



## ENERGY STAR Qualified Homes Thermal Bypass Inspection Checklist

The Thermal Bypass Inspection Checklist must be completed for homes to earn the ENERGY STAR label. The Checklist requires visual inspection of framing areas where air barriers are commonly missed and inspection of insulation to ensure proper alignment with air barriers, thus serving as an extra check that the air and thermal barriers are continuous and complete. State, local, and regional codes, as well as regional ENERGY STAR program requirements, supersede the items specified in this Checklist.

### Guidance on Completing the Thermal Bypass Inspection Checklist:

1. Accredited HERS Providers and certified home energy raters shall use their experience and discretion in verifying that each Inspection Checklist item is installed per the inspection guidelines (e.g., identifying minor defects that the Provider or rater deems acceptable versus identifying major defects that undermine the intent of the Checklist item).
2. Alternative methods of meeting the Checklist requirements may be used in completing the Checklist, if the Provider deems them to be equivalent, or more stringent, than the Inspection Checklist guidelines.
3. In the event an item on the Checklist cannot be verified by the rater, the home cannot be qualified as ENERGY STAR, unless the builder assumes responsibility for verifying that the item has met the requirements of the Checklist. This option is available at the discretion of the Provider or rater but may not be used to verify more than six (6) items on the Inspection Checklist. This responsibility will be formally acknowledged by the builder signing-off on the Checklist for the item(s) that they verified. The column titled "N/A" should be used when the checklist item is not present in the home or when local code requirements take precedent.
4. The Checklist may be completed for a batch of homes using a RESNET-approved sampling protocol when qualifying homes as ENERGY STAR. For example, if the approved sampling protocol requires rating one in seven homes, then the Checklist will be completed for the one home which was rated.
5. In the event that a Provider or rater finds an item that is inconsistent with the Checklist Inspection guidelines, the home cannot be qualified as ENERGY STAR until the item is corrected in a manner that meets the ENERGY STAR requirements. If correction of the item is not possible, the home cannot earn the ENERGY STAR label.
6. The Provider or rater is required to keep a hard copy record of the completed and signed Checklist. The signature of a builder employee is also required if the builder verified compliance with any item on the Checklist.
7. For purposes of this Checklist, an air barrier is defined as any solid material that blocks air flow between a conditioned space and an unconditioned space, including necessary sealing to block excessive air flow at edges and seams. Additional information on proper air sealing of thermal bypasses can be found on the Building America Web site ([www.eere.energy.gov/buildings/building\\_america](http://www.eere.energy.gov/buildings/building_america)) and in the EEBA Builder's Guides ([www.eeba.org](http://www.eeba.org)). These references include guidance on identifying and sealing air barriers, as well as details on many of the items included in the Checklist.



