



VOLUME 11.

BUILDING AMERICA BEST PRACTICES SERIES



MARINE CLIMATE

BUILDERS CHALLENGE GUIDE TO
**40% Whole-House Energy
Savings in the Marine Climate**

PREPARED BY

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MEASURE	Building America Recommendations	Builder #1	Builder #2	Builder #3
INSULATION (take a look at a house under construction before sheetrock is installed)				
Insulation installed behind tubs, landings, and other hard to reach places	Yes			
Insulation fills entire cavities—no voids or compressed batts—Attic insulation level without gaps and covers entire attic floor	Yes			
Where fiberglass batt insulation is used it is high-density	Yes			
Rim joists are insulated	Yes			
Rigid foam insulation applied under exterior siding or stucco	Yes			
WINDOWS (take a look at a house under construction before exterior siding is installed)				
ENERGY STAR qualified windows, doors, and skylights	Yes			
Windows flashed to help repel water	Yes			
Windows rated to U-factor of 0.40 or less and SHGC of 0.40 or less	Yes			
MOISTURE MANAGEMENT (take a look at a house under construction before exterior siding is installed)				
Ground slopes away from house	Yes			
Housewrap, building paper, or rigid foam exterior insulation, taped at seams and caulked at edges, covers OSB walls in wood-framed houses	Yes			
Roof flashing in valleys, where walls and roofs intersect, and at other places where water may enter the house—the more complex the roof, the more flashing you should see	Yes			
Air gap between stucco, brick, or masonry cladding and housewrap	Yes			
Overhangs for shade and to direct water away from walls	Yes			
Trees planted ten feet from house, no overhanging branches	Yes			
Plantings 18 to 36 inches away from the foundation	Yes			
No wood or siding in direct contact with ground	Yes			
AIR BARRIERS				
Follow ENERGY STAR Thermal Bypass Checklist	Yes			
All penetrations through exterior walls sealed	Yes			
Careful sealing of sheetrock or exterior sheathing	Yes			
Canned lights rated as airtight and for insulated ceiling (ICAT)	Yes			
Electrical boxes on exterior walls caulked or gasketed	Yes			
Holes into attic sealed	Yes			
Attic hatch weather-stripped and insulated	Yes			
Air leakage determined with house depressurization test	Yes			
Wall-roof intersection carefully sealed to avoid ice dams	Yes			
Draft-stops installed behind tubs, showers, stairs, and fireplaces	Yes			
Garage completely sealed from conditioned areas of house	Yes			
Careful sealing around bathtubs, landings, fireplaces, kneewalls, cantilevered floors, etc.	Yes			
Sill plates gasketed or sealed	Yes			

Roof Assemblies

Controlling Liquid Water in Roof Assemblies

Roof and wall assemblies must contain surfaces that will drain water in a continuous manner down and off the building. Water must have a path that will take it from its point of impact, around any elements, such as chimneys, windows, doors, and seams, all the way to the exterior ground, and away from the house. Consider implementing the following recommendations:

- Properly flash valleys and roof edges.
- Size gutters and downspouts to accommodate anticipated storms. Show gutter sizes on elevations and specify sizes in construction documents.
- Provide downspout drainage to carry water at least 3 feet beyond the building.
- In areas with potentially high winds and heavy rains, install 4-inch to 6-inch “peel and seal” self-adhering water-proofing strips over joints in roof decking before installing the roof underlayment and cover.
- Keep roof geometry simple. The more complex the roof—the more dormers, ridges, and valleys—the more likely the roof will leak.

Controlling Water Vapor in Roof Assemblies

Vapor diffusion should be considered as a secondary moisture transport mechanism when designing and building roofs. Specific vapor retarders are often unnecessary if appropriate air movement control is provided or if control of condensing surface temperatures is provided (Lstiburek 2004b).

Controlling Air Flow in Roof/Attic Assemblies

Air sealing of the ceiling uses techniques similar to those used for the walls, although roof air sealing may be made more challenging by irregularities in the roof shape. **[The 2009 IECC 402.4 requires that the building thermal envelope be air sealed, including all joints, seams, and penetrations; dropped ceilings; knee walls; walls and ceilings separating a garage from conditioned space; attic access openings; rim joist junctions; and other sources of infiltration.]**



(top & middle) New Tradition Homes of Vancouver, Washington, uses a basic roof shape in the back of its houses and adds design interest with architectural details in the front to keep roofs simpler and therefore easier to flash and waterproof.

