

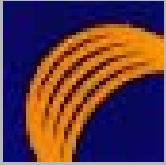
Completing the Thermal Bypass Checklist

Ben Adams
&

Don Swift

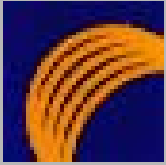
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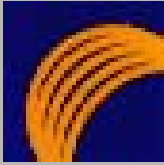
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- Providing home energy rating services for 9 years
- Certified approximately 20,000 homes in NJ, PA, NY to Energy Star to date
- All homes have been required to complete a pre-drywall inspection

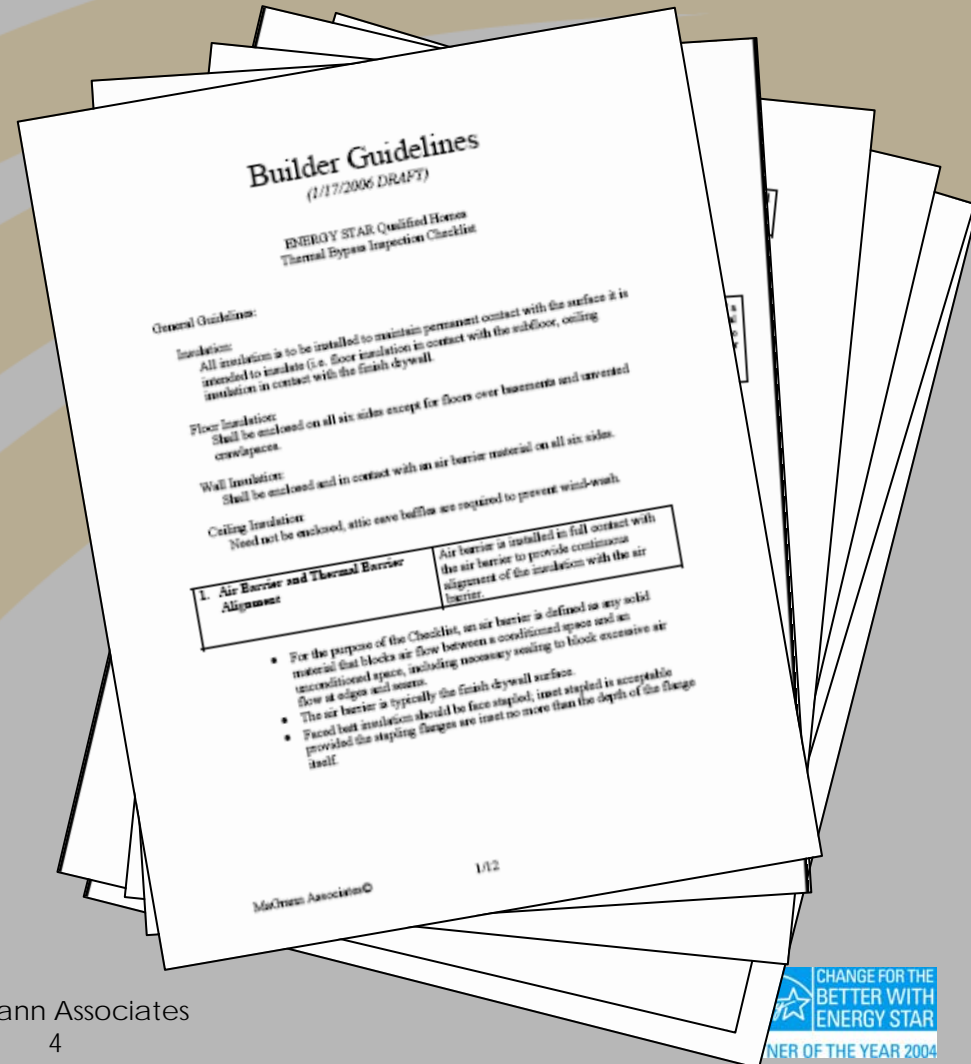


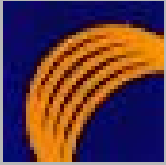
Additional Time to Complete TBC

- Minimal additional time required to fill in the Thermal Bypass Checklist?
- As long as we do a good job of communicating to the builder and his subs what is expected



