





Building an EarthCraft House™

EarthCraft House™ recognizes that there are many ways to reduce pollution and the waste of natural resources when building. EarthCraft House™ gives home builders great flexibility by providing a point system. Builders can earn the necessary points by choosing the measures most practical for their specific homes.

As environmental building products and techniques constantly change, the EarthCraft House™ Technical Guidelines cannot be all inclusive nor always reflect the latest building science theory. Under the Innovative Points section, builders may submit measures which are not included in these guidelines. The EarthCraft House™ Technical Guidelines are intended to illustrate broad design and construction guidelines and are not to be used as design or construction specifications. These guidelines are not intended to substitute for manufacturer's installation, or use recommendations, or building codes. However, the EarthCraft House™ Technical Guidelines often exceed the minimum requirements of a product manufacturer, installer, or building code.

Version June, 2005

These guidelines highlight all the requirements for the EarthCraft House single-family residential program. In addition, EarthCraft Multi-family guidelines are included and are keyed with the letter "M" in a black box throughout the publication. Multi-family builders should note that these guideline entries overlap and are in addition to the single-family residential program components.

M = Multifamily guideline



The EarthCraft House program is a voluntary green building program for the Southeastern region of the United States that serves as a blueprint for healthy, comfortable homes that reduce utility bills and protect the environment. Any size and type of home can be certified EarthCraft House by following the technical guidelines in the program. The guidelines are flexible enough to allow for a variety of approaches to environmental construction. The program was created in 1999 as a partnership between the Greater Atlanta Home Builders Association and Southface Energy Institute, and is available in many different cities in the Southeast. Please contact an EarthCraft House staff member for availability in your area.

The technical guidelines in this book apply to all new construction in the EarthCraft House program, including single-family homes, duplexes, townhomes, and low-rise apartments and condominiums. These guidelines must be used in conjunction with the appropriate EarthCraft House Worksheet. Available worksheets can be obtained from the program website or at an EarthCraft House training. Please note that there are different worksheets for single family and multi-family housing, as well as different worksheets for different geographic areas in the Southeast.

In order to join the EarthCraft House program, the builder of the home must attend a one-day training taught by Southface staff. This training includes an overview of program requirements and detailed discussions about practical techniques for improving the energy efficiency, durability, comfort, air quality, and environmental sustainability of homes. For a list of upcoming trainings, please visit the Southface website.

In order to participate in the EarthCraft Multifamily program, the development team must conduct a charrette with Southface staff specific to the project pursuing certification. This charrette will allow program specifics to be discussed and a strategy for certification to be agreed upon by all stakeholders involved in the project.

As part of the EarthCraft House certification process, the builder must complete the EarthCraft House worksheet to show that the home will score enough points to qualify, and every EarthCraft House is inspected and tested by an independent third-party inspector approved by Southface.

For technical assistance or scheduling information please contact:

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EarthCraft House™ and Low-rise Multifamily Technical Guidelines

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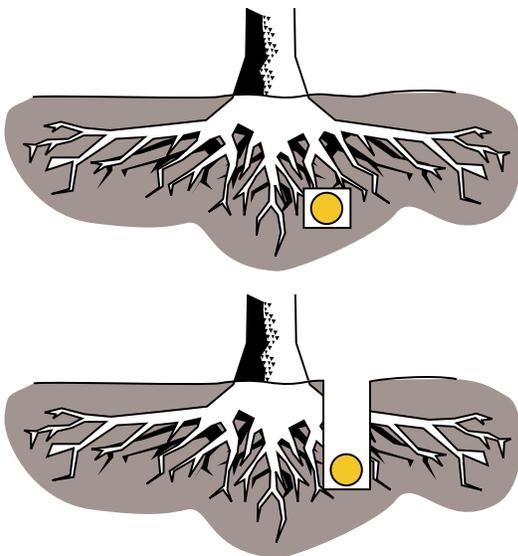
| | |
|--|---|
| | |
| <p>SITE PLANNING</p> | |
| <p><i>Required: Must comply with all federal, state, and local government erosion control and tree protection measures.</i></p> | <p>Use of redundant mulch, compost, or straw bales for erosion control</p> |
| <p>Erosion control site plan</p> | |
| <p>Builder shall follow guidelines set forth in the NAHB Research Center publication, "Storm Water and Nonpoint Source Pollution Control—Guide for Builders and Developers" or the local Soil and Water Conservation Service's "Manual of Erosion and Sedimentation Control." Builder shall submit documentation of a site plan for erosion and sedimentation control before site is cleared or graded including contours of slopes to be cleared, location and type of erosion control measures, stormwater and sediment management systems, and a vegetative plan for temporary and permanent stabilization.</p> | <p>In addition to required silt fencing, builder shall install mulch, compost, or straw bale berms or blankets. These additional measures shall be installed on steep slopes, locations where silt fences do not hold up, and around storm drains. For specifications on using compost for these applications, please see the Cooperative Extension Service's website at www.ces.uga.edu/pubcd/B1200.htm</p> <p>Grind stumps and limbs for mulch</p> <p>Builder shall grind a minimum of 80% of all tree stumps and limbs for mulch. Mulched material cannot be buried in a landfill.</p> |
| <div data-bbox="430 1071 568 1207" data-label="Image"> </div> <p><i>National Association of Home Builders Research Center — www.nahbrc.org</i></p> | <p>Mill cleared logs</p> <p>A minimum of 80% of logs that meet commercial sawmill standards shall be taken to a sawmill for processing into lumber, pulp or other use. Logs cannot be buried in a landfill, burned or chipped.</p> |
| <p>Workshop on erosion and sediment control</p> | <p>Building <i>With</i> Trees program</p> |
| <p>The site supervisor shall attend either the "Fundamentals of Erosion Control and Sedimentation" or the "Structural and Vegetative Design for Erosion and Sediment Control" workshop or equivalent offered by your local Soil and Water Conservation or equivalent Schedule is on the web at www.gaswcc.org/workshops.htm.</p> | <p>Builder shall participate in the Building With Trees program developed by the National Arbor Day Foundation in cooperation with NAHB. Builder shall complete the Build With Trees Pledge and comply with Planning and Design, Tree Protection During Construction, and Maintenance/Long-term Care requirements of the program.</p> <div data-bbox="1063 1585 1299 1732" data-label="Image"> </div> <p><i>See resources for contact information</i></p> |
| <p>Excavated topsoil protected from erosion</p> | |
| <p>Builder shall have a site plan that designates topsoil areas to be protected throughout all construction activities. Protected topsoil areas shall be clearly marked and the builder shall communicate protection measures to all subcontractors. Excavated topsoils shall be protected from erosion by wind or rain with tarps or other suitable material.</p> | |

Tree preservation plan

A tree expert (certified arborist, or individual with a professional degree in forestry, landscape architecture or related field) shall develop a site plan prior to clearing, grading, or construction that identifies existing trees with diameter at breast height dimensions exceeding 2 inches and which designates trees to be protected during all construction activities. Tree root zones (area extending in all directions from trunk) must be protected with physical barrier. Tree Preservation Plan shall be reviewed with subcontractors and posted on job site.

Utilities in tree root zones tunneled or hand dug

Trees that are marked to be preserved on a site plan and for which utilities must pass through their root zones shall not have surface-dug trenches. Tunnels shall be dug through the root zone in order to minimize root damage (one point per tree - maximum 5 trees).



Tunnel to minimize root damage (top) as opposed to surface-dug trenches in root zone

Individual trees fenced at drip line

No soil from clearing, grading, or construction activity shall be placed on top of any root zone for trees that are designated on a site plan to be preserved. Trees must be fenced around the drip line throughout the construction process. Fences must be firmly set-if wood fence posts are used, they must be a minimum of 2x2 lumber.

Protected tree save area

A minimum of 25% of the lot must be protected from all grading and tree clearing for lots 1 acre or smaller. These points can also be taken if 25% of the land in the community is protected, even if not every lot has 25% of its area protected. Lots larger than 1 acre must protect 75% of their area in order to take these points.

Tree planting

Site plan shall document that a minimum of 12 trees per acre are planted. For example, if the house is built on a ½ acre lot, 6 trees must be planted.

Wildlife habitat

The site shall have a wildlife habitat area that is approved by the National Wildlife Federation. Wildlife habitats can be established by planting native plants or by leaving tracts of land undisturbed and protected. Native plant lists can be obtained from organizations such as the Georgia Wildlife Federation.

M Road/vehicle protocols

A vehicle washing station shall be provided in close proximity to each construction entrance and protocols describing appropriate use shall be clearly posted both at the on-site office and at the washing station. Descriptions of washing station features and construction can be found in the NPDES reference book (“Green Book”) in section “Co” or at the Georgia Soil and Water Conservation website www.gaswcc.georgia.gov.

Protocols for road sweeping and cleaning shall also be clearly posted at the on-site construction office and the construction budget include funds for implementation of such measures during construction.

M Plant materials from disturbed site areas relocated

Appropriate ornamental and native plants not included within tree-save or undisturbed areas of the site shall be relocated, stored and replanted, or made available for relocation by others prior to the area being disturbed.

In Georgia, the Georgia Native Plant Society may help organize such relocation efforts. Information on plant “rescues” can be found at www.gnps.org.

M On-call sedimentation/erosion control personnel

Developer or contractor shall provide on-call personnel for inspecting erosion control measures and repairing erosion control failures during rain events that occur during non-working hours at the site. Site should automatically be inspected by designated personnel during rain events of 1/3" or greater in any 24-hour period.

M Downstream water quality testing

Testing of surface water shall be conducted following National Pollution Discharge Elimination System (NPDES) standards. Standards can be found on the Georgia Soil and Water conservation website at www.gaswcc.georgia.gov.

M Phase I environmental testing and remediation

Conduct a Phase I Environmental Site Assessment and additional assessments if required, and provide a plan for abatement of any hazards with documentation of its proper removal.

