BUILDING ENERGY CODES PROGRAM

Setting the Standard

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

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Lighting Control Requirements in the Newest Energy Codes – What's required in ASHRAE 90.1-2004 and 2006 IECC?

Revisions and additions in the newest versions of International Energy Conservation Code (IECC) (2006) and American Society of Heating, Refrigerating, and Air Conditioning Engineers (ASHRAE) 90.1 (2004) will affect most new building designs. These requirements are mandatory and cannot be traded away, but options and exceptions are provided to meet the needs of various building and space types and activities. The requirements are categorized into two general areas: basic space control and automatic shutoff controls.

Basic space control lighting

The basic space control provisions require that each room or ceiling-height partitioned space have at least one control for the lighting that is generally available to occupants. The codes include exceptions for safety or security situations; the codes also allow for control from remote locations when adequately labeled. In addition, ASHRAE 90.1 limits the amount of building space that can be assigned to an individual control.

Additional control is required for some specific spaces and tasks. For example, both require that hotel and motel guest room lighting be controlled at room entry (IECC exempts bathroom lighting) and ASHRAE 90.1 requires additional separate control for accent, display case, task, nonvisual, and demonstration lighting.

The IECC also requires additional light reduction (bi-level) control in all areas requiring individual control with exceptions for spaces with occupancy sensors, corridors, storerooms, restrooms, public lobbies, guest rooms, and low energy use spaces. ASHRAE includes a requirement that occupancy sensors be used in most classrooms, conference/meeting rooms, and employee break/lunch rooms.

Automatic shutoff controls

Both IECC and ASHRAE require automatic shutoff controls for buildings larger than 5,000 ft^2. This can be accomplished with whole building automatic control systems, individual occupancy sensors, or a similar automatic system. Exceptions are provided for patient care areas, spaces with safety or security concerns, guest rooms (IECC), and 24-hour lighting (ASHRAE). There is also a requirement that occupants be able to override the automatic shutoff for up to 4 hours for ASHRAE and 2 hours for IECC.

Finally, both IECC and ASHRAE require photocell or programmable time control of exterior lighting with exceptions for areas where safety and security are a concern.

The basic requirement for lighting controls is to make sure lights can be turned off when not needed.

As with all codes and standards, consult the written requirements to ensure that you understand any small differences and specific applications not discussed here. Any situations not covered by the code (and there are bound to be some!) should be addressed with the local building officials as they have the final application and compliance authority. For more information, see ASHRAE 90.1-2004 Lighting Update Video at **http://www.energycodes.gov/training/onlinetraining/lighting_update.stm** and the Advanced Lighting Design and the Energy Code Webcast and Q&A at **http://www.energycodes.gov/training/onlinetraining/advanced_lighting_1105.stm.**

Relationship Between Standard 90.1 and the IECC

The two most commonly used national model energy codes or standards for commercial buildings in the United States today are the International Code Council's International Energy Conservation Code (IECC) and the American Society of Heating, Refrigerating, and Air Conditioning Engineers (ASHRAE) Standard 90.1. Most commercial structures built in the last 30 years have probably been designed to meet the requirements of one of these documents, their predecessors, or related state codes that draw on these documents.

Standard 90.1 and the IECC have a long, intertwined history of development, starting with the original development of Standard 90-75 in direct response to the oil crisis in 1973 and continuing on to the latest documents – the 2006 IECC and Standard 90.1-2004. Both documents are currently on 3-year development cycles, with development following the rules and procedures of their respective organizations. Both documents are developed with input and suggestions from the building science community, including industry representatives, code officials, building owners and operators, architects, mechanical engineers, and lighting designers.

Standard 90.1 and the IECC are rarely identical, usually equivalent, and typically similar in how they approach a particular code requirement. While a detailed comparison of each version of Standard 90.1 and the IECC is beyond the scope of this article, a few general statements can be made:

A newer code or standard is usually better. In terms of efficiency of the building design and in terms of clarity of the documents, a newer code or standard is usually the best choice.

Designers have lots of options. Both documents have multiple compliance paths. Every IECC document contains both a set of commercial building requirements and a reference to Standard 90.1, giving IECC users flexibility.

You can build "good" buildings under either document. However, both documents set minimum requirements for building design, so you can also build much "better" buildings than either Standard 90.1 or the IECC requires.

The U.S. Department of Energy's COM*check*™ software supports multiple versions of both Standard 90.1 and the IECC. To find out if your state accepts the COM*check*™ software and what your current commercial code requirements are, visit the Status of State Codes database at http://www.energycodes.gov/implement/state_codes/index.stm.

If your state has adopted a version of the IECC or the Model Energy Code, you can also use the database to identify what version of ASHRAE Standard 90.1 may also be used for compliance.

Software Tools for LEED Certification and Energy Credits

To have a building certified by the U.S. Green Building Council, architects and designers can use several tools to demonstrate that the building complies with various sustainable design requirements. The Council certifies the building through the Leadership in Energy and Environmental Design (LEED) Green Building Rating System®. This is a voluntary, consensus-based performance rating system.

