

Additional Efficiency Package Options in the 2012 IECC Commercial Provisions

Section C406, Additional Efficiency Package Options, is a new requirement that appears in the 2012 International Energy Conservation Code (IECC) commercial provisions. Section C406 provides three sets of provisions, one of which must be applied.

This section is intended to achieve additional energy efficiency in commercial buildings designed to meet the 2012 IECC while at the same time providing flexibility to the designer in terms of how that energy efficiency is achieved.

Designers may choose to include more efficient HVAC equipment than required by the rest of the 2012 IECC, more efficient lighting systems than required by the rest of the 2012 IECC, or they may choose to add renewable energy systems, (which are not required in the 2012 IECC at all) to their design. The three options were intended to be equal in energy efficiency, although the impacts of each option on specific building designs in specific locations may vary.

The Requirement

The requirement in C406.1 is simply that every building must comply with one of the three options and that tenant spaces must comply with the lighting or



HVAC equipment option unless they can provide documentation for meeting the renewables option for the entire building, not just the tenant space.

The Options

The three options listed in C406.1 are: Efficient HVAC Performance (C406.2), Efficient Lighting System (C406.3), and On-Site Supply of Renewable Energy (C406.4). Buildings can comply with any one of these three options. These options are only relevant if the prescriptive commercial provisions of the IECC are used. If using ASHRAE Standard 90.1 as a compliance path, these do not apply.



Choosing an Option

Each option has advantages and limitations. These are listed in Table 1 and discussed further in the paragraphs that follow.

Table 1. Advantages and Limitations of IECC Section C406 Compliance Options

| Option | Advantages | Limitations |
|---|--|---|
| C406.2 Efficient HVAC Performance | Requires use of high-efficiency equipment that may be specified anyway, especially in buildings designed and constructed to green codes, sustainable requirements, or rating systems that encourage more efficient equipment | <ul style="list-style-type: none"> • Only applies to the equipment types listed in Tables C406.2(1) through C406.2(7) —See following discussion for what is not included |
| C406.3 Efficient Lighting System | Functionally equivalent to compliance with lighting requirements in ANSI/ASHRAE/IES Standard 90.1-2010 | <ul style="list-style-type: none"> • Only applies to those building area types covered in Table C406.3 —Does not include “parking garage” or “penitentiary” from Table C405.5.2(1) • Does not take into account the space-by-space method in Table C405.2(2) |
| C406.4 On-Site Supply of Renewable Energy | Does not require any changes to the “standard” building design (e.g., envelope, mechanical, lighting) with the exception of the addition of a renewable energy system | <ul style="list-style-type: none"> • Sufficient on-site renewable resources or space for on-site renewable energy equipment may not be available • Not available to tenant spaces unless documentation for entire building can be supplied |

C406.2 Efficient HVAC Performance

Advantages

In many projects, high-efficiency HVAC equipment is already specified as a matter of choice or regulation. For example, designers working on buildings that are being submitted for a green building certification [such as the U.S. Green Building Council (USGBC) Leadership in Energy and Environmental Design (LEED) or the Green Building Initiative’s Green Globes] may be using high-efficiency equipment to achieve additional energy savings for that certification. But these buildings must also comply with the applicable energy code and the high-efficiency equipment can help meet the requirements of Section C406. Designers working on buildings being designed for green building certification

may also be utilizing a whole-building code compliance option such as the Energy Cost Budget Method in ANSI/ASHRAE/IES Standard 90.1-2010 (ASHRAE Standard 90.1-2010) as well. In this case, compliance with Section C406 is not required.

Limitations

Not all possible HVAC systems are covered by Section C406.2. Table 2 lists the systems that are not covered under C406.2. If a building is being designed with one of these systems and the designer does not wish to change the system being used, Section C406.2 is not an option.

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Table 2. HVAC Systems Not Covered by IECC Section C406.2

| HVAC Equipment | Minimum Requirements | Efficient HVAC Performance | What is Not Covered in Efficient HVAC Performance |
|--|----------------------|--------------------------------|---|
| Electrically Operated Unitary Air Conditioners and Condensing Units | Table C403.2.3(1) | Table C406.2(1) | Condensing Units |
| Electrically Operated Unitary and Applied Heat Pumps | Table C403.2.3(2) | Table C406.2(2) | Nothing |
| Electrically Operated Packaged Terminal Air Conditioners, Packaged Terminal Heat Pumps, Single-Package Vertical Air Conditioners, Single-Package Vertical Heat Pumps, Room Air Conditioners, and Room Air-Conditioner Heat Pumps | Table C403.2.3(3) | Table C406.2(3) | Nothing |
| Warm Air Furnaces and Combination Warm Air Furnaces/Air-Conditioning Units, Warm Air Duct Furnaces and Unit Heaters | Table C403.2.3(4) | Table C406.2(4) | Nothing |
| Gas- and Oil-Fired Boilers | Table 403.2.3(5) | Table C406.2(5) | Nothing |
| Condensing Units, Electrically Operated | Table 403.2.3(6) | NA | Condensing Units |
| Water Chilling Packages | Table 403.2.3(7) | Tables C406.2(6) and C406.2(7) | Nothing |
| Heat Rejection Equipment | Table 403.2.3(8) | NA | Heat Rejection Equipment |
| Heat Transfer Equipment | Table 403.2.3(9) | NA | Heat Transfer Equipment |