ENERGY EFFICIENT BUILDING ENVELOPE AND SYSTEMS

The building envelope defines the conditioned and unconditioned spaces in the house. The building envelope consists of two parts: a thermal barrier (insulation) and an air barrier (any number of materials and approaches). For instance, an unfinished basement (without carpet, drywall, etc.) where the exterior walls are insulated and air sealed shall be considered “conditioned space” for the purposes of the EarthCraft House™ program. An unfinished basement where the insulation and air barrier are in the ceiling is considered “unconditioned space.”

ENERGY STAR



www.energystar.gov

Home must be certified Energy Star in compliance with guidelines set by the U.S. Environmental Protection Agency and U.S. Department of Energy. Builder must provide verification of Energy Star

certification upon completion of construction. House must be rated “5 star” by a certified HERS rater; this evaluation requires a blower door and a duct pressurization test plus a certified software rating. Certified HERS raters can be found on the web at www.natresnet.org.

A builder option package (BOP) is a list of construction specifications that can qualify a builder for ENERGY STAR. The following example is for Fulton County, Georgia, Climate Zone 7. For a list of BOPs by state and county visit www.energystar.gov. Note: all specifications must be verified in the field.

- Maximum window area: 18%
- Window U factor less than 0.35
- Window SHGC less than 0.35
- Attic R-30
- Exterior walls R-15
- Floor above unheated space R-19
- Basement/ Crawlspace walls R-10
- Gas furnace greater than 90 AFUE
- Duct leakage less than 6%
- Air infiltration less than 0.35 ACH_{nat}
- Programmable thermostat

ENERGY MEASURES

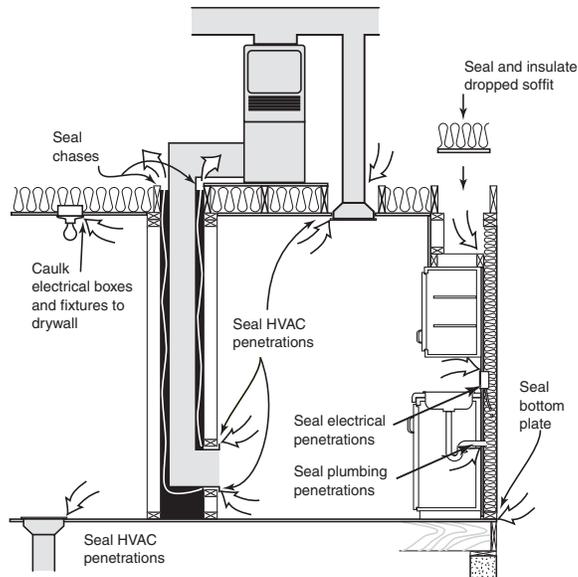
Required: Homes must meet or exceed all requirements of the 2000 International Energy Conservation Code or state energy code, whichever is more stringent. The following air sealing measures are required as part of the code.

REQUIRED AIR SEALING MEASURES

Required: Houses must meet or exceed the air sealing requirements of the Energy Code.

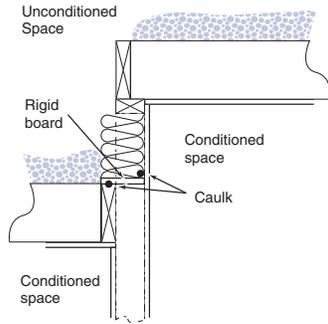
Chases sealed and insulated

Framed spaces that connect conditioned areas to unconditioned attics, basements or crawl spaces shall be sealed with sheet material and sealant. These areas include chases for plumbing, duct work, chimneys and flues. For chases with high temperature heat sources, noncombustible sheet materials, such as sheet metal and high temperature caulk, shall be used. Where the code prohibits sealing this gap (such as with fireplace flues) manufacturer-supplied sheet metal shall be used that fits the flue pipe as closely as allowed. Breaks in framing and interior finish materials, such as for dropped soffits and changing ceiling heights, that connect unconditioned and conditioned areas, shall be sealed with blocking or sheet material and sealant.



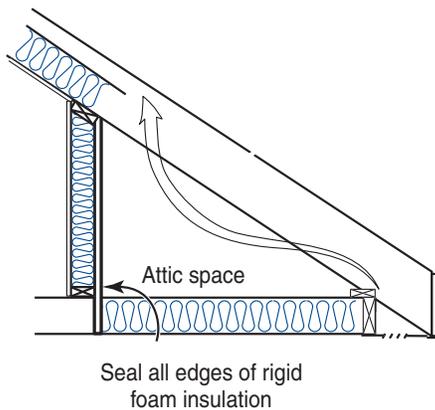
Stud cavities blocked at change in ceiling height

Stud cavities shall be blocked at locations of varying ceiling height, such as in common walls between adjacent homes, to retard airflow through the wall cavities.



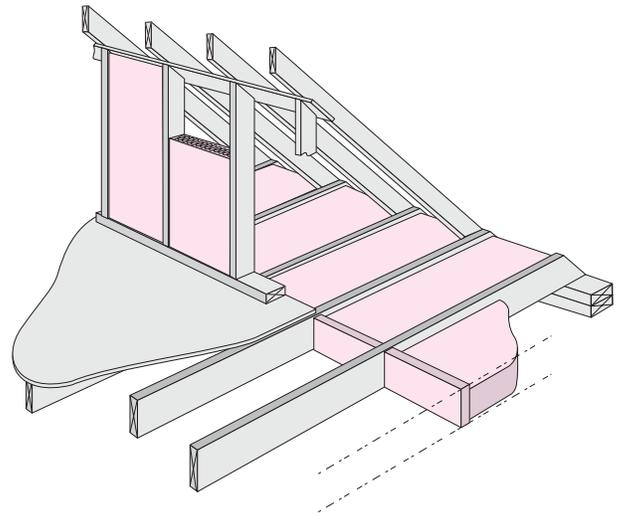
Attic kneewall has sealed exterior sheathing or netting for dense insulation

Sheet material shall be sealed to the kneewall framing on the attic side of the kneewall to create an airtight seal using caulk or housewrap tape. Sheathing or blocking must extend down between the flat ceiling joists to seal the floor joist cavities. Sheathing on air impermeable insulation not required unless mandated by fire code.



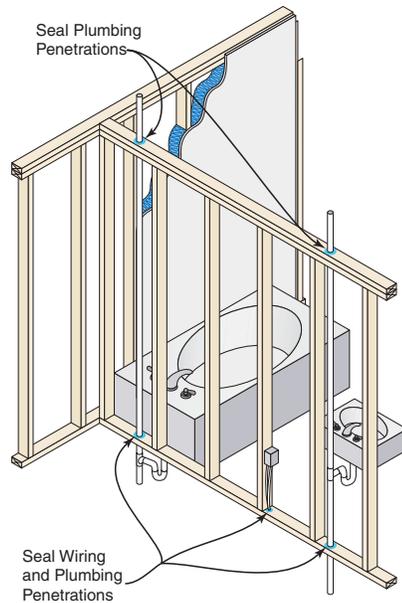
Joist cavities under attic kneewalls blocked

Sheeting material shall be installed between joist cavities underneath kneewalls and sealed at seams with proper sealant in any location in which attic air may enter the band area between conditioned floors.



Penetrations through top and bottom plate sealed

All holes in the floor assembly for plumbing, wiring, ductwork, and other purposes connecting conditioned and unconditioned (and exterior) areas shall be sealed. Penetrations for flues and other heat-producing items shall be sealed with noncombustible sheet materials and high temperature sealant.

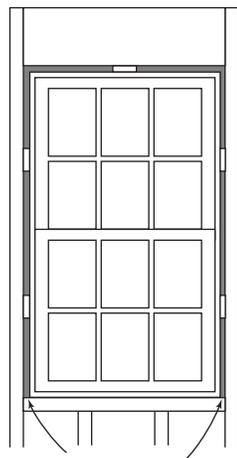


Bottom plate sealed to floor or foundation

Bottom plates shall be sealed to floor or foundation with a proper sealant. An optional strategy is a foam gasket beneath the bottom plate in combination with a suitable sealant.

Window and door rough openings sealed

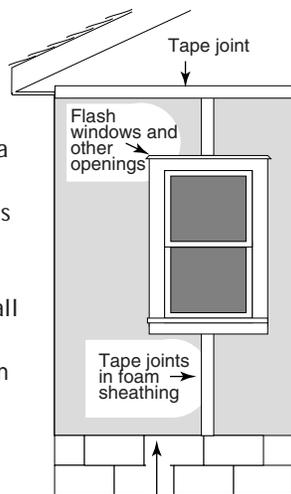
The space between the framing for window or door (including attic access) rough openings and the installed units shall be sealed with non-expanding spray foam sealant, closed cell foam backer rod, spray applied insulation, or other suitable sealant. Cellulose, fiberglass or rock wool batt insulation is not acceptable as a sealant but can be used as a backing for a sealant (such as caulk). Thresholds for exterior doors shall be sealed to the subfloor.



Use backer rod to fill gaps between window and rough opening

Gaps in exterior wall sheathing sealed

All gaps in exterior sheathing, such as seams between adjacent sheets, shall be sealed with a proper sealant. All penetrations, such as holes drilled for condensation lines and utility boxes, shall be sealed with an expanding spray foam or equivalent.



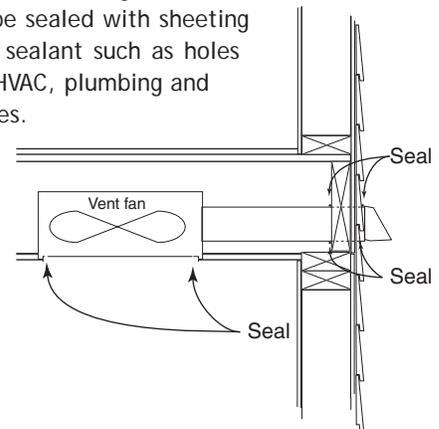
Extend sheathing below bottom plate and seal

Sheathing penetrations sealed

All sheathing penetrations including condensation lines, electrical outlets and locations with broken or missing sheathing shall be sealed with sheathing and a proper sealant.