The LEED rating system is organized into five major credit categories, including energy and atmosphere. The energy and atmosphere credit category provides the opportunity for energy-efficient buildings to qualify for up to 10 of the total 69 possible LEED-NC V2.2 credit points for new construction.

Each credit category consists of mandatory prerequisites and optional credit requirements for LEED certification. One of the prerequisites for the energy and atmosphere credit requires the proposed building to comply with American Society of Heating, Refrigerating, and Air Conditioning Engineers (ASHRAE) Standard 90.1, as the minimum energy performance. To verify the compliance with the Standard 90.1, designers can use COM*check*™ or EnvStd 4.0.

If the proposed design exceeds the baseline design per ASHRAE 90.1-2004 Appendix G, additional energy credit points can be obtained depending on the percentage of energy cost savings. To obtain the additional credits, energy simulation tools are required.

Green buildings can increase occupant comfort and reduce energy costs. Use COMcheck™ and EnvStd 4.0 to verify a building's compliance with ASHRAE Standard 90.1, a prerequisite for the LEED Green Building Rating System™ energy and atmosphere credit.

The U.S. Department of Energy provides a catalog of most of the available building simulation tools (see http://www.eere.energy.gov/buildings/tools_directory). Designers can use the available energy simulation software and model the proposed building and the baseline building.

For additional information on desktop tools for sustainable design, see http://www.energycodes.gov/implement/pdfs/DesktopTools.pdf.

Webcasts Now Offer AIA Learning Units

By completing Building Energy Codes Program web-based classes, registered members of the American Institute of Architects (AIA) can receive learning units. Following the webcasts, participants wanting AIA learning units must take an online test. If at least 80% of the questions are answered correctly, the program submits the participant's information to AIA for credit. Webcasts are a new extension of the Building Energy Codes Program's decade-long work as a registered AIA training provider.

Participation in the program's web-based training events can also earn participants 0.15 continuing education units toward renewing an International Code Council certification.

The Building Energy Codes Program offers free webcasts on energy efficiency topics and all aspects of code adoption, implementation, and enforcement. Registration is available at http://www.energycodes.gov. Each event includes a dynamic question and answer period to address questions received during the webcast by the presenter. All participants may also print a certificate of completion using an online certificate generator to document their participation.

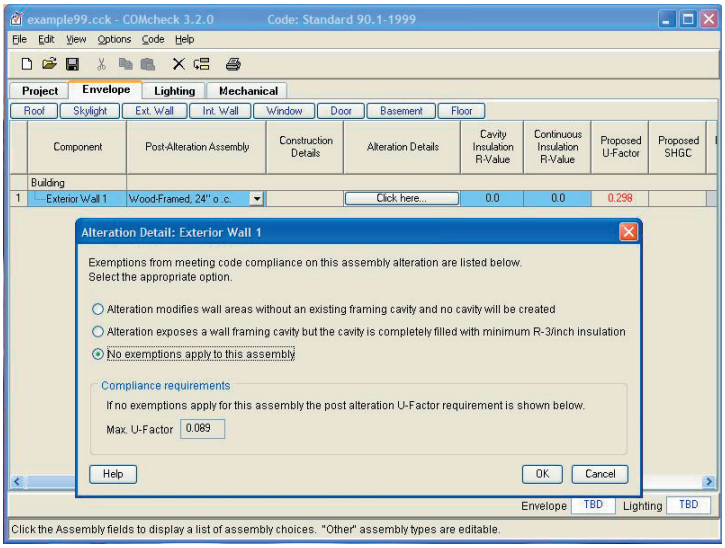
Do you have suggestions for webcast topics or other learning unit credits that you would like to receive? Give us your feedback at http://energycode.pnl.gov/EnergySurvey/entry.jsp?id=1146062583274.

Alterations and Additions in COM*check*™

Recent enhancements to the desktop version of COM*check*™ improve the software's ability to demonstrate compliance for commercial alterations and additions. The software is applicable to American Society of Heating, Refrigerating, and Air Conditioning Engineers (ASHRAE) 90.1-1999 and later editions but does not address International Energy Conservation Code (IECC) alterations because the IECC alteration requirements are not significantly different than the standards for new buildings. To see if you are using the correct code for your area, check the Status of State Codes database (http://www.energycodes.gov/implement/state_codes/index.stm).

The following outline is a quick start guide for using this software feature.

1. Select the correct code from the "Code" menu. You must be using ASHRAE 90.1-1999 or later to see alteration compliance features.
2. Select the "Alterations" radio button on the project tab. If you are adding new, conditioned space (new square feet), choose "Addition."
3. Add information in the Area Category section only if you need to show compliance for a lighting alteration.
4. Switch to the envelope tab and enter the components that will remain after the alteration is completed. Follow the software instructions for each component. Watch the information in the "Alteration Details" column as you go for a summary.
5. Enter the proposed R-value/U-factor information for each component in the software unless it is exempt. Component requirements (non-exempt) are based on the prescriptive requirements of the ASHRAE standard.
6. If you have a lighting alteration, switch to the lighting tab. Input existing and new fixtures for each space type only if you do not qualify for lighting exemptions. Note, if you filled out the Area Category section in the project tab, some information will be pre-populated.



