

Know your boundaries – your thermal boundaries

A critical element that is crucial to efficiency, comfort of a home

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Boundaries are important. They let us know how far to mow on Saturday mornings, which school we visit when we vote and whether or not we owe a state sales tax.

Boundaries are also critical for keeping homes efficient and comfortable, too – most notably thermal boundaries.

The air that is heated and cooled within a home should have a good container to keep it in place. If the envelope enclosing the conditioned space of a house is air-tight and well insulated, a good thermal boundary has been put in place.

There are lots of different methods and materials used to build high-performance walls, ceilings and floors in a house, but any good thermal boundary must include two key components. To be effective, a thermal boundary must include insulation and an air barrier in continuous contact with that insulation. Although this sounds simple, misalignment of insulation and an air barrier are common defects in at least some areas of nearly every home's construction.

The amount of heat transmission through a wall, ceiling or floor – also known as the shell of a home – depends on the amount of insulation, or thermal

resistance, and the surface area of the shell. Heat is also transmitted through the shell or envelope of a house by air passing through or around installed insulation.

If insulation can be bypassed by moving air then it is no longer an effective thermal barrier. Igloo coolers and refrigerators have great thermal boundaries. The hard plastic inner liners and gasketed doors and lids stop air movement in and out of the cooled space. Insulation placed against the plastic liner is continuous at nearly every point surrounding the cooled space, keeping the contents frosty cold. (Why do I want a beer now?)

Energy Star for Homes was created when a group of residential building science experts got together and developed a set of best practices to remedy common thermal boundary defects noted in new and existing homes. The Thermal Bypass Checklist (TBC), developed by Energy Star for Homes, gives homebuilders an easy reference that helps eliminate the worst thermal boundary problems by identifying the most common defects in an easy to use one page check sheet.

Visual inspections using the TBC at key times during framing and insulation installation of new homes in combination with follow-up air infiltration testing (whole-house blower door assessments) insure air barriers and insulation are installed and performing to provide the desired thermal barrier.

This process has been successful in improving the comfort and decreasing the utility use of new homes. More than 1 million homes have been built nationwide following these TBC best practices. Dozens of builders have built hundreds of Energy Star (and TBC) certified homes in Las Cruces and Doña Ana County.

National, state and local residential builders, code officials and municipalities have recognized the effectiveness of installing good thermal boundaries in new homes. The 2009 IECC Residential code (being adopted statewide in New Mexico) includes provisions to limit thermal boundary bypass defects in new homes and will require third-party inspection and infiltration testing.

Some homebuilders who have educated themselves on the importance of thermal boundaries have moved way beyond what is required by green programs, Energy Star or building codes. It is common to see new home envelopes in our area

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Insulated concrete form walls combined with spray foam insulation fill the attic and wall sections in this David Coyle Home currently under construction and targeting Build Green New Mexico gold certifications in Las Cruces.

with advanced insulation and air barriers systems.

Continuous rigid polystyrene insulation under the stucco, insulated concrete forms, structural insulated panels, most spray foam applications and blown or loose fill insulation in attics each create effective home envelopes with continuous insulation and limited air infiltration. Discuss thermal boundaries and the thermal bypass inspection process with your builder if you are building or buying a new home or if you are considering retrofit and remodel work. Las Cruces Realtors can help you find an existing home that has been Energy Star certified at its original construction, too.

It is good to know our boundaries, be more comfortable and more efficient by learning about your home's thermal boundaries at these websites:

- Oak Ridge National Laboratories – Building Technology & Research Center
www.ornl.gov/sci/ees/etsd/btr/c/factsheets.shtml
- Energy Star for Homes
www.energystar.gov/index.cfm?c=new_homes.hm_index
- Inspection Connection LC – Home Energy Rating and Residential Green Building Services
www.icenergyrate.com

Miles Dyson is the owner of Inspection Connection LC - Professional Home Energy Rating and Home Inspection Services in Mesilla Park and can be reached at 202-2457. Dyson is a RESNET certified Home Energy Rater and ASHI certified Home Inspector.



The Otero County Habitat for Humanity used rigid insulation installed at the exterior walls of a home, which was built to Build Green New Mexico silver certification in Tularosa.