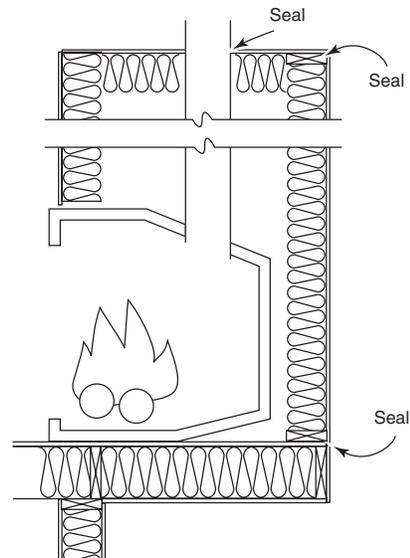
Penetrations through band sealed

All penetrations through the band area shall be sealed with sheathing and proper sealant such as holes drilled for HVAC, plumbing and electric lines.



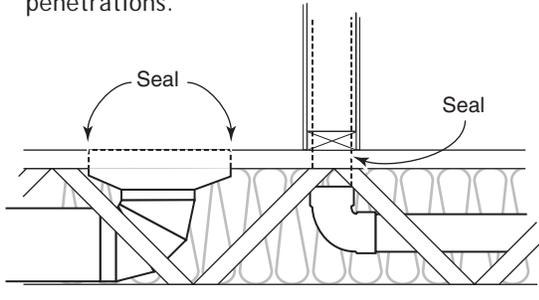
Exterior walls of fireplace chase sealed

All exterior walls of fireplaces shall be sealed with proper sealant and where permissible, a proper sealant shall be used at the junction between sheathing and flue pipe and comply with the fire code and the manufacturer's specifications.



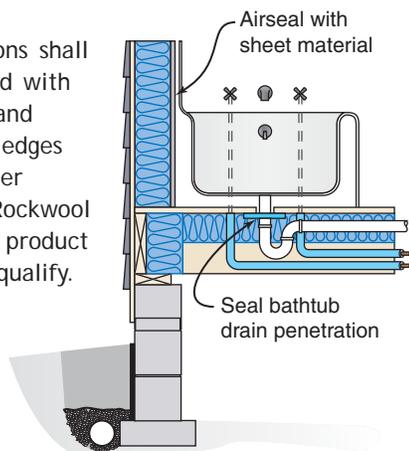
Penetrations through insulated subfloor sealed

All penetrations through insulated floor systems over unconditioned areas (such as basements, crawlspaces, and garages) must be need sealed including duct, electrical and plumbing penetrations.



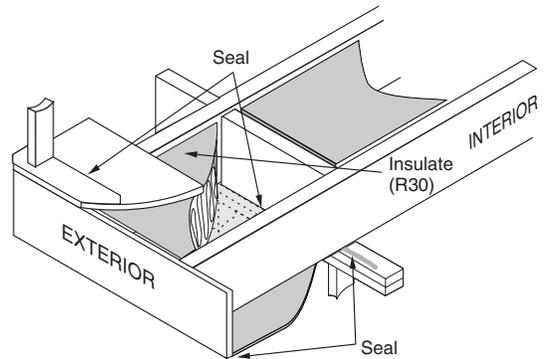
Shower and tub drain sealed

Plumbing penetrations shall be blocked with sheeting and sealed at edges with proper sealant. Rockwool or similar product does not qualify.



Cantilevered floor sealed above supporting wall

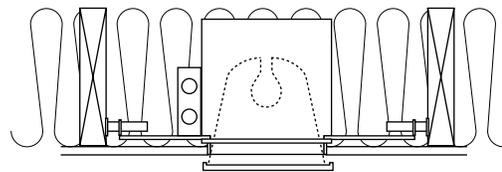
For floors with conditioned area over unconditioned open areas, the floor joist cavity shall be sealed with sheet material or blocking and sealant above the top plate of the supporting wall and insulated to minimum R19, either with batt insulation between floor joists or with a combination of joist insulation and insulated sheathing on underside of floor joist.



Air seal and insulate cantilevered floors.

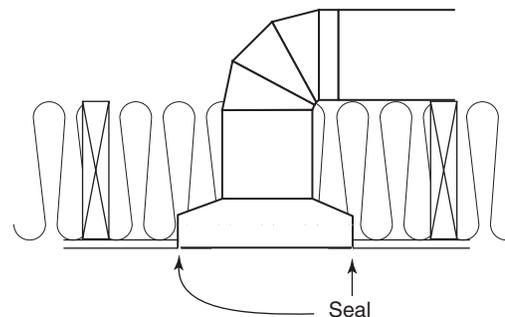
All recessed can lights in insulated ceilings must be air tight and IC rated

Recessed lights in ceilings with an unconditioned area above must meet the Energy Code specification (2000 IECC section 502.1.3 section 1 or 3) for air tightness and must be Insulation Contact (IC) rated.



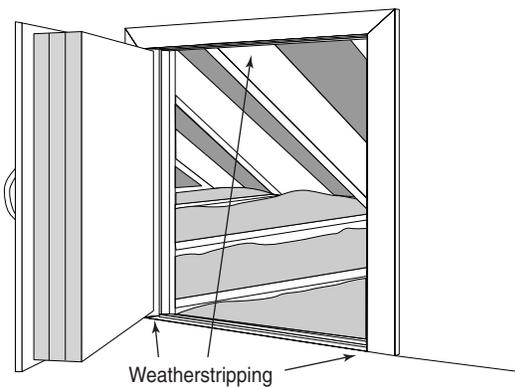
Penetrations through insulated ceilings sealed (including HVAC boots)

All penetrations through insulated ceilings shall be sealed with a proper sealant including HVAC boots, bathroom fans, light fixtures, security, and audio speakers.



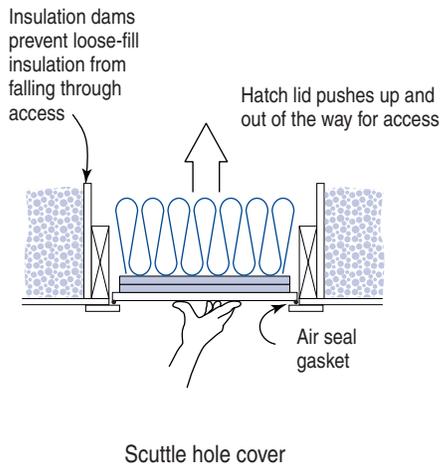
Attic kneewall doors and scuttle holes weather-stripped

Doors in kneewalls that connect conditioned space to unconditioned attic areas shall be weatherstripped and latched to provide an airtight seal against the door trim and wall drywall (EarthCraft House recommends insulation on attic access doors).



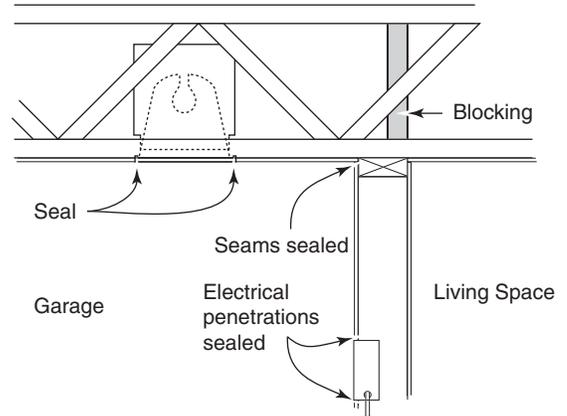
Attic pull-down stairs, scuttle holes and kneewall doors sealed at rough openings

Attic scuttle holes that are located in conditioned space shall be weatherstripped to provide an airtight seal against the ceiling trim and drywall.



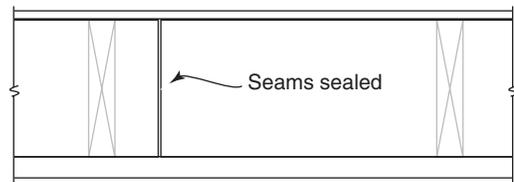
Penetrations through drywall in attached garage sealed

All penetrations through drywall in attached garage shall be sealed. Band area shall be blocked and sealed between joists above interior garage partition walls.



M Seams in band joist between conditioned floors sealed

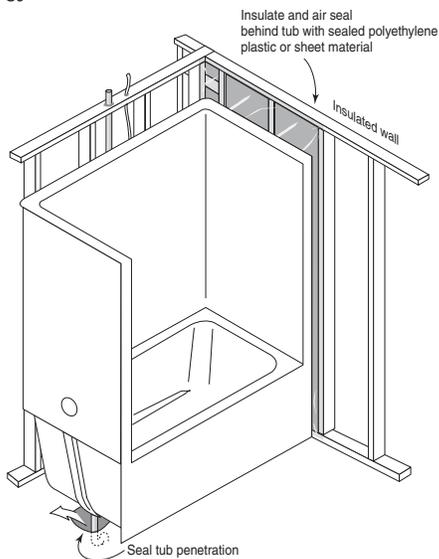
All seams shall be sealed in band joists between conditioned floors, since the band is part of the building envelope.



ADDITIONAL AIR SEALING MEASURES

Air barrier installed behind tubs and showers on insulated walls

A secondary air barrier shall be installed behind tubs and showers before installing bath and shower assemblies. The sheeting material must be sealed with a proper sealant and the exterior wall must be insulated to the requirements of the Energy Code.

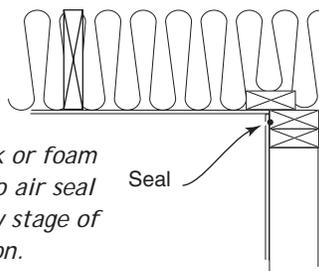


Seams in band joist between conditioned floors sealed

All seams shall be sealed in band joists between conditioned floors, since the band is part of the building envelope. (see illustration page 9)

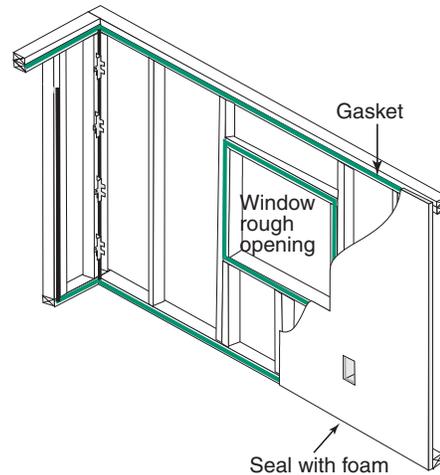
Ceiling drywall sealed to top plate

Drywall shall be sealed to top plate on ceilings separating attic from conditioned space.