7. If you are altering the heating, ventilation, and air conditioning (HVAC) system, switch to the mechanical tab. Input the systems for your project. The requirements of this section are fairly simple, either you qualify for an exemption (such as repair) or you must meet the new equipment requirements in the code.
8. Print or e-mail the compliance reports for your code official. As with any code compliance issue, the code official has the final decision on all the changes in the building.

Remember, this feature is a separate part of the software, and you may not switch back to "New Construction" once you have started using the Alteration section.

To get the new alteration feature, you'll need to use COM*check*™ version 3.2.0 or later.

To download the software, go to http://www.energycodes.gov.

For technical support, go to http://www.energycodes.gov/support/helpdesk.php.

To see the video Alterations Feature for 90.1 in COM*check*™, go to: http://www.energycodes.gov/training/onlinetraining/comcheck_alterations_0202.stm.

Alteration projects involve changes to or replacement of:

1) existing building components that are part of the building envelope, 2) lighting, heating, ventilating, air conditioning, and water heating equipment, 3) other equipment.

Alterations also include converting an unconditioned or semi-heated space to a conditioned space. Software inputs for alterations include only those envelope components, lighting fixtures, or mechanical systems/equipment that will exist upon completion of the alteration project.

Additions (i.e., added square footage), even if in conjunction with existing building alterations or new construction (i.e., new building), must be shown to comply in separate compliance runs.

Software Updates

RES*check*-Web™ and COM*check*-Web™ now include a feature that allows project data files to be shared between the web tools and the desktop versions. Web tool users who log in with a username and password can choose to download data files in the format appropriate for the desktop versions. Logged-in users can also load project data files saved on their computers into the web tools.

Building Energy Codes Training

Upcoming Events

Part three (Lighting) of the three-part series on the Commercial Requirements of the 2006 IECC will be held July 13.

The 2006 National Workshop on State Building Energy Codes will take place July 31 through August 3 at the Four Points Sheraton Denver Southeast in Denver, Colorado. The workshop provides an opportunity to learn and share information about a wide variety of energy codes and standards-related topics. The U.S. Department of Energy sponsors the event. Visit http://www.energycodes.gov/news/2006_workshop/.

Past Events

Rob Pickett, Log Homes Council, was a guest speaker with Pam Cole and Heather Dillon, Pacific Northwest National Laboratory, for the training event *"Log Homes in REScheck™"* in February.

Pam Cole, Pacific Northwest National Laboratory, presented the webcast *"Residential Requirements of the 2006 IECC"* in March and again in April. More than 1,600 people participated in the two classes.

The first two parts of the three-part series on the Commercial Requirements of the 2006 IECC were held:

- Part 1: Envelope on June 15
- Part 2: Mechanical on June 22

Videos of past events are available online at http://www.energycodes.gov/training/onlinetraining/videos.stm.

For a complete **calendar** of upcoming energy code-related training events, visit http://www.energycodes.gov/events/index.php.

Are Duct Sealing Requirements in Codes Working?

Majority felt inspections inadequate, favored mandatory testing

Our survey on the duct sealing requirements in energy codes in the February 2006 issue of *Setting the Standard* newsletter netted 58 responses. While these results are not statistically representative, they do provide insights. Eighty-five percent of the respondents felt that duct sealing requirements are not currently enforced well in their area, and 83% felt that mandatory duct testing is a good idea.

Most respondents felt that inspections of duct sealing were inadequate. Below are some representative responses:

- **Builders know that inspectors want to see mastic; therefore, the mastic is smeared on the exterior just for looks, and this does little to seal the ducts.**
- **There is little to no enforcement.**
- **It is difficult to determine leakage via a visual inspection.**

Eight of 58 responded that enforcement was occurring, although 3 of the 8 qualified this by saying enforcement was not universal or as good as it could be.

The responses on whether mandatory duct leak testing should be required generally focused on the costs and benefits. Most felt the long-term energy savings justified the cost impact of the test. One builder pointed out that testing ducts is similar to plumbing pressure tests and gas line tests, which are widely accepted tests. A few of the respondents felt the cost of testing was excessive and not justified.

To learn more about duct sealing, see the California Energy Commission video at http://www.energyvideos.com/bldvid.php?P=CA&A=5&S=hva.

Excellence in the Advancement of Building Energy Codes and Performance Award

The first-ever Jeffrey A. Johnson Award for Excellence in the Advancement of Building Energy Codes and Performance will recognize sustained service in the pursuit of building energy efficiency. Sponsored by the U.S. Department of Energy, the award will be given to an individual or a team that uses innovation and fosters collaboration to develop and promote progressive advancement of building energy codes. The recipient will exemplify Jeff's enthusiasm, his motivation and drive for innovation, and his can-do, no-fear attitude for making a difference.

The nominees and winner will be announced at the 2006 National Workshop on State Building Energy Codes, July 31-August 3, Denver, Colorado.

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