

## Easier Energy Star® Compliance with Concrete Homes

*A Thermal By-Pass Checklist must be completed for all homes earning the Energy Star® Label. The Checklist identifies required exterior wall details homebuilders must incorporate into the homes, and that third party energy inspectors must review, to make sure the exterior envelope performs efficiently. Properly installed continuous concrete and foam wall systems, such as Insulating Concrete Forms (ICFs) inherently provide alignment of insulation and air barriers with no gaps, voids or compression. This can provide the homebuilder with a greatly simplified thermal assembly. Concrete wall systems reduce the more expensive and time consuming challenges and coordination of attempting to obtain compliance with conventionally insulated frame construction.*

### How do homes qualify for the Energy Star® Label?

The program for Energy Star® qualified homes was developed by the US Environmental Protection Agency (EPA), to ensure that new houses are built to higher performance standards. Homes built to meet Energy Star are at least 15% more energy efficient than the requirements of the International Residential Code and include additional energy-saving features often making them even more efficient than conventional residential construction. Each Energy Star® qualified home can keep an EPA estimated 4,500 lbs of greenhouse gases out of our air each year.<sup>1</sup>

### What is Thermal By-Pass?

Thermal By-Pass refers to the movement of heat around and through insulation. For insulation to be an effective thermal barrier it must be combined with an air barrier, material that restricts the flow of air through the wall assembly. Both must be installed without any holes, gaps, voids, compression, or wind intrusion. Creating just a 5 percent gap in insulation coverage reduces the effective R-value by 50 percent,<sup>2</sup> leaving little room for substandard work.

Conventional insulation products work only by trapping air. Allowing air flow through insulation greatly reduces its effectiveness. This frequently occurs when conventional frame construction is insulated with conventional thermal blankets, called batts, installed in the open spaces between framing members. If the insulation is not carefully installed tightly on all sides up against surrounding air barriers, framing, and finishes, if it is compressed around electrical wiring, pipes, or other obstructions within the wall, the actual thermal performance of the wall can easily be reduced. Even small gaps between the air barrier and insulation can cause air to begin to circulate as it heats.

### Why is the Thermal By-Pass Checklist Required?

EPA recognizes how much the careful construction of the exterior envelope can impact the overall energy efficiency of a home. The Thermal By-Pass Checklist was developed to provide builders and inspectors with a comprehensive list of critical frame construction details that must be carefully addressed to make sure improper workmanship has not compromised the thermal performance of the exterior wall assembly.

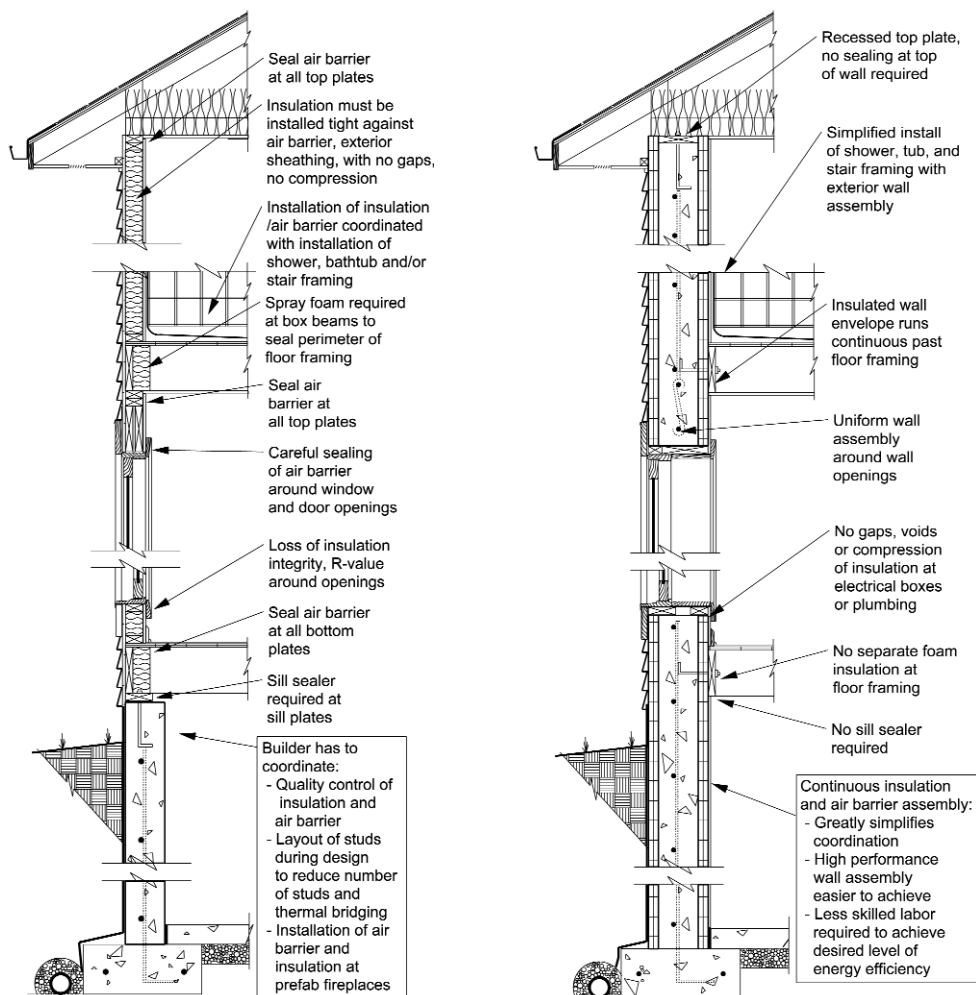
### How Do Concrete Walls Make the Builder's Job Faster and Less Complicated?

Complying with the meticulous requirements of the Checklist is time consuming and difficult. EPA's Thermal ByPass Checklist Guide indicates air barriers "must be perfectly aligned with the insulation" in order for conventionally built wall assemblies to insulate properly. Wall Section 1 shows a cross section of a typical 2-story wood frame exterior wall insulated with batt insulation. It identifies the many potential trouble spots identified in the Checklist that have to be carefully handled by the builder, and reviewed by the energy raters.

Wall Section 2, shows a 2-story ICF exterior wall section, showing the far less complicated wall assembly, with fewer areas requiring special consideration and inspection. Building with ICFs, removable forms, precast concrete, or similar concrete and foam systems eliminates critical coordination issues and construction details that would have to be addressed and verified when building typical Energy Star®

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compliant exterior walls. This saves valuable time and allows high performance concrete homes to be completed faster. One construction cycle study estimates each day of delay costs homebuilders \$140 in combined capital cost, management cost, and sales opportunities.<sup>3</sup>



1 Wood Frame Wall Section

2 Insulated Concrete Wall Section

### What's the Bottom Line?

Advances in building science now demonstrate the shortcomings of traditional batt insulated frame construction. To make it work properly, extra steps, care, and time are required, adding significantly to the cost of a home. Concrete wall systems offer homebuilders a faster, simpler approach to building high performance exterior wall construction that meets Energy Star® insulation and air barrier installation requirements.

1. "Energy Star® Qualified Homes Thermal Bypass Checklist Guide," US Environmental Protection Agency, Version 2.1, June 2008
2. Cutchin, Kelly, & Rashkin, Sam (May 2008) So You Think You Know Building? Sustainable Home Magazine, pages 48–49
3. Caldeira, E. (1998) Cycle time reduction – what is a day worth? (online) [www.toolbase.org/Best-Practices/Business-Management/Cycle-Time-Reduction](http://www.toolbase.org/Best-Practices/Business-Management/Cycle-Time-Reduction)