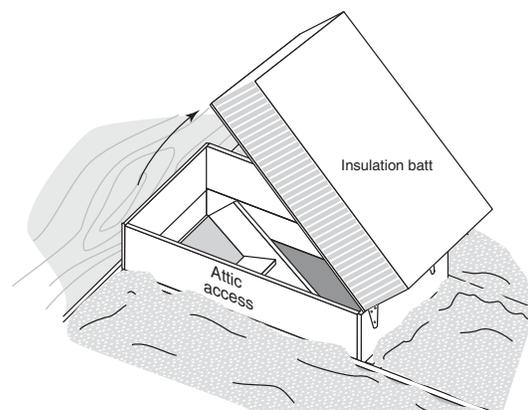
Drywall penetrations in insulated walls

All penetrations in drywall in insulated walls shall be sealed with a proper sealant including wall switches, electrical outlets and kneewall door rough openings.



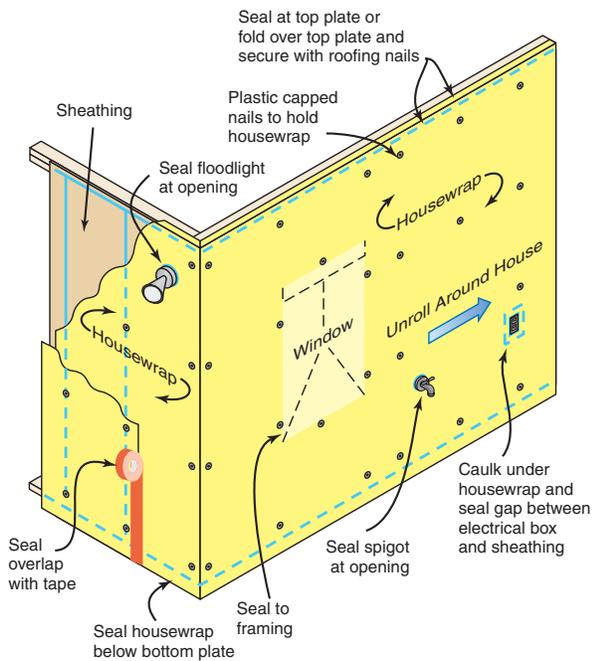
Insulated Attic Hatch

An insulated attic hatch shall be built to open to the attic and form an airtight seal when closed. The attic hatch must accommodate the "hideaway stairs" and be insulated to at least R-5. Additional points may be earned if the attic hatch is insulated to R-19.



Housewrap installed with all seams and edges taped

Housewrap shall be installed according to the manufacturer’s specifications. All seams must be cut properly and all edges taped to ensure a continuous air barrier



M Gypcrete on all framed floors separating unit envelopes

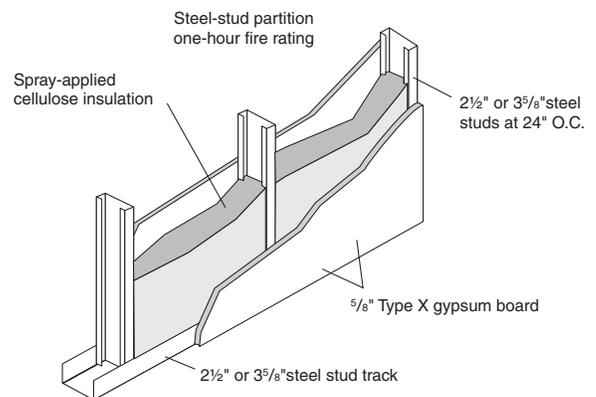
Gypcrete or other approved poured-floor system shall be installed at all framed floors with conditioned space below them. Application of the material shall be after all plumbing, electrical and mechanical systems have been roughed-in and drywall has been installed with at least one application of joint compound.

M Two-pour gypcrete application

Gypcrete or other approved poured-floor system is installed in areas that will be made inaccessible after drywall installation, such as underneath bathtubs and at party-wall separations. This is in addition to the above requirements and occurs prior to that installation. Temporary blocking or curbing may be necessary to achieve proper coverage in some areas such as underneath bathtubs.

M Firewalls/party walls that eliminate airspace

All walls separating unit envelopes shall be constructed using rated constructions that do not require the use of an airspace or “gap” between two independent walls. One such system is the U370 system.



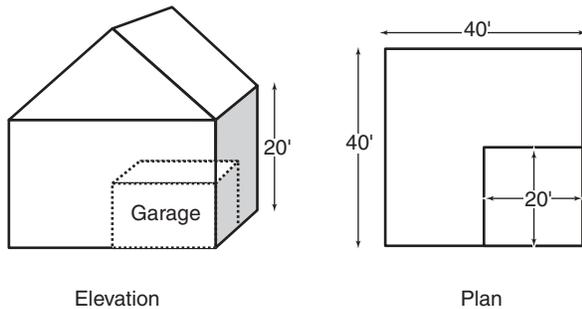
AIR LEAKAGE TEST- BLOWER DOOR

SFBE Building Envelope Leakage Test

The home must meet minimum criteria for air tightness. The standard ASTM test is a blower door test conducted at 50 Pascals. The results of the test for a single-family house must satisfy the following condition:

$$\frac{CFM_{50}}{SFBE} < 0.50$$

Where CFM_{50} is the volume of air in cubic feet per minute moved through the fan to maintain a 50 Pa pressure difference and SFBE is the square foot of building envelope between conditioned and unconditioned spaces.



EXAMPLE:

SFBE = Slab + Walls + Room over Garage + Ceiling

Slab = $(40 \times 40) - (20 \times 20) = 1600 - 400 = 1200 \text{ ft}^2$
 Walls = $20 \times (160) = 3200 \text{ ft}^2$
 Room Over Garage = $(20) \times (20) = 400 \text{ ft}^2$
 Ceiling = $(40) \times (40) = 1600 \text{ ft}^2$
 SFBE = $1200 + 3200 + 400 + 1600 = 6400 \text{ ft}^2$

BLOWER DOOR TEST RESULT:

2000 CFM_{50} at 50 Pa pressure

CALCULATION:

$2000 \text{ CFM}_{50} / 6400 \text{ SFBE} = 0.32$
 since $0.32 < 0.40$ testing criteria is fulfilled

M ACH Building Envelope Leakage Test

The housing units must meet minimum criteria for air tightness. The minimum required blower door test result shall be <0.35 ACH Natural with outside ventilation

$$ACH_{\text{natural}} = \frac{ACH_{50}}{N}$$

$N = C \times H \times S$

C = Climate correction factor

H = Height correction factor

S = wind Shielding factor

Equation:

$$ACH_{50} = (CFM_{50} \times 60) / \text{Volume}$$

$$ACH_{\text{natural}} = ACH_{50} / (H \times S \times C)$$

Where:

H = Height correction factor

| | | | | | |
|-----------|---|-----|-----|------|-----|
| # Stories | 1 | 1.5 | 2 | 2.5 | 3 |
| H = | 1 | 0.9 | 0.8 | 0.75 | 0.7 |

S = wind Shielding factor

| | | | |
|---------------------|----------|--------|---------|
| Extent of Shielding | Shielded | Normal | Exposed |
| S = | 1.2 | 1 | 0.9 |

C = Climate correction factor
(use 21 for Atlanta)

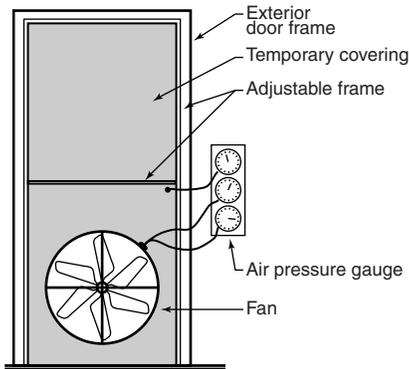
| | |
|-----------|-----------------------------------|
| C = 14-17 | North Texas panhandle |
| C = 17-20 | Most of Texas |
| C = 20-23 | LA, AR, NC, SC, most of MS and GA |
| C = 23-25 | Northeast MS, LA, south GA |

Example:

2,000 sq ft unit with 8 ft. ceiling
 Blower door test reveals 1,760 cfm_{50}
 S = Normal
 H = 1 story
 C = 21

So, $ACH_{50} = (1,760 \times 60) / 16,000 \text{ ft}^3$
 $ACH_{50} = 6.6$

and, $ACH_{\text{natural}} = 6.6 / (1 \times 1 \times 21)$
 $ACH_{\text{natural}} = .31$



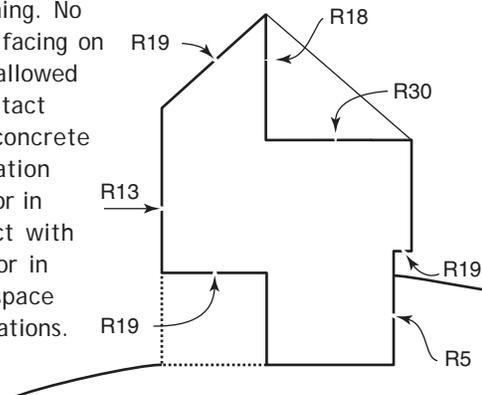
Blower door diagnostics determine building envelope leakage.