Builder Guidelines

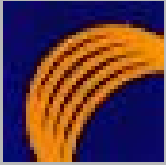




Power Point Presentation



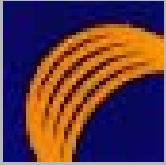
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Power Point Presentation

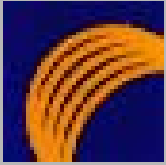


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Thermal Bypass Summary

- **General Insulation**
 - Insulation must be installed in permanent contact with the surface it is intended to insulate.
- **Floor Insulation**
 - Must be enclosed on all six sides, except for floors over basements and crawl spaces.
- **Wall Insulation**
 - All wall insulation must be enclosed and in contact with a solid material on all six sides (excluding band areas)
- **Ceiling Insulation**
 - Need not be enclosed, attic baffles are required



Thermal Bypass Summary

- **Building Envelope (Air Barrier)**
 - The building envelope must be continuous and complete including spanning the joist cavities between floors.
 - Building envelope penetrations and seams must be air sealed using durable materials.
 - Accesses in the building envelope (including doors, panels, and stairways) must be fully insulated and gasketed.



Thermal Bypass Checklist Issues

ENERGY STAR Qualified Homes Thermal Bypass Inspection Checklist

Home Address: _____ City: _____ State: _____

Thermal Bypass	Inspection Guidelines	Rater Verified	Builder Verified
1. Air Barrier and Thermal Barrier Alignment	Insulation is installed in full contact with the air barrier to provide continuous alignment of the insulation with the air barrier	<input type="checkbox"/>	<input type="checkbox"/>
2. Shower / Tub at Exterior Wall	Exterior walls have been enclosed on all six sides	<input type="checkbox"/>	<input type="checkbox"/>
3. Insulated Floor Above Garage	Exterior walls have been fully insulated	<input type="checkbox"/>	<input type="checkbox"/>
4. Attic Knee Walls	Air barrier is installed at any exposed edges of insulation	<input type="checkbox"/>	<input type="checkbox"/>
5. Attic Access Panel / Drop-Down Stair	Insulation is installed to maintain permanent contact with the underside of the sub-floor decking	<input type="checkbox"/>	<input type="checkbox"/>
6. Cantilevered Floor	Continuous top and bottom plates are installed with an air barrier on the attic side of insulated walls, including exposed edges of insulation at joints and rafters	<input type="checkbox"/>	<input type="checkbox"/>
7. Duct Shaft	Insulation is in complete alignment with interior wall finish and the attic side air barrier	<input type="checkbox"/>	<input type="checkbox"/>
8. Flue Shaft	Insulation is in complete alignment with interior wall finish and the attic side air barrier	<input type="checkbox"/>	<input type="checkbox"/>
9. Piping Shaft / Penetrations	Attic access panel or stair is fully gasketed for an airtight fit	<input type="checkbox"/>	<input type="checkbox"/>
10. Dropped Ceiling / Soffit	Attic access panel or stair is covered with insulation that is attached and fits snugly in the framed opening	<input type="checkbox"/>	<input type="checkbox"/>
11. Fireplace Wall	Air barrier spans cantilever and any exposed edges of insulation	<input type="checkbox"/>	<input type="checkbox"/>
12. Staircase Framing at Exterior Wall / Attic	Floor framing is completely filled with insulation or insulation is installed to maintain permanent contact with the sub-floor decking	<input type="checkbox"/>	<input type="checkbox"/>
13. Recessed Lighting	Openings to unconditioned space are sealed with solid blocking and any remaining gaps are sealed with caulk or foam	<input type="checkbox"/>	<input type="checkbox"/>
14. Porch Roof	Opening around flue is fully sealed with flashing and any remaining gaps are sealed with fire-rated caulk or sealant	<input type="checkbox"/>	<input type="checkbox"/>
15. Whole-House Fan Penetration at Attic	Combustion clearance between flue and combustible materials (e.g., OSB) are with fire-rated caulk or sealant	<input type="checkbox"/>	<input type="checkbox"/>
16. Common Walls Between Dwelling Units	Combustion clearance between flue and combustible materials (e.g., OSB) are properly closed with UL-approved metal collars	<input type="checkbox"/>	<input type="checkbox"/>
	Opening is fully sealed as required with flashing and any remaining gaps are sealed with caulk or foam	<input type="checkbox"/>	<input type="checkbox"/>
	Air barrier is fully aligned with insulated framing and any gaps are fully sealed with caulk, foam, or tape	<input type="checkbox"/>	<input type="checkbox"/>
	Air barrier is fully aligned with insulated framing and any gaps are fully sealed with any gaps are fully sealed with caulk, foam, or tape	<input type="checkbox"/>	<input type="checkbox"/>
	Air barrier is fully aligned with insulated framing and any gaps are fully sealed with caulk, foam, or tape	<input type="checkbox"/>	<input type="checkbox"/>
	Airtight IC-rated recessed light fixtures are sealed to drywall with gasket, caulk, or foam	<input type="checkbox"/>	<input type="checkbox"/>
	Air barrier is installed at the intersection of the porch roof and exterior wall finish	<input type="checkbox"/>	<input type="checkbox"/>
	Air barrier is provided that is gasketed or sealed to the opening from either the attic side or ceiling side of the fan	<input type="checkbox"/>	<input type="checkbox"/>
	Air barrier is installed to seal the gap between a gypnast shaft wall (i.e., common wall) and the structural framing between units in duplex and townhouse construction	<input type="checkbox"/>	<input type="checkbox"/>

