Northwest ENERGY STAR® Homes Thermal Enclosure Checklist

Home Address: _____ City: _____ State:_____

Inspection Guidelines	Must Correct	Builder Approved[1]	Rater Approved	N/A
1. High-Performance Windows				
1.1 *Prescriptive Path:* Windows shall meet or exceed ENERGY STAR window requirements[2]	☐	☐	☐	☐
1.2 *Performance Path*: Windows shall meet or exceed 2009 IECC requirements[3]	☐	☐	☐	☐
2. Quality-Installed Insulation				
2.1 Ceiling, floor, and wall insulation levels shall meet or exceed 2009 IECC levels[4]	☐	☐	☐	☐
2.2 Slab insulation shall meet or exceed 2009 IECC levels[4]	☐	☐	☐	☐
2.3 Insulation shall achieve RESNET-defined Grade I installation or, alternatively, Grade II for walls with insulated sheathing, (see checklist item 4.3.1 for required insulation levels)	☐	☐	☐	☐
3. Fully-Aligned Air Barriers [5]				
At each location noted below, a complete air barrier shall be provided that is fully aligned with the insulation as follows: • At interior surface of ceilings in all Climate Zones • At exterior surface of walls in all Climate Zones; and also at interior surface of walls for Climate Zones 4-8[6] • At interior surface of floors in all Climate Zones, including supports to ensure permanent contact and blocking at exposed edges[7]				
3.1 Walls				
3.1.1 Walls behind showers and tubs	☐	☐	☐	☐
3.1.2 Walls behind fireplaces	☐	☐	☐	☐
3.1.3 Attic knee walls	☐	☐	☐	☐
3.1.4 Skylight shaft walls	☐	☐	☐	☐
3.1.5 Wall adjoining porch roof	☐	☐	☐	☐
3.1.6 Staircase walls	☐	☐	☐	☐
3.1.7 Double walls	☐	☐	☐	☐
3.1.8 Garage rim / band joist adjoining conditioned space	☐	☐	☐	☐
3.1.9 All other exterior walls	☐	☐	☐	☐
3.2 Floors				
3.2.1 Floor above garage	☐	☐	☐	☐
3.2.2 Cantilevered floor	☐	☐	☐	☐
3.2.3 Floor above unconditioned basement or vented crawlspace	☐	☐	☐	☐
3.3 Ceilings				
3.3.1 Dropped ceiling/soffit below unconditioned attic	☐	☐	☐	☐
3.3.2 At all insulated ceilings, including wind baffles installed at eaves in every bay, or equivalent air barrier, at edge of ceiling insulation	☐	☐	☐	☐
3.3.3 Insulated attic slopes/walls	☐	☐	☐	☐
4. Reduced Thermal Bridging				
4.1 Raised-heel truss or equivalent framing/insulation method used in the attic[8]	☐	☐	☐	☐
4.2 HVAC and other attic platforms installed to allow for full-depth insulation below	☐	☐	☐	☐
4.3 Reduced thermal bridging at walls with **one of the following options**:				
4.3.1 Continuous rigid insulation sheathing, insulated siding, or combination of the two; ≥ R-3 in Climate Zone 4, ≥ R-5 in Climate Zones 5-8 [9,10], **OR**;	☐	☐	☐	☐
4.3.2 Structural Insulated Panels (SIPs), **OR**;	☐	☐	☐	☐
4.3.3 Insulated Concrete Forms (ICFs), **OR**;	☐	☐	☐	☐
4.3.4 Double-wall/staggered stud framing[11], **OR**;	☐	☐	☐	☐
4.3.5 Smart framing, including all of the items below:	☐	☐	☐	☐
4.3.5a All corners insulated to edge[12], **AND**;	☐	☐	☐	☐
4.3.5b All headers above windows & doors insulated[13], **AND**;	☐	☐	☐	☐
4.3.5c Framing limited at all windows & doors[14], **AND**;	☐	☐	☐	☐
4.3.5d All interior / exterior wall intersections insulated[15], **AND**;	☐	☐	☐	☐
4.3.5e Minimum stud spacing of 19.2" oc framing unless construction documents specify other spacing is structurally required[16]	☐	☐	☐	☐

Northwest ENERGY STAR® Homes Thermal Enclosure Checklist

Inspection Guidelines	Must Correct	Builder Approved[1]	Rater Approved	N/A
5. Air Sealing				
5.1 Penetrations to unconditioned space fully sealed with solid blocking or flashing as needed and gaps sealed with caulk or foam				
5.1.1 Duct / flue shaft	☐	☐	☐	☐
5.1.2 Plumbing / piping	☐	☐	☐	☐
5.1.3 Electrical wiring	☐	☐	☐	☐
5.1.4 Bathroom and kitchen exhaust fans	☐	☐	☐	☐
5.1.5 Recessed lighting fixtures ICAT labeled and fully gasketed/caulked to ceiling	☐	☐	☐	☐
5.2 Cracks in the building envelope fully sealed				
5.2.1 Foam gasket placed beneath sill plate and foundation; sill plate sealed to foundation with caulk	☐	☐	☐	☐
5.2.2 For walls, continuous top plates or sealed blocking using silicone caulk, latex foam, or equivalent material.	☐	☐	☐	☐
5.2.3 Sheetrock sealed to top plate at all attic/wall interfaces using silicone caulk, latex foam, or equivalent material. Construction adhesive shall not be used.	☐	☐	☐	☐
5.2.4 Rough opening around windows & exterior doors sealed with caulk or foam	☐	☐	☐	☐
5.2.5 Marriage joints between modular home modules at all exterior boundary conditions fully sealed with gasket and foam	☐	☐	☐	☐
5.2.6 All seams at Structural Insulated Panels (SIPs) foamed and taped	☐	☐	☐	☐
5.2.7 In multi-family buildings, the gap between the drywall shaft wall (i.e. common wall) and the structural framing between units fully sealed at all exterior boundary conditions	☐	☐	☐	☐
5.3 Other Openings				
5.3.1 Exterior doors gasketed or made substantially air-tight	☐	☐	☐	☐
5.3.2 Attic access panels and drop-down stairs equipped with ≥R-10 insulated cover and gasketed	☐	☐	☐	☐
5.3.3 Whole-house fans equipped with ≥R-10 insulated cover that is either installed on the house side or mechanically operated, and gasketed	☐	☐	☐	☐