# ENERGY STAR Qualified Homes Thermal Bypass Inspection Checklist

Home Address: _____		City: _____		State: _____	
Thermal Bypass	Inspection Guidelines	Corrections Needed	Builder Verified	Rater Verified	N/A
1. Overall Air Barrier and Thermal Barrier Alignment	<b>Requirements:</b> Insulation shall be installed in full contact with sealed interior and exterior air barrier except for alternate to interior air barrier under item no. 2 (Walls Adjoining Exterior Walls or Unconditioned Spaces)				
	<b>All Climate Zones:</b>				
	1.1 Overall Alignment Throughout Home	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	1.2 Garage Band Joist Air Barrier (at bays adjoining conditioned space)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	1.3 Attic Eave Baffles Where Vents/Leakage Exist	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<b>Only at Climate Zones 4 and Higher:</b>				
	1.4 Slab-edge Insulation (A maximum of 25% of the slab edge may be uninsulated in Climate Zones 4 and 5.)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<b>Best Practices Encouraged, Not Req'd.:</b>				
1.5 Air Barrier At All Band Joists (Climate Zones 4 and higher)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
1.6 Minimize Thermal Bridging (e.g., OVE framing, SIPs, ICFs)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
2. Walls Adjoining Exterior Walls or Unconditioned Spaces	<b>Requirements:</b> <ul style="list-style-type: none"> <li>• Fully insulated wall aligned with air barrier at both interior and exterior, OR</li> <li>• Alternate for Climate Zones 1 thru 3, sealed exterior air barrier aligned with RESNET Grade 1 Insulation fully supported</li> <li>• Continuous top and bottom plates or sealed blocking</li> </ul>				
	2.1 Wall Behind Shower/Tub	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	2.2 Wall Behind Fireplace	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	2.3 Insulated Attic Slopes/Walls	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	2.4 Attic Knee Walls	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	2.5 Skylight Shaft Walls	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	2.6 Wall Adjoining Porch Roof	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	2.7 Staircase Walls	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.8 Double Walls	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
3. Floors between Conditioned and Exterior Spaces	<b>Requirements:</b> <ul style="list-style-type: none"> <li>• Air barrier is installed at any exposed fibrous insulation edges</li> <li>• Insulation is installed to maintain permanent contact with sub-floor above including necessary supports (e.g., staves for blankets, netting for blown-in)</li> <li>• Blanket insulation is verified to have no gaps, voids or compression.</li> <li>• Blown-in insulation is verified to have proper density with firm packing</li> </ul>				
	3.1 Insulated Floor Above Garage	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	3.2 Cantilevered Floor	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Shafts	<b>Requirements:</b> Openings to unconditioned space are fully sealed with solid blocking or flashing and any remaining gaps are sealed with caulk or foam (provide fire-rated collars and caulking where required)				
	4.1 Duct Shaft	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	4.2 Piping Shaft/Penetrations	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	4.3 Flue Shaft	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Attic/ Ceiling Interface	<b>Requirements:</b> <ul style="list-style-type: none"> <li>• All attic penetrations and dropped ceilings include a full interior air barrier aligned with insulation with any gaps fully sealed with caulk, foam or tape</li> <li>• Movable insulation fits snugly in opening and air barrier is fully gasketed</li> </ul>				
	5.1 Attic Access Panel (fully gasketed and insulated)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	5.2 Attic Drop-down Stair (fully gasketed and insulated)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	5.3 Dropped Ceiling/Soffit (full air barrier aligned with insulation)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	5.4 Recessed Lighting Fixtures (ICAT labeled and sealed to drywall)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	5.5 Whole-house Fan (insulated cover gasketed to the opening)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. Common Walls Between Dwelling Units	<b>Requirements:</b> Gap between drywall shaft wall (i.e., common wall) and the structural framing between units is fully sealed at all exterior boundary conditions				
	6.1 Common Wall Between Dwelling Units	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Home Energy Rating Provider: _____		Rater Inspection Date: _____		Builder Inspection Date: _____	
Home Energy Rater Company Name: _____		Builder Company Name: _____			
Home Energy Rater Signature: _____		Builder Employee Signature: _____			

Pooled 06/02/08

# THERMAL BYPASS CHECKLIST

## KEY TERMS

Air Barrier – Any material that restricts air flow. In wall assemblies, the exterior air barrier is often a combination of sheathing and either building paper, house wrap or board insulation. The interior air barrier is typically gypsum board.

Alignment – Insulation installation condition where the insulation is in full contact with the air barrier (contiguous) and continuous across the entire thermal enclosure.

Batt Insulation – Insulation that is typically manufactured out of fiberglass or rock wool into ‘blankets’ sized for typical framing bays and manually fitted into place. They require extra diligence to ensure no gaps, voids, compression or misalignment where framing bays are not typical framing dimensions or include wiring and piping.

Blown-in Insulation – Insulation typically made from fiberglass or cellulose that is blown into construction assemblies dry or wet that inherently fills the entire framed assembly without any gaps, voids, compression or misalignment.

Cantilever - An overhang where one floor extends beyond and over a wall below thereby exposing the floor to exterior conditions.

Compression – Insulation installation condition where the full thickness is reduced, resulting in increased density and reduced air pockets that drive thermal resistance. This undermines the effective R-value of the insulation.

Convective Air Flow – As used with thermal bypass, this refers to air-flow that occurs in gaps between insulation and the air barrier due to temperature differences in and across the gap resulting in a stack effect or driving forces from more to less heat.