Home Energy Rating Provider: _____ Builder Company: _____
 Home Energy Rater Company: _____ Builder Employee Signature: _____
 Home Energy Rater Signature: _____ Inspection Date: _____
 Inspection Date: _____ Re-inspection Date: _____



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:

- 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).
- Alternative methods of meeting the Checklist requirements may be used if the Provider deems them to be equivalent, or more stringent, than the Inspection Checklist guidelines.
- 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, under the direction and oversight of the Provider, 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 four (4) items on the Checklist. This responsibility will be formally acknowledged by the builder signing-off on the Checklist for the item(s) that they verified.

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 testing one in seven homes, then the Checklist will be completed for the one home which was rated.

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.

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.

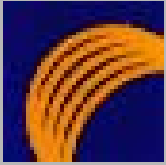
Uses of this Checklist, an air barrier is defined as any solid material that blocks air flow between conditioned space and an unconditioned space, including necessary sealing to block excessive air leaks and seams. Additional information on proper air sealing of thermal bypasses can be found in the Building America Web site (www.eere.energy.gov/buildings/building_america) and in the Provider's Guides (www.eere.org). These references include guidance on identifying and sealing as well as details on many of the items included in the Checklist.



Continuous Air Barrier

- Is band joist insulation required to be enclosed on all six sides? When will we know final duct tightness?
- Band joists areas required to be air sealed to provide continuation of the air barrier across floors sufficient?

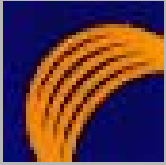




Items May Not be Verifiable

- At the pre-drywall inspection phase, there are three items on the checklist that may not be verifiable by the rater...

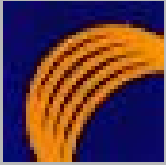
At the discretion of the Provider or Rater the builder may sign-off on no more than 4 items.



2. Shower/ Tub at Exterior Wall

- Exterior walls have been enclosed on all six sides.
- Exterior walls have been fully insulated.

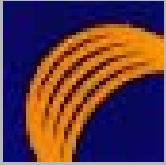




6. Cantilevered Floor

- Air barrier spans cantilever and any exposed edges of insulation.
- Floor framing is completely filled or insulation is installed to maintain permanent contact with the sub-floor decking.

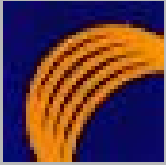




11. Fireplace Wall

- Air barrier is fully aligned with insulated framing in framed shaft behind fireplace and any gaps are fully sealed with caulk, foam, or tape.





