture ID	Fixture Description	Lamp Description/ Wattage Per Lamp	Ballast	Lamps Per Fixture	Number of Fixtures	Fixture Wattage
Exterior Lighting Areas:		Tradable Wattage: Allowed = 2470 Proposed = 2383					
1	Drive-up window (2 window(s))	Non-tradable Wattage: Allowed = 800 Proposed = 960					
2	HID 1		Metal Halide 100W	Magnetic	1	8	120
3	Main entry/exit (4 ft of door width)	Tradable Wattage: Allowed = 120 Proposed = 84					
4	Compact Fluorescent 1		Spiral 42W	Electronic	1	2	42
5	Parking area(s) (15000 ft2)	Tradable Wattage: Allowed = 2250 Proposed = 2200					
6	HID 2		High-Pressure Sodu...	Magnetic	1	5	440
7	Walkway < 10 feet wide (100 ft of w)	Tradable Wattage: Allowed = 100 Proposed = 99					
8	HID 3		Metal Halide 32W	Electronic	1	3	33

Exterior Lighting: Passes using supplemental allowance watts. Design 0% better than Code Envelope TBD Interior Lighting TBD Exterior Lighting 0%

Add/move fixtures to an appropriate exterior area category.

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Allowed 2470 + 800 = 3270 x 5% unrestricted allowance = 163.5 watts  
 Drive Up Window: Proposed Wattage = 960 vs. 800 allowed  
 Failing by 160 watts, unrestricted allowance covers it

Exterior Lighting: Passes using supplemental allowance watts. Design 0% better than Code Envelope TBD Interior Lighting TBD Exterior Lighting 0%

Add/move fixtures to an appropriate exterior area category.

# www.energycodes.gov

The screenshot shows the homepage of the Building Energy Codes Program website. At the top, it features the U.S. Department of Energy logo and the text "Energy Efficiency and Renewable Energy" with the tagline "Bringing you a prosperous future where energy is clean, abundant, reliable, and affordable." Below this is a green banner with the text "Building Energy Codes Program". The main content area is divided into several sections: "About the Program" with a description of the program's mission; "Compliance Tools" listing REScheck, COMcheck, and on-line compliance tools; "Training/Education" listing recorded webcasts, self-paced presentations, and events; "Code Analysis and Development" listing resource centers and expert advice; "Implementation Tools" listing DOE determinations and assistance; "Technical Support" listing code notes; and "Related Links" with XML and RSS feeds. On the right side, there is a search bar, a "Need Help?" section with links to software tools and assistance, and a "NEWS" section with recent articles such as "Exterior Lighting Requirements and COMcheck Live Webcast" and "Greensburg having to filing inspection jobs".

## Training Tools

- PowerPoint presentations with faculty notes
- Case studies
- Online training
- Online videos

The screenshot shows the "ONLINE TRAINING" interface for COMcheck 101. The page has a header with the "Building Energy Codes ONLINE TRAINING" logo. Below the header, there is a "Search Forums" section with an "Advanced search" button. To the left, there is a "Course categories" sidebar with a tree view showing "Videos", "Codes", "Commercial", "Residential", and "Area Takeoffs". The main content area is titled "Topic outline" and contains the following text: "Welcome to the new Building Energy Codes Program online training tool. This tool allows you to learn about using COMcheck to comply with the 2003 International Energy Conservation Code at your own pace. You can choose to proceed through the course in topic order or proceed to the summary sections and take the test to challenge your knowledge. Each section is designed to provide a basic overview of the requirements, and most sections have links that provide additional details on that section's topic as well as additional resources for more information if you are interested. CEUs: Participants who successfully complete the course and test and enter their AIA numbers will be submitted to AIA by BECP for 1.5 AIA/CEES LU (HSW). A certificate of completion is available for participants who can self-report for CEUs, including for ICC renewal certification. Note: you must be a registered user of the BECP Training site to access course quizzes and tests. Audience: Building energy code officials, designers, engineers, builders, and anyone else involved in demonstrating energy code compliance for a commercial building."

**Building Energy Codes RESOURCE CENTER**

SEARCH: Graphics FOR: duct system approach HVAC » SEARCH BROWSE: Select a Topic... » GO!

Home About the Resource Center Ask a Question Advanced Search Help

**Graphics Search Results**  
Keywords: duct system approach HVAC

Viewing: 1-9 of 92

Printer-friendly Format

ADDITIONAL RESOURCES

- Articles
- Online Tools
- Presentations
- Videos

## Setting the Standard Newsletter

- Register on-line to receive the latest up-to-date information on energy code related issues.

### Newsletter

- <http://www.energycodes.gov/news/>



#### Basements: Advantages and Disadvantages of Finishing Basements During Initial Construction of the Home

The 2015 and 2018 Editions of the International Energy Conservation Code (IECC) require basement walls to be included in the basement or conditioned part of the heated and/or cooled living space (conditioned space). If the basement is subject to the additional, additional requirements for the basement ceiling. The 2015 IECC requires that one conditioned space or basement wall that falls within the conditioned space (Section 703.2.1.1 or 703.2.1.2) to meet the applicable energy conservation requirements (IECC Section 703.2.1.1 or 703.2.1.2) to meet the applicable energy conservation requirements. In these cases, the energy of the basement is conditioned, the floor above the basement (basement ceiling) can be included and part of the requirements of the IECC for basements with no conditioned space. The basement is considered part of the conditioned building envelope, the basement walls can be included and part of the requirements of the IECC for basement walls. The requirements in the code are dependent on the climate and climate conditions. Requirements in the IECC include some of the following: Section 703.2.1.1, Section 703.2.1.2, Section 703.2.1.3, and Section 703.2.1.4.

Many homes are being constructed with unfinished basements to reduce initial costs. In most cases, the basement is usually finished after the basement is added during construction for finishing basement wall installation. Because most basements are typically completed for all ranges and short ranges of finishing the basement should be thoroughly reviewed prior to permitting and construction.

Note: I provide a list of advantages and disadvantages of basement wall installation required to meet building code requirements.

## More Information?

- More information and detailed training opportunities are available from:



[www.ashrae.org](http://www.ashrae.org)



[www.iccsafe.org](http://www.iccsafe.org)



[www.iesna.org](http://www.iesna.org)



[www.energycodes.gov](http://www.energycodes.gov)

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## Questions/Comments

- Help Desk – on-line electronic form  
<http://www.energycodes.gov/support/helpdesk.php>
- Email  
[Techsupport@becp.pnl.gov](mailto:Techsupport@becp.pnl.gov)

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