C406.3 Efficient Lighting System

Advantages

The advantage of choosing this option is that the whole-building lighting power density numbers in the table are identical to the whole-building lighting power density numbers found in Table 9.5.1 in ASHRAE Standard 90.1-2010, which many lighting designers may be using already. If designers are using ASHRAE Standard 90.1-2010 in its entirety as an alternative to the 2012 IECC (as allowed in Section C401.2 in the 2012 IECC), then the requirements in C406 do not have to be met. If the lighting requirements in C406.3 are being routinely used in ASHRAE Standard 90.1-2010 compliance, then there should be no major issues in using them for 2012 IECC compliance.

Limitations

A designer working on a penitentiary or parking garage will not be able to utilize this option because penitentiaries and parking garages are not included in the list of building types. Additionally, if a building is

being designed to meet the requirements of the space-by-space method in the 2012 IECC due to the added flexibility of this method, the use of Section C406.3 will probably be precluded.

C406.4 On-Site Supply of Renewable Energy

Advantages

The main advantage of this option from a design standpoint is that it does not require modification of the design for the rest of the building – building envelope, mechanical, and lighting. A renewable energy system can be a “bolt-on” addition to the building design, requiring only connection to the building electrical, mechanical, or plumbing system that it is serving. There is no specific type of renewable energy system required. On-site renewable energy is defined in the 2012 IECC as “energy derived from solar radiation, wind, waves, tides, landfill gas, biomass, or the internal heat of the earth. The energy system providing on-site renewable energy shall be located on the project site.” Under this definition, a building being built with a large enough photovoltaic

(PV) system, on-site wind turbines, or biomass boiler (or other eligible renewable energy system) would be considered to have on-site renewable energy. If one of these systems was already planned for the building, meeting the requirements of C406.4 will be automatic.

Limitations

Not every building site is amenable to on-site renewable systems. It may be hard to put necessary amounts of PV or wind power on an urban building, for example. Waves, tides, landfills, and biomass may not be available on-site. The internal heat of the earth is available at most sites, but designers may not wish to use it. In this case, one of the other options in C406 may be chosen.

Enforcement

Enforcement of Section C406 can be relatively straightforward or complex depending on the option chosen by the designer and the amount of documentation provided by the designer.

- 1) Check to see if the building is being designed under the 2012 IECC or under ASHRAE Standard 90.1-2010.
 - a. If the building is being designed under the 2012 IECC, go to item 2.
 - b. If the building is being designed under ASHRAE Standard 90.1-2010, C406 is not required.
- 2) Check to see which option under C406 has been chosen. This should be specified on the plans or documentation. If not, it may require asking the designer.
- 3) Check to see if the requirements of the chosen option have been met.
 - a. For C406.2, Efficient HVAC Performance, the code official will need to check the plans and specifications for each piece of HVAC equipment in the building. Each piece of equipment must be covered by the tables in Section C406.2 for this option to be used, and each piece must meet the requirements in the tables in Section C406.2 for compliance to be confirmed.
 - b. For C406.3, Efficient Lighting System, there will be a new

set of interior lighting power density numbers in Table C406.3 to check. The values in this table are lower than the values found in Table C405.5.2(1), but the process of checking them is the same. As previously noted, this option only covers whole buildings. If the space-by-space method is used for lighting compliance, another option would have to be chosen.

- c. For C406.4, On-Site Renewable Energy, there should be some sort of renewable energy system listed on the plans and specifications. Depending on the type of renewable energy system chosen, this could be part of the electrical system, the HVAC system, or the service water heating system. If the system exists and has a capacity that meets the requirements of C406.4, the requirements of C406.4 are met. The requirements of C406.4 are either a system size of 1,850 W, or 0.5 watts per square foot of conditioned floor area, or not less than 3% of the energy used for building mechanical, service water heating, and lighting. A notation on the size of the system or the percent of the building loads served by the system should be on the plans or specifications.
- 4) If compliance with C406 is required, a note should be made by the code official who performs plan review that the design as proposed meets the requirements of C406 so that information may be transferred to the field inspector.
- 5) During field inspection, the field inspector should check to see that the approved option for meeting C406 described on the plans exists.

A special note on tenant spaces

Tenant spaces may comply individually with either C406.2 or C406.3. If the designer of a tenant space wishes to comply with C406.4, documentation must be provided that the entire building is served by a renewable energy system of the proper size.