Items That do Not Apply

- There are items on the checklist that may not apply to the home being inspected.

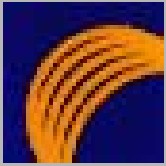


Customized TBC Inspection Form

ENERGY STAR Qualified Homes Thermal Bypass Inspection Checklist

Address: _____ City: _____ ST: _____

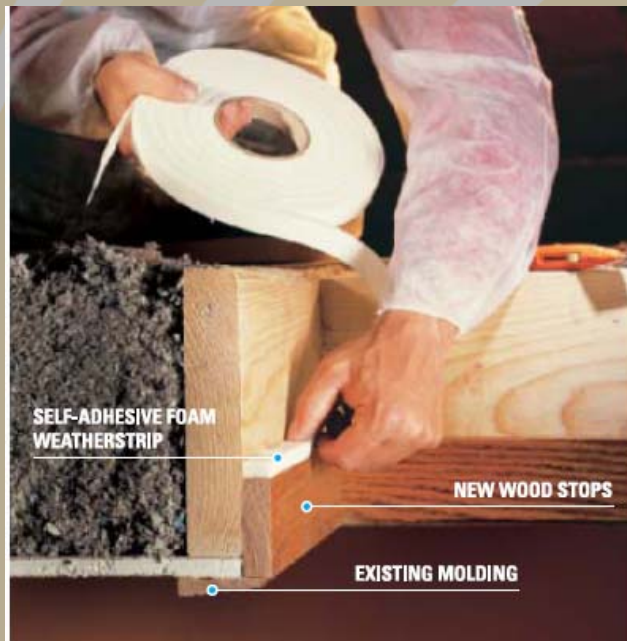
Thermal Bypass	Inspection Guidelines	Rater Verified	Builder Verified	Not Applicable	Check at Final
1. Air Barrier and Thermal Barrier Alignment	Air barrier is installed in full contact with the air barrier to provide continuous alignment of the insulation with the air barrier.	<input type="checkbox"/>			
2. Shower/ Tub at Exterior Wall	Exterior walls have been enclosed on all six sides.	<input type="checkbox"/>		<input type="checkbox"/>	
	Exterior walls have been fully insulated	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
3. Insulated Floor Above Garage	Air barrier is installed at any exposed edges of insulation.	<input type="checkbox"/>		<input type="checkbox"/>	
3. Insulated Floor Above Garage cont.	Insulation is installed to maintain permanent contact with the underside of the sub-floor decking.	<input type="checkbox"/>		<input type="checkbox"/>	
4. Attic Knee Walls	Continuous top and bottom plates are installed with an air barrier on the attic side of the insulated walls, including exposed edges of insulation at joists and rafters.	<input type="checkbox"/>		<input type="checkbox"/>	
	Insulation is in complete alignment with interior wall finish and the attic side air barrier.	<input type="checkbox"/>		<input type="checkbox"/>	
5. Attic Access Panel/ Drop-Down Stair	Attic access panel or stair is fully gasketed for an air tight fit	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Attic access panel or stair is covered with insulation that is attached and fits snugly in the framed opening.	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
6. Cantilevered Floor	Air barrier spans cantilever and any exposed edges of insulation	<input type="checkbox"/>		<input type="checkbox"/>	
	Floor framing is completely filled with insulation or insulation is installed to maintain permanent contact with sub-floor decking.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	



Items Checked at Final

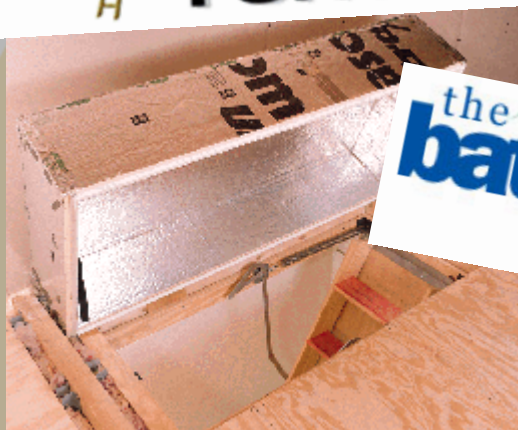
5. Attic Access Panel/ Drop-Down Stair

- Attic access panel or stair is fully gasketed for an air tight fit.
- Attic Access panel or stair is covered with insulation that is attached and fits snugly in the framed opening.