REQUIRED INSULATION

| | |
|--|------|
| Exterior walls & band joist | R13 |
| Exterior walls hot humid climate | R11 |
| Flat ceilings | R30 |
| Sloped ceilings | R19 |
| Cantilevered floors | R19 |
| Framed floors | R19 |
| Framed floor hot humid climate | R11 |
| Foundation walls | R5 |
| Attic kneewalls | R19 |
| Insulated sheathing on metal-framed exterior walls (thermal break) | R2.5 |

The minimum insulation levels must meet or exceed those listed above. In addition, insulation must comply with the energy code, which may require insulation beyond the above requirements. The insulation shall be continuous (no gaps or missing pieces) and contiguous (in contact with the air barrier.) For example, in the floor of a room-over-garage, the insulation must be in continuous contact with either the garage ceiling or sub floor sheathing. No

paper facing on batts allowed in contact with concrete foundation walls or in contact with subfloor in crawlspace applications.



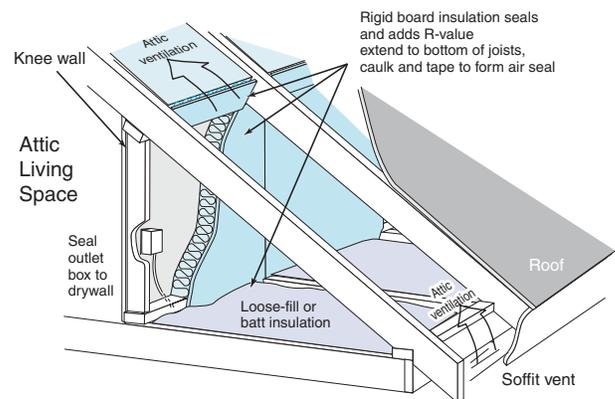
M Insulated sheathing on metal-framed exterior walls

In buildings where steel framing or studs are used in exterior walls, insulated sheathing equal to or greater than R2.5 shall be installed as a thermal break on a minimum of 80% of the exterior wall area.

ADDITIONAL INSULATION

2 x 6 attic kneewalls with R19 cavity insulation and non-insulated sheathing

Kneewalls shall be constructed with non-insulated sheathing on the attic side properly sealed at the seams.



2 x 6 attic kneewalls with R19 cavity insulation and R3 insulated sheathing

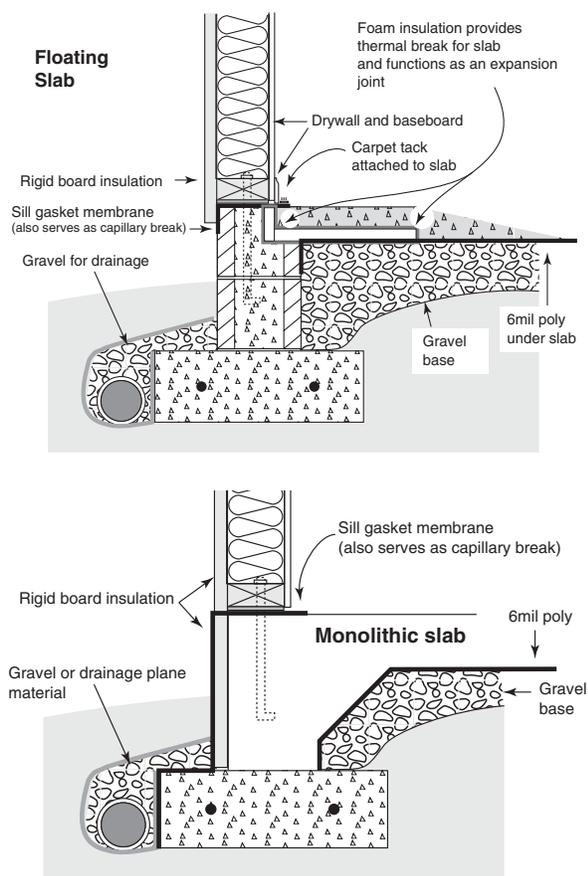
Kneewalls shall be constructed with R3 insulated sheathing such as 1/2-inch foam board on the attic side properly sealed at the seams.

2 x 4 attic kneewalls with R13 cavity insulation and R5 insulated sheathing

Kneewalls shall be constructed with R5 insulated sheathing such as 1-inch foam board on the attic side properly sealed at the seams.

Slab insulation (R4)

R4 or greater exterior slab insulation, such as for monolithic slabs, may be installed with approved membranes (such as EPDM-type membranes) to protect against termites. Alternatively, non-monolithic slabs may use rigid insulation between the stem wall and the poured (floating) slab, using the protective membrane as a termite flashing and as a capillary break.

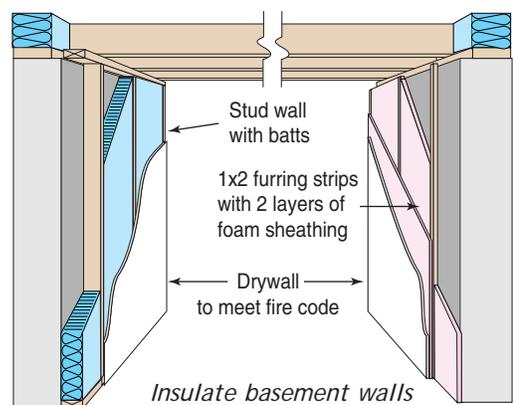


M Bond break at breezeway and contiguous slab locations

Concrete slabs in unconditioned areas that are in contact or may come into contact with slabs in conditioned areas due to settlement shall be separated with an insulating material covering the entire surface of potential slab contacts.

Foundation walls insulated instead of the floor over basement

Foundation walls shall be insulated to a minimum of R5 by a code approved assembly instead of insulating the joist cavities over the basement. Options include code-approved foil-faced foam board, foam with furring strips and drywall, fiberglass blankets, or framed 2 x 4 walls with R11 unfaced batts in the stud cavities.

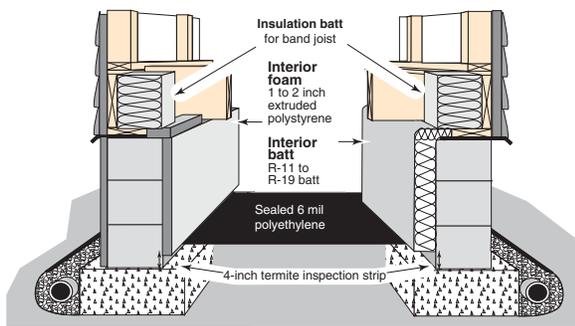


Foundation walls insulated with continuous insulation

Continuous insulation protects basement wood framing from condensation. Foam board between framing and foundation wall is one example.

Sealed, insulated crawl space walls

Crawl space walls shall be airtight and sealed with caulk, foam sealant, or gasket between the foundation stem wall and the sill plate, between the sill plate and the band joist, and between the band joist and subfloor. All penetrations in the crawl space wall shall be sealed and access doors weatherstripped. Walls shall be insulated to R8 or greater. Any vents must be closed and sealed.



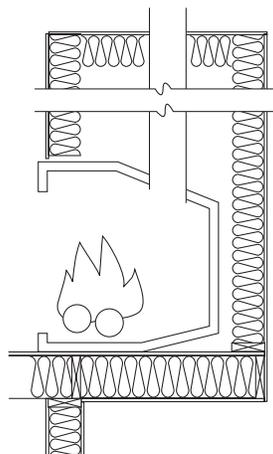
Insulate crawl space walls

Cantilevered floors R30

For floors with conditioned area over unconditioned open areas, the floor joist cavity shall be insulated to minimum R30. See description of minimum requirements and illustration on page 8.

Insulate fireplace chase

Exterior fireplace chase which connects to conditioned space shall be insulated to a minimum of R13 (R11 for hot humid climate). Insulation must be continuous in exterior walls and ceiling above. Insulation shall be located no closer than 1 inch to the flue pipe, or according to local code. These points are available for homes without fireplaces.

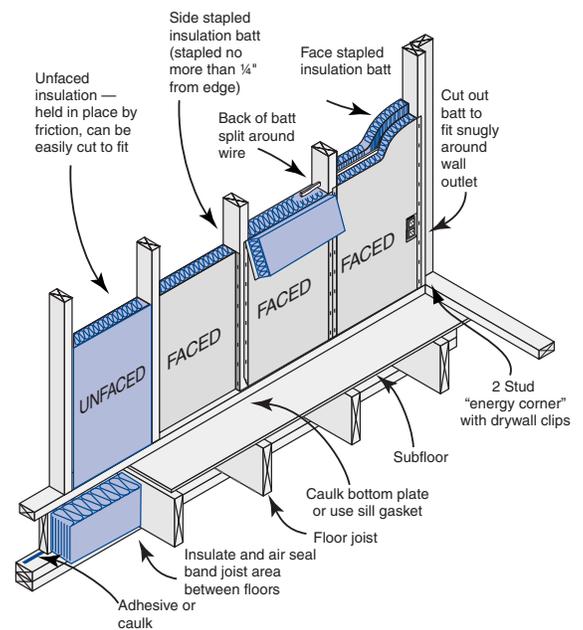


Spray applied wall insulation

Spray applied insulation shall be installed in a minimum of 80% of exterior wall stud cavities (plus walls adjacent to unconditioned spaces), including band joist areas between floors.

Insulated wall stud cavity R15

Insulation in a minimum 80% of stud cavities insulated walls shall be equal to or greater than R15. Insulation shall be installed according to manufacturer's specifications and provide complete coverage.

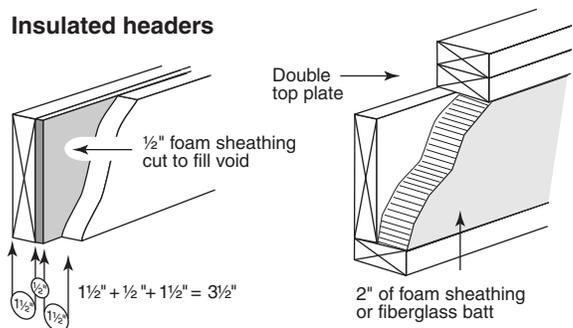


Wall cavity insulation

Insulated headers

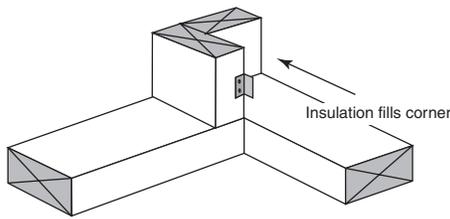
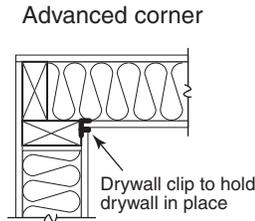
Exterior walls featuring headers (over windows and door openings) shall be framed with at least 1/2 inch of rigid foam insulation between the 2x members. Other methods of achieving insulated headers, such as boxed headers with insulation batts, are also acceptable.