Floating Slab – Non-monolithic slab and foundation. This can occur where rigid slab edge insulation is placed between the foundation wall and slab leaving the slab unsupported.

FSK Radiant Barrier – A foil-coated insulation that prevents against fire spreading and smoke generation while reflecting internal or external heat. FSK insulation is commonly used in high heat areas of a building including behind fireplaces and the attic knee walls. FSK stands for Foil, Scrim, Kraft; the components of this insulation.

Fully Aligned – Condition where air barriers and thermal barrier (insulation) are contiguous (touching) and continuous across the entire building envelope.

Fully Supported – When insulation is evenly and securely held in place so that it does not bow or hang loose. Insulation that is not fully supported is more likely to be misaligned with the air barriers.

Infrared Imaging – Heat sensing camera which helps reveal thermal bypass conditions by exposing hot and cold surface temperatures revealing unintended thermal flow, air flow, and moisture flow. Darker colors indicate cool temperatures, while lighter colors indicate warmer temperatures.

Insulated Concrete Form (ICFs) – Factory-built wall system blocks that are made from extruded polystyrene insulation. Steel reinforcing rods are added and concrete is poured into the voids, creating a very air-tight, well-insulated and sturdy wall as the insulation is inherently aligned with the exterior and interior air barriers.

Insulation Contact (IC) – Rating for recessed lights allowing insulation to be placed directly over the top of the fixture.

Insulation Contact, Air-Tight (ICAT) Lighting Fixture – Rating for recessed lights that can have direct contact with insulation and constructed with air-tight assemblies to reduce thermal losses.

# THERMAL BYPASS CHECKLIST

## KEY TERMS

Misalignment – Condition where air barrier and thermal barrier (Insulation) are not contiguous (touching) and not continuous across the entire building envelope.

Optimal Value Engineering (OVE) – A strategy for reducing thermal bridging by minimizing wall framing needed for structural support. Common techniques include 2x6 framing with 24" on-center spacing, single top plates where trusses align with wall framing below, properly sized headers, two-stud corners, lattice strips at exterior/interior wall intersections, and the elimination of excessive fire blocking and window framing. This results in much more open framing for insulation to improve energy efficiency and comfort.

Rigid Insulation – Insulation typically made from polystyrene or polyurethane manufactured into 4' x 8' boards of various thicknesses. As an exterior sheathing material, rigid board insulation provides a complete thermal break assembly and can effectively shift the dew point outside of the exterior wall construction assembly.

R-value – A measure of the thermal resistance of a material. Higher R-values indicate better resistance to heat flow through material. The effective R-value of an insulation material will be reduced by gaps, voids, compression or misalignment.

Spray Foams Insulation – Insulation available in both open- and closed-cell configurations that is typically made from polyurethane. It is sprayed into construction assemblies as a liquid that expands to fill the surrounding cavity. Once dry, spray foam functions as both an air barrier and thermal barrier and effectively fill holes and cracks for both a well-insulated and air-tight wall assembly. Closed-cell spray foams are more dense and also function as a vapor barrier.

Structural Insulated Panels (SIPs) – Factory-built insulated wall assemblies that ensure full alignment of insulation with integrated air barriers. Composed of insulated foam board glued to both an internal and external layers of sheathing (typically OSB or plywood). Many SIP panels are manufactured with pre-cut window and door openings.

Thermal Barrier – Term used to describe when flow of heat is restricted or slowed. Accomplished through insulation.

Thermal Bridging – Accelerated thermal flow that occurs when materials that are poor insulators displace insulation.

Thermal Bypass Checklist – Comprehensive list of building details for ENERGY STAR Qualified Homes addressing construction details where air barriers and insulation are commonly missing.

Thermal Bypass – The movement of heat around or through insulation. This typically occurs when gaps exist between the air barrier and insulation or where air barriers are missing.

Vapor Barrier – Any material that restricts the flow of moisture. In hot climates, a vapor barrier would be installed on the exterior surface and in cold climates on the interior surface.

Wind Baffle – An object that serves as an air barrier for the purpose of blocking wind washing at attic eaves.

Wind Washing – When insulating properties of insulation are eliminated due to air-current penetration.