Attic Stair Options



Insulated Cover door:

White MFD panel, 1/8" (3mm)

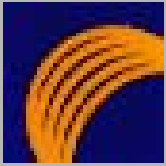
Foam core polystyrene insulation
1-1/2" thick cover door : 1-1/4" (30 mm),
1" thick cover door: 3/4" (20 mm)

Solid wood edge, 3-1/2" (80 mm)

White MFD panel, 1/8" (3mm)



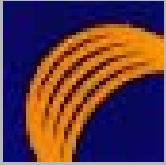
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13. Recessed Lighting

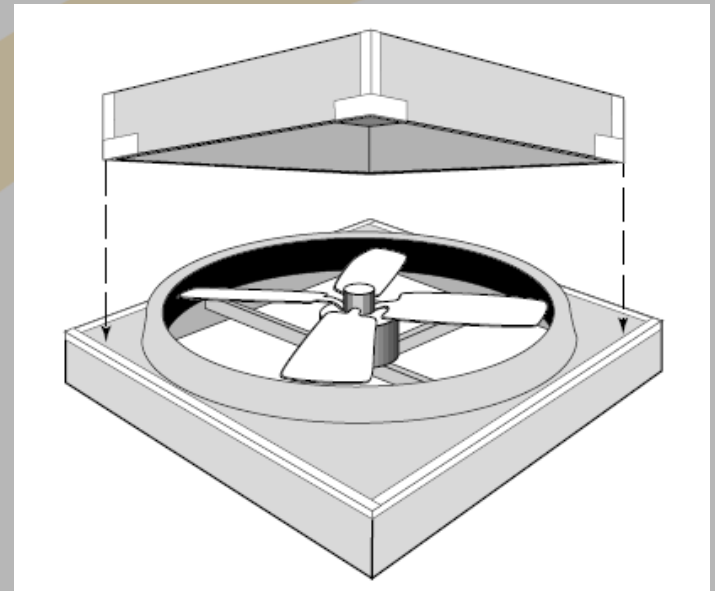
- Airtight IC-rated recessed light fixtures are sealed to drywall with gasket, caulk, or foam.





15. Whole House Fan Penetration at Attic

- An insulated cover is provided that is gasketed or sealed to the opening from either the attic side or ceiling side of the fan.





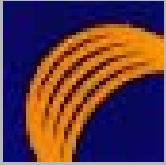
Final Inspection Data

Thermal Bypass Checklist:

Thermal Bypass	Inspection Guidelines	Verified	Not Applicable
Attic Access/ Pull down stair	Attic access panel or stair is fully gasketed for an air tight fit	<input type="checkbox"/>	<input type="checkbox"/>
	Attic access or stair is covered with insulation that fully covers opening	<input type="checkbox"/>	<input type="checkbox"/>
Recessed Lighting	Airtight IC-rated recessed fixtures are sealed to drywall with caulk, foam, gasket	<input type="checkbox"/>	<input type="checkbox"/>
Whole-house fan	Insulated cover is provided that is gasketed or sealed to the opening	<input type="checkbox"/>	<input type="checkbox"/>

Address: _____

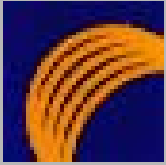
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No Pre-drywall = Major Issues

- If you did not complete a pre-drywall inspection, there are 8 items on the TBC that are not easily verifiable at final inspection phase.
 - Insulation
 - behind tubs/ showers
 - in floors over garages
 - in cantilevers
 - Draftblocking
 - floors over garage
 - cantilevers
 - staircases
 - Fireplaces
 - Porch roofs

At the discretion of the Provider or Rater the builder may sign-off on no more than 4 items.



Summary

- If you are currently not doing pre-drywall inspections, you probably want to start.
- Good communication to your builder and his subs of what is expected is key.

Thank You!