(bottom) Kick-out flashing should be installed to divert water runoff into gutters rather than flowing down the wall.

Controlling Heat Flow in Wall Assemblies

- Use 2x6 advanced framing techniques and specify framing details in plans.
- Insulate wall cavities that separate conditioned and unconditioned spaces with high-density, unfaced fiberglass batts, spray-applied cellulose, or spray-applied foam. **[Per 2009 IECC 402 insulate the wood wall cavity to R-20 or insulate the cavity to R-13 plus R-5 insulated sheathing; insulate mass walls to R-13 exterior or R-17 interior in the marine climate.]**
- Properly install wall insulation to ensure the cavity is completely free of voids.
- Use spray foam to insulate and seal rim joists at areas between floors or where the wall connects to the floor (and where the wall connects to the roof in non-vented attics).
- Install taped rigid foam insulating sheathing (in addition to cavity insulation) on the exterior side of the wall to control moisture and air infiltration, eliminating double vapor barriers.
- Install efficient windows with minimum U-values of 0.3 **[2009 IECC Table 402.1.3 requires ≤ 0.35].**
- Use ENERGY STAR labeled doors.
- Use roof overhangs to provide shade and protect windows, doors, and walls.

Roof Assemblies

Controlling Liquid Water in Roof Assemblies

- In areas with potentially high winds and heavy rains, apply 4-inch to 6-inch “peel and seal” self-adhering waterproofing strips over joints in roof decking before installing the roof underlayment and cover.
- Install roofing materials shingle-fashion to provide a continuous drainage plane over the entire surface of the roof.
- Properly flash roof valleys and edges including kick-out flashing at the edges.**
- Size gutters and downspouts to accommodate anticipated storms. Roof drainage should carry water at least 3 feet from the building.

Controlling Water Vapor in Roof Assemblies

- Install roof/attic ventilation in vented attics.
- Do not use any kind of interior vapor barrier material in the ceiling (e.g., polyethylene sheeting).

Controlling Air Flow in Roof Assemblies

- Insulate and seal at the intersection between the walls and roof, including attics, cathedral ceilings, and knee walls. Use blown-in foam for tight sealing of the wall-roof intersection in non-vented attics.
- Tape and seal all ceiling gypsum board seams so that the gypsum board functions as an air barrier. Caulk, glue, or tape all intersections with walls and other components (soffits, fans, registers, light fixtures) **[per 2009 IECC 402.4].**

Wall-to-Roof Flashing

Kick-Out Diverter Flashing Details

Water runoff from roof-wall intersections can flow down the exterior wall and eventually find its way into the wall where it can cause serious damage. Anywhere roof sections adjoin wall sections, kickout flashing should be used to divert water away from the walls and preferably into rain gutters where it can be carried down and away from the structure.



STEP 1 Apply drip edge and roof underlayment over roof deck and continue lapping up the sidewall and over the weather-resistant barrier (in this case house wrap) a minimum of 6 inches.



STEP 2 Install shingle starter strip at roof eave in accordance with roofing manufacturer's instructions.

- Place seamless, one-piece, non-corrosive kick-out diverter flashing as the first piece of step flashing.
- Slide kick-out diverter up roof plane until the starter trough stops at the shingle starter strip.
- Diverter must be flat on the roof and flush to the sidewall.
- Fasten and seal diverter to the roof deck and starter strip. (Do not fasten to the sidewall.)



STEP 3 Place first shingle and next section of sidewall flashing over up-slope edge of diverter, lapping a minimum of 4 inches over diverter. (Sidewall flashing height requirement should be determined by design professional and local building codes.)



STEP 4 Install remaining sidewall flashing, appropriate counter flashing, and shingles in accordance with manufacturer's instructions.



STEP 5 Apply self-adhesive flashing over top of wall flashing, diverter, and house wrap.



STEP 6 Install house wrap. Cut the house wrap to fit over the self-adhesive flashing and sidewall flashing.

STEP 7 Apply siding over house wrap.