Green Building Practice Summary 03/17/2011

Sector: Commercial

Category/Practice: Energy Efficiency & Conservation / Building Thermal Envelope - Continuous Air Barrier

Proposed GB practice

Description

The building thermal envelope must be designed and constructed with a continuous air barrier that limits air leakage into, or out of, the conditioned space.

Applicability

New construction: Applies
Additions: Applies
Alterations: No

Intent

Improve energy efficiency, comfort, and building durability.

Benefits and Costs

Triple Bottom Line Benefits

People: Improved comfort, fewer pest problems

Economic: Energy cost savings, reduced maintenance cost through building durability (avoid water damage, mold). Potentially, smaller HVAC systems are needed.

Environment: Reduced CO_2 emissions. Longer building durability equates to less material use in the long run.

Costs Passed to Owner

$0.75 - $2.00/SF of above-ground building envelope:
($6k - $15k for example building)
*$0.75/SF for commercial fabric wrap (e.g. Tyvek)
*$1.00/SF for incremental cost between fiberglass batt insulation and closed-cell foam insulation
*$1.25/SF for single-coat, fluid applied
*$2.00/SF for self-adhering rubberized asphalt membrane

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Lost Opportunity

Yes. There is only one chance to get this right.

Implementation

Availability of products and/or services
Products and services are available in the Front Range, but not necessarily in Fort Collins. Local market will respond to demand for resources, materials and technical expertise.

Practicality
This is a well-accepted practice in some parts of the country.

Certification Issues
Certification will be required for assembly and whole-building testing

Enforcement Procedures
Permit application/plan review: All air barrier components of each envelope assembly shall be clearly identified on construction documents with details about the joints, interconnections, and penetrations of the air barrier components.
Field inspection: City building inspectors visually inspect installed air barrier, spot checking only.
Third party testing: Required.
Certificate of Occupancy:

Support Materials Needs
Resource guides on material selection and proper design and installation of air barriers.

Training Needs – Industry
Substantial training needed for architects, builders, trades. Continuous technical assistance needed.

Training Needs – Staff
Training needed for plan reviewers and inspectors

Background

Current practice
Continuous air barriers are not currently required by code. Analysis of existing building stock shows substantial energy loss through building envelope systems. A 2007 paper by the National Institute of Standards (NIST) and ASHRAE show heating and cooling energy savings ranging from 9%-36% from increasing the air tightness of commercial buildings.

Context
It has been traditionally assumed that energy loss through commercial building enclosures is minimal and as a result they have been given little attention. Work in Canada, Europe and the United States over the last 30 years has demonstrated the value to energy savings, occupant comfort and building durability of a well-designed and implemented continuous air barrier system.

Related GB practices
The tightness of the building envelope can affect HVAC system sizing. A tighter building requires less of a safety factor to assure occupant comfort.

A continuous air barrier is one component of a wall system that includes thermal, vapor, and weather barrier layers. It is important that these are integrated for optimum performance of the envelope.

Commissioning the air barrier system ensures that it was installed and performs as designed.

Known objections

- Higher building first cost
- Potential lack of local expertise for design and implementation

Sources

Emmerich, S.; McDowell, T.; Anis, W. “Simulation of the Impact of Commercial Building Envelope Airtightness on Building Energy Utilization” (http://www.nist.gov/customcf/get_pdf.cfm?pub_id=905031)

Air Barrier Association of America (www.airbarrier.org - numerous articles.

"Air Barriers in Building Construction: Understanding Costs, Meeting Performance Standards and Exceeding Codes" (Honeywell white paper).

"Investigation of the Impact of Commercial Building Envelope Airtightness on HVAC Energy Use" NIST, 2005.