Insulated headers



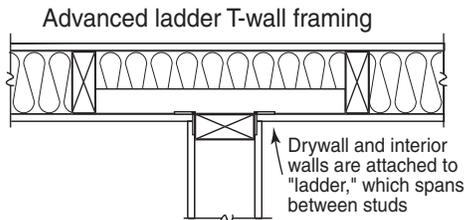
Insulated corners

The intersecting corner of two insulated walls shall be framed such that insulation is continuous in the external wall (corners with unnecessary 2x4's are not permitted). A "California corner" or two-stud corner with drywall clips are methods of achieving this.



Insulated T-walls

The intersection of an interior wall and an insulated wall shall be framed such that insulation is continuous in the external wall. A "ladder" type intersection is one method of achieving this.



Insulated wall sheathing R2.5 or greater

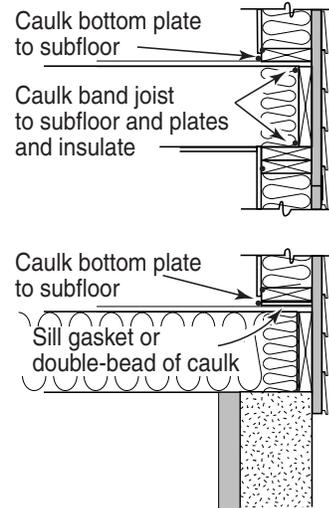
The sheathing for exterior walls shall be equal to or greater than R2.5. Sheathing shall be installed with gaps no larger than 0.25 inch and provide complete coverage except for where structural sheathing is required by code (maximum of 25%).

Insulated wall sheathing R5 or greater

Homes with exterior wall sheathing equal to or greater than R5 qualify for these points.

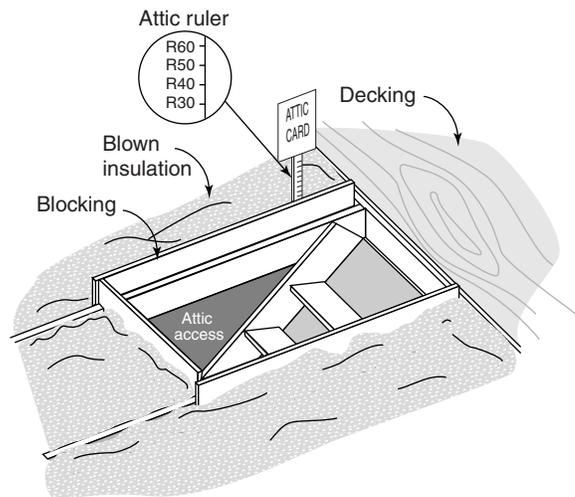
Band joist insulated R19

The band joist connecting two conditioned floors shall be insulated to R19 or greater.



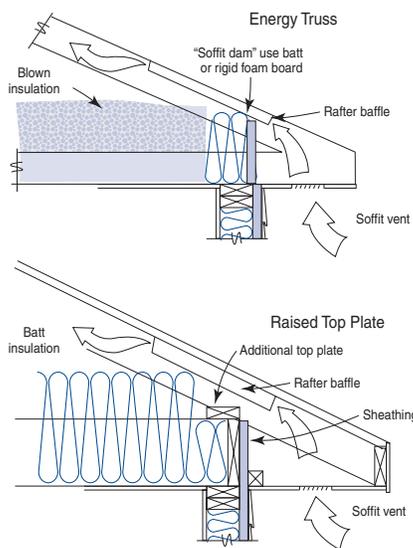
Loose-fill attic insulation card and rulers

Written documentation (an "attic card") specifying the insulation type, coverage area, and R-value shall be provided if loose-fill insulation is installed in the attic. Attic rulers to verify insulation depth must be provided every 300 ft² and face the attic entrance. Insulation must be installed according to manufacturer's specifications and provide for complete coverage and full R-value. A maximum of 5% of ceiling area shall be R19 or greater to accommodate attic flooring for storage and mechanical equipment.



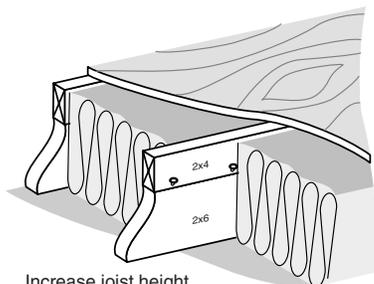
Energy heel trusses or raised top plates

To ensure full depth of attic insulation above exterior wall top plates, energy trusses with raised top chord or raised top plate for joist/rafter assemblies shall be used.



Flat ceilings R38

Ceilings with unconditioned attic space above shall have complete coverage of attic insulation equal to or greater than R38. A maximum of 5% of ceiling area shall be R25 or greater to accommodate elevated attic flooring for storage and mechanical equipment.



Increase joist height under decking to raise R-value for ceiling

Increase height of joists for utility flooring in attic to add more insulation.

Vaulted and tray ceilings R25

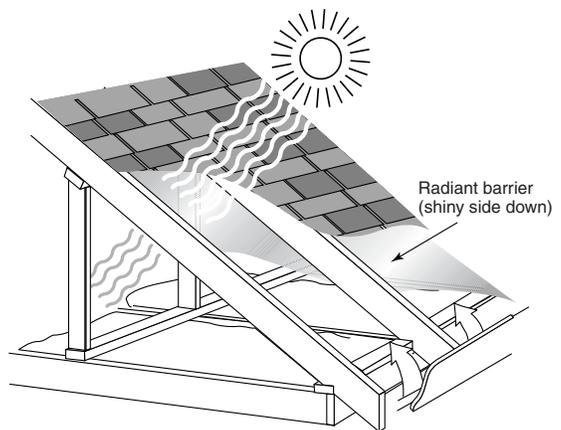
Vaulted, tray, or cathedral ceilings shall be insulated to R25 or greater.

Vaulted and tray ceilings R30

Vaulted, tray, or cathedral ceilings shall be insulated to R30 or greater.

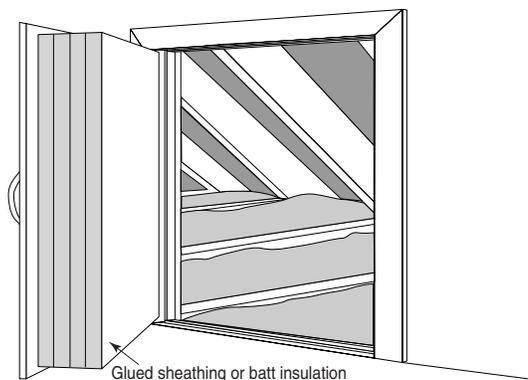
Attic radiant barrier

A radiant barrier must be installed over at least 80% of the vented attic space. The radiant barrier must have a reflective surface facing down towards a minimum 1 inch vented air space and have an emissivity rating of 0.05 or less.



Attic kneewall doors R8

Doors in kneewalls that connect conditioned space to unconditioned attic areas shall be insulated to R8 or greater.

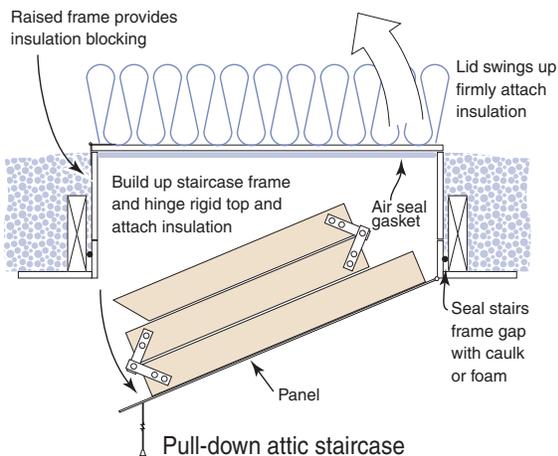
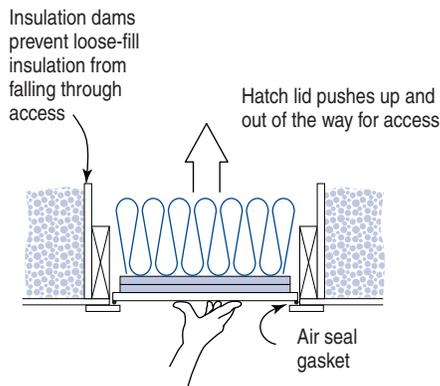


Attic pull-down or scuttle hole R5

Pull-down attic stairs located in conditioned space shall have an insulated box equal to or greater than R5. Scuttle holes that are located in conditioned space shall be insulated with batt insulation or rigid foam insulation to R5 or greater.

Attic pull-down or scuttle hole R19

Pull-down attic stairs located in conditioned space shall have an insulated box equal to or greater than R19. Scuttle holes that are located in conditioned space shall be insulated with batt insulation or rigid foam insulation to R19 or greater.



WINDOWS

Required: Window areas and U-factors or R-values must comply with Energy Code. 95% of all window area must have U < .65 (5% may be exempt).

