

Conditioned Greenhouse Envelope Requirements

IECC: 202, 202, 202 (New), C402.1.1, 402.1.1.1 (New), **Table C402.1.1.1** (New)

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2018 International Energy Conservation Code

Revise as follows:

Fenestration Products classified as either skylights or vertical fenestration.

Skylights Glass or other transparent or translucent glazing material installed at a slope of less than 60 degrees (1.05 rad) from horizontal, including unit skylights, tubular daylighting devices and glazing materials in solariums, sunrooms, roofs, greenhouses, and sloped walls.

Vertical fenestration Windows that are fixed or operable, opaque doors, glazed doors, glazed block and combination opaque and glazed doors composed of glass or other transparent or translucent glazing materials and installed at a slope of not less than 60 degrees (1.05 rad) from horizontal.

GREENHOUSE. A structure or a thermally isolated area of a building that maintains a specialized sunlit environment exclusively used for, and essential to, the cultivation, protection or maintenance of plants. Greenhouses are those that are erected for a period of 180 days or more.

Add new definition as follows:

INTERNAL CURTAIN SYSTEM. An internal curtain system consists of moveable panels of fabric or plastic film used to cover and uncover the space enclosed in a greenhouse on a daily basis.

TEMPORARY GROWING STRUCTURE. A temporary growing structure has sides and roof covered with polyethylene, polyvinyl or similar flexible synthetic material and is used to provide plants with either frost protection or increased heat retention. Temporary growing structures are those that are erected for a period of less than 180 days.

Revise as follows:

C402.1.1 Low-energy buildings, buildings and greenhouses. The following low-energy buildings, or portions thereof separated from the remainder of the building by *building thermal envelope* assemblies complying with this section, shall be exempt from the *building thermal envelope* provisions of Section C402.

1. Those with a peak design rate of energy usage less than 3.4 Btu/h • ft² (10.7 W/m²) or 1.0 watt per square foot (10.7 W/m²) of floor area for space conditioning purposes.
2. Those that do not contain *conditioned space*.
- ~~3. Greenhouses.~~

Add new text as follows:

402.1.1.1 Greenhouses Greenhouse structures or areas that are mechanically heated or cooled and that comply with all of the following shall be exempt from the building envelope requirements of this code:

1. Exterior opaque envelope assemblies comply with Sections C402.2 and C402.4.5.
 1. Exception: Low energy greenhouses that comply with Section C402.1.1.
2. Interior partition building thermal envelope assemblies that separate the greenhouse from conditioned space comply with Sections C402.2, C402.4.3 and C402.4.5.
3. Fenestration assemblies that comply with the thermal envelope requirements in Table C402.1.1.1. The U-factor for a roof shall be for the roof assembly or a roof that includes the assembly and an internal curtain system.
 1. Exception: Unconditioned greenhouses.

Table C402.1.1.1
Fenestration Thermal Envelope Maximum Requirements

Component	U-factor (BTU/h-ft²-°F)
Skylight	0.5
Vertical fenestration	0.7

Reason Statement: Greenhouses are currently exempt from the energy code through the low-energy building path even though they can use substantial amounts of energy. This proposal places commonplace envelope requirements on the structure when it is being mechanically heated or cooled. Low-energy use greenhouses structures are still exempt if they have a low energy usage per square foot in line with C402.1.1.

Cost Impact: The code change proposal will increase the cost of construction. Costs of \$1.27/sqft are based on a one-time installation cost of double IR poly-film at \$0.10/sqft and a thermal curtain at \$1.17/sqft. These costs are based on product offerings and utility rebate program findings. Total size of greenhouse assumed to be an average size single bay with dimensions of 35 feet wide, 100 feet long, 4-foot sidewalls and 14-foot total ceiling height.

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