Rater Name: _____ Rater Pre-Drywall Inspection Date: _____ Rater Initials: _____

Rater Name: _____ Rater Final Inspection Date: _____ Rater Initials: _____

Builder Employee: _____ Builder Inspection Date: _____ Builder Initials: _____

Notes:

1. At the discretion of the Rater, the builder may verify up to eight items specified in this checklist. When exercised, the builder's responsibility will be formally acknowledged by the builder signing off on the checklist for the item(s) that they verified.
2. *For Prescriptive Path:* All windows, doors, and skylights shall meet ENERGY STAR Program Requirements for Residential Windows, Doors, and Skylights – Version 5.0 as outlined at www.energystar.gov/windows except fenestration utilized as part of a passive solar design. These windows shall be facing within 15 degrees of true south and directly coupled to thermal storage mass that has a heat capacity > 20 btu/ft^{3}x^{o}F and provided in a ratio of at least 3 sq. ft per sq. ft. of south facing fenestration. Generally, thermal mass materials will be at least 2" thick. Also, note that the U-value and SHGC for doors apply to the whole door, not just to the glazing portion.
3. *For Performance Path:* All windows, doors and skylights shall meet or exceed IECC 2009 U-factor and SHGC requirements specified in the 2009 IECC – table 402.1.1.
4. Insulation levels in a home shall meet or exceed those specified in the 2009 IECC. Compliance can be determined by meeting component insulation requirements in Table 402.1.1, using U-factor alternatives in Table 402.1.3, or using a total UA alternative, as described in Section 402.1.4 of the 2009 IECC. Note that the U-factor for steel-frame envelope assemblies shall be calculated using the ASHRAE zone method or a method providing equivalent results, and not a series-parallel path calculation method. Additionally, reduction of ceiling insulation in space-constrained roof/ceiling assemblies shall be limited to 500 sq. ft. or 20% of ceiling area, whichever is less. Finally, slab insulation shall extend to the top of the slab to provide a complete thermal break.
5. For purposes of this checklist, an air barrier is defined as any durable solid material that blocks air flow between conditioned space and unconditioned space, including necessary sealing to block excessive air flow at edges and seams. EPA recommends, but does not require, rigid air barriers. If flexible air barriers are used, they shall be fully taped and sealed as required for a complete air barrier assembly and shall not be made of materials that are easily torn, including paper-based products such as kraft paper. 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) and in the EEBA Builder's Guides (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.

6. Band joists are currently exempt from interior air barrier requirement in Climate Zones 4 thru 8, but highly encouraged by EPA as a best practice.
7. Examples of supports necessary for permanent contact include staves for batt insulation or netting for blown-in insulation.
8. Raised-heel trusses or equivalent framing techniques shall elevate the roof adequately to allow for insulation at a depth at the inside face of the stud wall below of at least R-29, full insulation level used throughout the rest of the attic.
9. If used, insulated siding shall provide the required R-value at its minimum thickness and be attached directly over a water-resistive barrier and sheathing. If non-insulated structural sheathing is used at corners, advanced framing details listed under requirement 4.3.5 shall be met for those wall sections.
10. Steel framing shall meet the reduced thermal bridging requirements by complying with item 4.3.1 of the checklist.
11. Double-wall framing is defined as any framing method that ensures a continuous layer of insulation covering the studs to at least the R-value required in Section 4.3.1 of the checklist, such as offset double-stud walls, aligned double-stud walls with continuous insulation between the adjacent stud faces, single sill (2x8) with staggered studs, or single-stud walls with 2x2 or 2x3 cross-framing. In all cases, insulation shall fill the entire wall cavity from the interior to exterior sheathing except at windows, doors and other penetrations.
12. All exterior corners shall have insulation extend to exterior wall sheathing using either "California Corners" or equivalent alternative framing technique that uses no more than three studs per corner and allows access to insulate the cavity to ≥R-6 or the minimum to meet state code.
13. Headers shall be minimum R-3 for Climate Zones 1 through 4 and R-5 for Climate Zones 5-8 using continuous rigid insulation sheathing, SIP headers, other prefabricated insulated headers, two-member headers with insulation between, single-member headers insulated on one side, or an equivalent assembly, except where structural engineered framing layout indicates that full-depth solid headers are the only acceptable option. R-value requirement refers to manufacturer's nominal insulation value.
14. Framing at windows shall be limited to a maximum of one pair of king studs and one pair jack studs per window opening to support the header and window sill. Additional jack studs shall be used only as needed for structural support and cripple studs only as needed to maintain on-center spacing of studs.
15. Insulation shall run continuously behind interior/exterior wall intersections using ladder blocking, full length 2"x6" or 1"x6" furring behind the first partition stud, drywall clips, or other equivalent alternative.
16. Vertical framing members shall either be on-center or have an alternative structural purpose that is apparent to the rater or documented by the builder, architect or engineer. No more than 5% of studs may lack an apparent or documented structural purpose, which is equivalent to one vertical stud for every 30 linear feet of wall, assuming 16" stud spacing.