NFRC rated windows

Windows shall be rated by the National Fenestration Rating Council (NFRC) and labeled accordingly.

| | | |
|--|--|--|
| National Fenestration Rating Council CERTIFIED | World's Best Window Co. | |
| | Millennium 2000+ Vinyl Clad Wood Frame Double Glazing • Argon Fill • LowE Product Type: Vertical Slider | |
| ENERGY PERFORMANCE RATINGS | | |
| U-Factor (U.S./I-P) | Solar Heat Gain Coefficient | |
| 0.35 | 0.32 | |
| ADDITIONAL PERFORMANCE RATINGS | | |
| Visible Transmittance | Air Leakage (U.S./I-P) | |
| 0.51 | 0.2 | |
| Condensation Resistance | | |
| 51 | — | |
| <small>Manufacturer stipulates that these ratings conform to applicable NFRC procedures for determining whole product energy performance. NFRC ratings are determined for a fixed set of environmental conditions and specific product sizes. www.nfrc.org</small> | | |

Window U-factor < 0.40

U factor of all windows shall be less than 0.40. 5% of glazing is excluded from this requirement.

Window U-factor < 0.35

U factor of all windows shall be less than 0.35. 5% of glazing is excluded from this requirement.

Window, skylight and glass door SHGC < 0.40

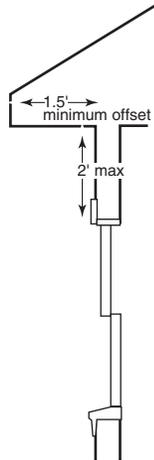
Weighted average SHGC of all windows shall be less than 0.40. 5% of glazing is excluded from this requirement. A free software program, REScheck (www.energycodes.gov) can perform this calculation.

Window, skylight and glass door
SHGC < 0.35

Weighted average SHGC of all glazing shall be less than 0.35. 5% of glazing is excluded from this requirement.

1.5-foot overhangs on all sides

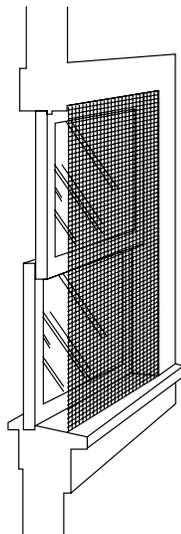
80% of all windows shall have a minimum 1.5-foot overhang to protect against moisture and solar gain. Installed gutters may contribute to the 1.5 ft. distance.



Solar shade screens

At a minimum, windows facing east and west shall have solar shade screening with a shading coefficient of 0.7 or greater. Shade screening shall be installed on exterior of window glazing.

Exterior shade screens reduce heat gain through windows by up to 70%



West facing glazing less than 2% of floor area

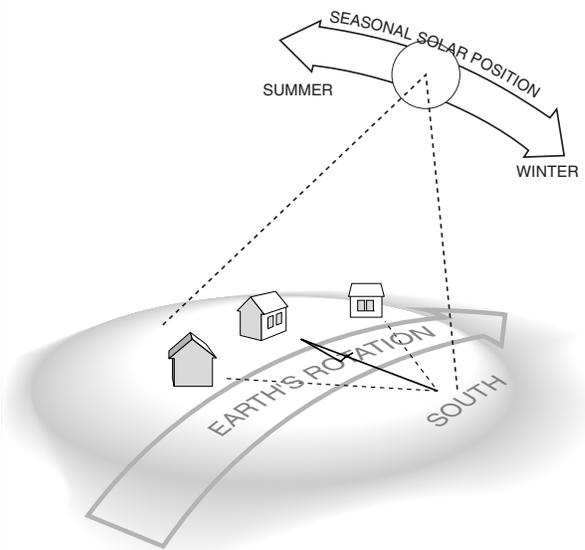
The total window or door glazing area within 25 degrees of due west shall be less than 2% of the total floor area.

East facing glazing less than 3% of floor area

The total window or door glazing area within 25 degrees of due east shall be less than 3% of the total floor area.

Certified passive solar design

Builder certifies that passive solar heating contribution shall reduce heating loads by 25% or greater and not increase cooling loads by more than 10%. Certification shall be based on Energy 10 or similar modeling program and included with EarthCraft House™ scoring worksheet.



Seasonal location of the sun in the sky can determine window location, overhangs and landscaping considerations in passive solar homes.

*SBIC - Energy 10
www.sbicouncil.org*

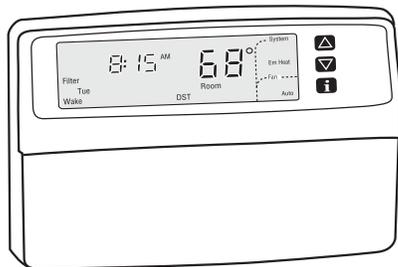
| | |
|--|---|
| | |
| <p>HEATING AND COOLING EQUIPMENT</p> | <p>90% AFUE furnaces/ 7.5 HSPF heat pumps</p> |
| <p><i>Required: Manual J calculation for each mechanical system used for heating and cooling as required by the Energy Code</i></p> <p>Manual J calculation based on house orientation</p> | <p>A minimum of 75% of the heating equipment shall meet these minimum efficiencies, 90% Annual Fuel Utilization Efficiency for gas combustion furnaces or 7.5 Heating Seasonal Performance Factor for heat pumps (indoor coil and condensing unit must be ARI verifiable).</p> |
| <p>Manual J calculation shall be based on the actual orientation (for example southwest) to ensure the heating and cooling equipment are properly sized.</p> <p>Cooling equipment sized within 6,000 btu/h of Manual J</p> | <p>SEER 12 cooling equipment</p> <p>A minimum of 75% of all cooling system output shall have a Seasonal Energy Efficiency Ratio (SEER) of 12 or greater (indoor coil and condensing unit must be ARI verifiable).</p> |
| <p>The size of all heat pump equipment shall be within 6,000 btu/h of the cooling load as determined by the Air Conditioning Contractors Association (ACCA) and American Society of Heating, Refrigeration, and Air Conditioning Engineers (ASHRAE) Manual J guidelines. Builder must submit documentation of Manual J sizing with EarthCraft House™ scoring worksheet.</p> <p>Heating equipment sized within 25,000 btu/h of Manual J</p> | <p>SEER 14 cooling equipment</p> <p>A minimum of 75% of all cooling system output shall have a Seasonal Energy Efficiency Ratio (SEER) of 14 or greater (indoor coil and condensing unit must be ARI verifiable).</p> <p>Geothermal heat pump</p> <p>All geothermal heat pumps shall have a cooling Energy Efficiency Ratio (EER) of 11.0 or greater and a heating Coefficient of Performance (COP) of 2.5 or greater as determined by the Air Conditioning and Refrigeration Institute (ARI) www.ari.org.</p> |
| <p>All furnaces and heat pump equipment shall be within 25,000 btu/h of the heating load as determined by the Air Conditioning Contractors Association (ACCA) and American Society of Heating, Refrigeration, and Air Conditioning Engineers (ASHRAE) Manual J guidelines. Builder must submit documentation of Manual J sizing with EarthCraft House™ scoring worksheet.</p> | <p>Sensible Heat Fraction</p> <p>All air conditioners and heat pumps shall have a cooling Sensible Heat Fraction of 0.75 or less. Builder must submit documentation of Sensible Heat Fraction with EarthCraft House™ scoring worksheet. A specification sheet on the installed equipment can be used for documentation.</p> $SHF = \frac{\text{Sensible Cooling}}{\text{Sensible} + \text{Latent}}$ |

Variable speed blower

A variable speed blower shall be operable in one or more of the heating and cooling systems.

Programmable thermostat

All heating and cooling equipment shall have an automatic, programmable indoor thermostat installed according to manufacturer's specifications.



Outdoor thermostat for heat pump

All air source heat pumps shall have an outdoor thermostat installed according to manufacturer's specifications that restricts electric resistance heating when outdoor air temperatures are above 40 degrees Fahrenheit.

Cooling equipment has non-CFC and non-HCFC refrigerant

All cooling equipment shall be charged with refrigerants not containing CFCs or HCFCs such as R-410A

Zone control

For multi-zoned HVAC systems, each zone must have a separate temperature control and wired damper controls.

DUCTWORK / AIR HANDLER

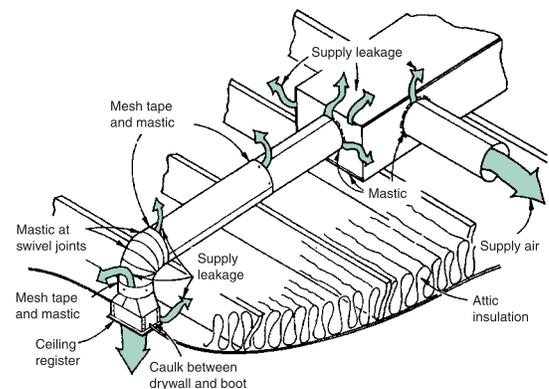
Required: All ductwork must be sealed and insulated according to the Energy Code (typically R5 or greater).

Required: Duct blaster test result < 10% of floor area served. All unions between components of HVAC system including joints between ductwork and the air handler shall be sealed with mastic or mastic tape.

Required: Flex-to-flex duct connections must have a metal collar connecting them and be sealed with mastic.

DUCT SEAMS AND AIR HANDLER SEALED WITH MASTIC

All transverse seams in supply and return ducts, including supply and return plenums and leakage sites in the air handler, shall be sealed with duct mastic and fibrous reinforcing mesh according to SMACNA specifications. Duct tape is not a suitable sealant for ducts but may be used for sealing leakage sites at the air handler's removable access panels and at filter access panels.

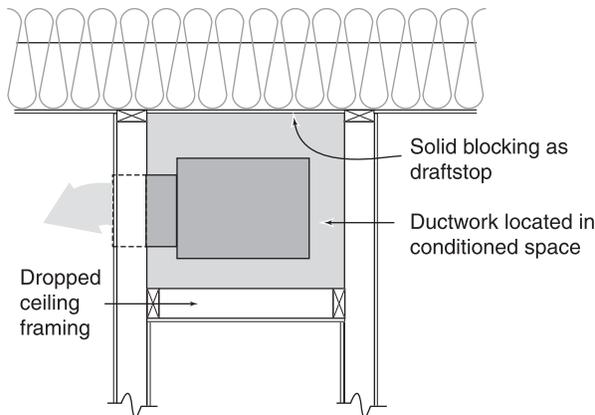


Air handler located within conditioned space

All air handlers are located within conditioned space. Vented combustion closets are not considered conditioned space. Furnaces using room air for combustion (including unfinished basements) are not eligible. A sealed combustion, 90% furnace or heat pump would satisfy this requirement.

