

Sector: Residential

Category/Practice: Energy Efficiency / Basement Windows

Proposed GB Practice

Description

Require basement windows to provide performance comparable to windows used in other living areas, by setting U-Factor = 0.40 maximum for any window when area-weighted U-Factor tradeoffs are used to comply with code.

Applicability

New Construction: Applies

Existing Buildings/Additions: Applies only to addition portion

Existing Buildings/Alterations: Does not apply.

Intent

Set stage for energy-efficient, comfortable living space when basement is finished.

Benefits and Costs

Triple Bottom Line Benefits

People:

- Improved thermal comfort in basement
- Reduced winter condensation on basement windows

Economic:

- Energy savings (very low)
- Avoided cost for window replacement when basement is finished (approximately \$500 per window)
- Less maintenance related to condensation on windows

Environment:

- Fewer discarded building materials
- Environmental benefits associated with energy savings (small)

Costs Passed to Owner

“Very low” to “low” cost (\$75 maximum). The maximum cost will be the difference in cost between a vinyl-framed, low-e insert or window versus a vinyl-framed, clear-glass insert or window (times the number of basement windows). Since the 2009 IRC prescriptive window U-factor requirement is more stringent than the U-factor specified in this amendment (see “Context” below), it is questionable whether any cost should be assigned to this item.

Lost Opportunity

It is much less expensive to initially install a higher quality window than to replace a lower quality window later.

Implementation**Availability of Products and/or Services**

Products and qualified contractors are readily available.

Practicality

No obstacles foreseen

Certification Issues

None

Enforcement Procedures

Permit application/plan review: Plan reviewer will check thermal specifications for basement windows, submitted with plans. (Slight change from current procedures)

Field inspection: Building inspectors will check that basement windows with qualifying specifications have been installed. (Slight change from current procedures)

Certificate of Occupancy: N/A

Support Materials Needs

None

Training Needs - Industry

No specific training on this requirement is needed; it will be covered in mandatory training on building code updates.

It may be useful to offer contractor training on installation approaches for basement windows, with an objective of reducing the practice of using pour-in-place metal bucks.

Training Needs – Staff

None

Background**Current Practice**

The following observations were made in a 2007 field survey of new Fort Collins homes:

- In all homes with garden level or walkout basements, windows installed in the frame portions of basement walls were of the same style and properties as windows in the main and upper living levels.
- Windows set in basement foundation walls followed a different pattern:
 - > Low-e, solar-control windows (U-Factor 0.35 to 0.39) in about 40% of homes
 - > Conventional, uncoated windows (U-Factor 0.49 to 0.50) in about 60% of homes
- Basement windows in foundation walls were installed in a variety of ways:
 - > Direct set to concrete foundation: about 50%
 - > Set into metal bucks poured into concrete foundation: about 50%

> Set into timber frame built into insulated concrete form foundation: one home

Context

Most Fort Collins homes have basements. In most new homes, these spaces are unfinished but some preparations are typically made during construction with the expectation that home owners will finish the basement as living space. For example, plumbing is roughed in so that a bathroom can be relatively easily added.

High-performance windows with low-e coatings had reached almost 100% market penetration in Fort Collins 2007 new construction. However, as noted above in “Current Practice,” basement windows in the majority of homes incorporated conventional, clear, uncoated glass. Compared with the low-e coated windows, conventional windows have higher heating and cooling loads, compromise comfort and are more vulnerable to condensation. When basements are finished as living space, owners will either put up with these disadvantages or replace the windows with units comparable to the rest of the house. Installing windows with comparable performance when the house is built avoids this problem.

The 2009 IRC prescriptive path requires windows to have an area-weighted average U-Factor of 0.35 or below. It also specifies that the maximum U-Factor allowed in an area-weighting tradeoff equals 0.48. This proposed amendment drops the latter to U-Factor = 0.40 maximum (equal to the 2009 IRC specification for Climate Zone 6).

A related issue, probably best addressed via training, is the basement window installation approach. As noted above in “Current Practice,” about half the homes surveyed in 2007 used metal bucks, part of the concrete formwork that is left in place after the foundation is poured. These bucks serve as thermal short-circuits that undermine the rated performance of the window.

Related Green Building Practices

N/A

Known Objections

None identified