

# GEW73-14

## 605.1.1.1, 605.1.1.1.1 (New), 605.1.1.1.2 (New)

**Proponent:** Steven Ferguson, American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE), representing American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) (sferguson@ashrae.org)

**Revise as follows:**

**605.1.1.1 Permanent shading devices for fenestration.** Vertical fenestration within 45 degrees (785 rad) of the nearest west, south, and east cardinal ordinate shall be shaded in accordance with Section 605.1.1.1 or 605.1.1.2 by permanent horizontal exterior projections with a projection factor greater than or equal to 0.25. Where different windows or glass doors have different projection factor values, each shall be evaluated separately, or an area-weighted projection factor value shall be calculated and used for all windows and glass doors. Horizontal projections shall extend laterally beyond the edge of the glazing not less than one-half of the height of the glazing, except at building corners.

**Exceptions:** Shading devices are not required for the following buildings and fenestrations:

1. Buildings located in hurricane-prone regions in accordance with Section 1609.2 of the *International Building Code* or on any other building with a mean roof height exceeding the height limits specified in Table 1504.8 of the *International Building Code* based on the exposure category and basic wind speed at the building site.
2. Where fenestration is located in a building wall that is within 18 inches (457 mm) of the lot line.
3. Where equivalent shading of the fenestration is provided by buildings, structures, geological formations, or permanent exterior projections that are not horizontal, as determined by sun angle studies at the peak solar altitude on the spring equinox, and three hours before and after the peak solar altitude on the spring equinox.
4. Where fenestration contains dynamic glazing that has a lower labeled solar heat gain coefficient (SHGC) equal to or less than 0.12, and the ratio of the higher and lower labeled visible transmittance (VT) is greater than or equal to 5. Dynamic glazing shall be automatically controlled to modulate, in multiple steps, the amount of solar gain and light transmitted into the space in response to daylight levels or solar intensity. Functional testing Commissioning of controls shall the dynamic glazing shall be conducted in accordance with Section C408.3.4 611.4. of the *International Energy Conservation Code*.

**605.1.1.1.1 Fixed shading devices for fenestration.** Shading shall be provided by permanent horizontal exterior projections with a projection factor greater than or equal to 0.25. Where different windows or glass doors have different projection factor values, each shall be evaluated separately, or an area-weighted projection factor value shall be calculated and used for all windows and glass doors. Horizontal projections shall extend laterally beyond the edge of the glazing not less than one-half of the height of the glazing, except at building corners.

**605.1.1.1.2 Automatic shading devices for fenestration.** Shading shall be provided by automatically controlled exterior projections with a projection factor greater than or equal to 0.25. Where different windows or glass doors have different projection factor values, each shall be evaluated separately, or an area-weighted projection factor value shall be calculated and used for all windows and glass doors. Shading devices for fenestration shall be provided with automatic controls that comply with all of the following:

1. Shading devices shall be capable of modulating in multiple steps the amount of solar gain and light transmitted into the space in response to daylight levels or solar intensity

2. Exterior shading devices in the closed position shall cover not less than 90 percent of the fenestration.
3. Interior shading devices in the closed position shall cover not less than 90 percent of the fenestration and shall have a minimum solar reflectance of 0.50 for the surface facing the fenestration.
4. Any manual override located in the same enclosed space as the vertical fenestration shall override operation of automatic controls no longer than 4 hours.
5. Commissioning for automatic controls for shading devices shall be conducted in accordance with Section 611.4.

**Reason:** This proposal adds automated shading systems (i.e. automatic window shading) as alternative compliance option instead of fixed overhangs or louvers because they can save equal or more energy than the fixed overhangs. This is consistent with similar requirements in ASHRAE 189.1-2011 sections 7.4.2.5 Permanent Projections and 8.4.1.2 Office Space Shading.

Below is summary of the advantages of automated shading systems vs. fixed overhangs taken from Lawrence Berkeley National Lab (LBNL). The full LBNL paper is attached separately.

1. Overhangs cannot be controlled once the design is complete and the system installed.
2. Overhangs will behave the same way in September as in March but March is typically still a heating season month whereas September is often still a severe cooling season month. Active dynamic glazing and shading systems can be operated to address these seasonal variations.
3. Dynamic systems (glazing/shading) can be operated to reject diffuse sky radiation as well as direct radiation.
4. Overhangs reduce useful daylight contributions when they should not, e.g. on overcast days, and during hours when the window is not in sunlight. Dynamic glazing and shading can be managed to be more transmissive when needed in order to admit daylight to reduce building lighting loads.

The first couple of changes are simply clarifications and corrections. The change to exception 4 properly refers to the commissioning of "dynamic glazing" not "functional testing of lighting controls". The appropriate section is for dynamic glazing commissioning is 611.4 Building Envelope Systems Commissioning and Completion Requirements.

In addition, this proposal splits the requirements for fixed projections and projections that are automatically controlled (but not necessarily fixed). A designer will have the option to use either for compliance.

**Cost Impact:** Will not increase the cost of construction. This will not increase the cost of construction as it allows an additional compliance option for fenestration shading.

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