Ducts located within conditioned space

At least 90% of all supply and return ducts are located within conditioned space.

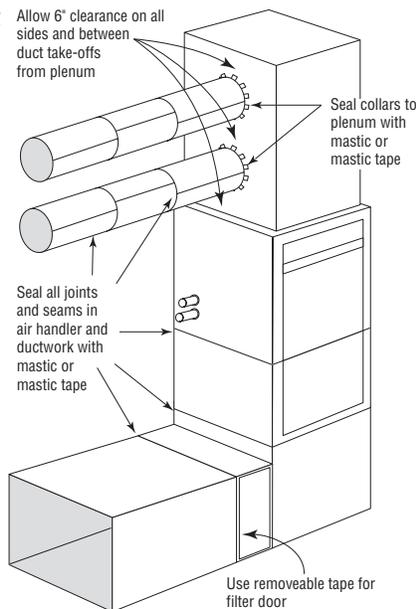


Duct design complies with Manual D

Ductwork design shall comply with the ACCA Manual D guidelines. Builder must submit documentation of Manual D design with EarthCraft House™ final worksheet.

All supply duct take-offs spaced 6" apart

All supply duct take-offs shall be spaced at least 6 inches apart from each other with no duct take-offs originating from the cap of the supply plenum. Junction boxes with 4 take-offs or less are excluded.



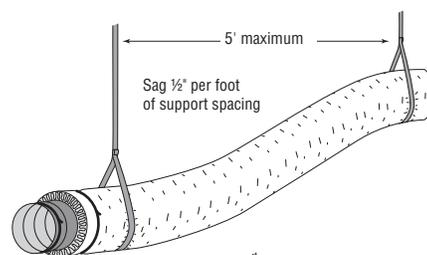
No duct take-offs within 6" of supply plenum cap

No duct take-offs from supply plenum cap. All duct take-offs shall be located at least 6 inches away from the supply plenum cap.

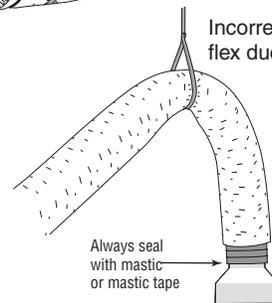
Rigid duct work or all flex duct pulled tight with no pinches

All duct work shall be made of rigid duct materials (sheet metal or duct board) or all flex duct shall be pulled tight for optimal air flow with no pinches or kinks.

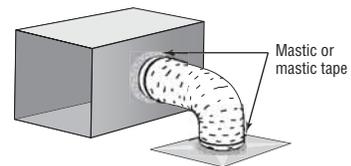
Correctly supported flex duct



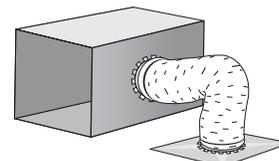
Incorrectly supported flex duct



Correct: flex duct installed with enough material, to create smooth turns with proper angles



Incorrect: flex duct installed with extra material, creating bunched turns with pinched angles



Return capacity 120% of supply capacity

All duct work installed should provide capacity for at least 120% more return air than supply air for every system. As an example, a 2 ton system with a 0.09 friction rate has the following flex duct supply take-offs:

- Two 10" ducts = 570 cfm
- One 8" duct = 160 cfm
- One 6" duct = 75 cfm

805 cfm total supply side

To achieve a return capacity that is at least 120% of the supply capacity, the system would need the following flex duct return take-offs:

- Two 10" ducts = 570 cfm
- Two 8" ducts = 320 cfm
- One 6" duct = 75 cfm

965 cfm total return side

Airflow for each duct measured and balanced to within 15 cfm of design value

Airflow for each duct run shall be measured and balanced to comply with Manual D specifications to within 15 cfm of design air flow. Builder must submit documentation of airflow measurement by independent third party testing agent.

No ducts in exterior walls or vaulted ceilings

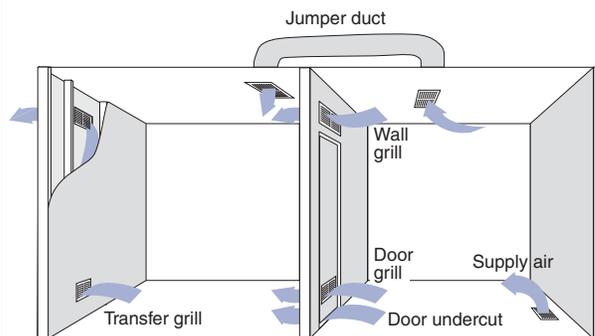
No supply or return ducts, boots or registers shall be located in exterior walls. This includes vaulted ceilings and insulated walls between conditioned and unconditioned space such as the common wall between the garage and the rest of the house.

Rigid supply trunk

All duct systems shall feature at least one long supply trunk with multiple take-offs. An "octopus" system with all duct runs originating at the supply plenum is not acceptable.

Multiple return ducts or transfer grills

Each bedroom shall have a dedicated return duct or, for homes with no return ducts located in bedrooms, all supply air shall have a direct path back to a return grill even when doors are closed. This path shall be through transfer grills. Houses with undercut doors to bedrooms do not qualify for these points.



Interior doors with 1-inch clearance to finished floor

For homes with no return ducts located in bedrooms, all interior bedroom doors shall have a minimum clearance of 1 inch between the bottom of door when closed and the finished floor surface. This clearance is to allow for air to be drawn to the main return grill when the door is closed.

Duct trunk lines that are outside conditioned space insulated to R8

All duct trunk lines located outside conditioned space shall be insulated to a minimum of R8.

M No open return systems

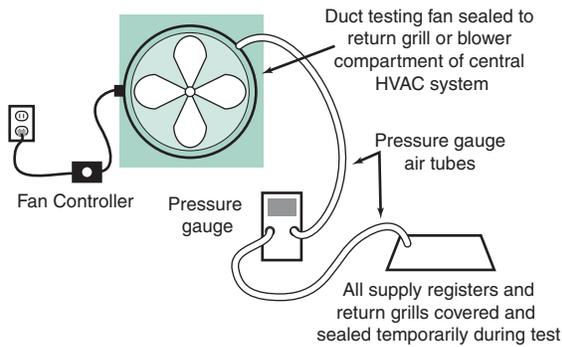
All air handlers shall be installed with a ducted return plenum sealed to the unit and any associated ducts with mastic or mastic tape.

DUCT BLASTER TEST

Required: Duct blaster test result <10% of floor area served.

Certify duct leakage less than 5%

Certify that ducts have a maximum leakage in cubic feet per minute (cfm) of no more than 5% of the total floor area using standard duct testing protocol set forth by ASTM for duct pressurization testing at 25 Pascals. As an example, a 1000 ft² house may have up to 5% or 50 cfm of duct leakage at 25 Pascals. This test measures duct leakage lost to unconditioned spaces and so may be run in conjunction with a blower door fan. Builder must submit verification of third party testing.



Duct blaster diagnostics can determine duct leakage in a HVAC system.

M Certify duct leakage less than 4%

Required: Duct blaster test result <6% of floor area served

Certify that ducts have a maximum leakage in cubic feet per minute (cfm) of no more than 4% of the total floor area using standard duct testing protocol set forth by ASTM for duct pressurization testing at 25 Pascals. As an example, a 1000 ft² unit may have up to 4% or 50 cfm of duct leakage at 25 Pascals. This test measures duct leakage lost to unconditioned spaces and so may be run in conjunction with a blower door fan. Builder must submit verification of third party testing.

| | |
|--|--|
| <p>ENERGY EFFICIENT APPLIANCES AND LIGHTING</p> | <p>M High efficiency parking area lighting</p> |
| <p>Lighting installed in an enclosed garage shall be considered interior lighting for purposes of the EarthCraft House™ program. Lighting installed in an open-air garage (e.g. carport) shall be considered exterior lighting.</p> <p>Indoor fluorescent fixtures</p> | <p>Parking area lighting shall be high-pressure sodium or equivalent high efficiency.</p> <p>M High efficiency exterior/common area lighting</p> |
| <p>Interior lighting shall include a minimum of 200 watts of fluorescent lighting fixtures. These may include the kitchen overhead fixtures; under-cabinet fixtures do not qualify. The lighting fixtures must be hard-wired and have the ballast integrated into the fixture to ensure that the fluorescent lighting will remain permanent.</p> | <p>Exterior, hallway and corridor lighting shall be fluorescent, high-pressure sodium or equivalent high efficiency. Any illuminated exit signage shall be LED type unit.</p> <p>High efficiency exterior lighting</p> |
| <p>M Fluorescent or compact fluorescent fixtures at foyer, hallways, main living and kitchen areas</p> | <p>All exterior lighting shall be high pressure sodium, fluorescent, or equivalent high efficiency. A maximum of 100 watts of outdoor incandescent or halogen lighting shall be permitted.</p> <p>Energy efficient dishwasher</p> |
| <p>Lighting fixtures in above rooms shall be fluorescent or integrated-ballast compact fluorescent fixtures.</p> | <p>Builder installed dishwasher shall be ENERGY STAR rated.</p> <p>Energy efficient refrigerator</p> |
| <p>Recessed light fixtures are compact fluorescents</p> | <p>Builder installed refrigerator shall be ENERGY STAR rated.</p> <p>No garbage disposal</p> |
| <p>At least 80% of all recessed light fixtures shall be compact fluorescent.</p> | <p>Plumbing system shall not include a garbage disposal. Composting of food wastes is recommended in place of a garbage disposal.</p> |
| <p>Automatic outdoor lighting controls</p> | |
| <p>All exterior lighting shall have automatic photocell, motion or timer controls.</p> | |

RESOURCE EFFICIENT DESIGN

Required: Framing design must comply with local building codes.

Total floor area of house less than 1800 sq. ft.

The total conditioned floor area of the house shall be less than 1800 sq. ft.

Total floor area of house between 1800 and 2100 sq. ft.

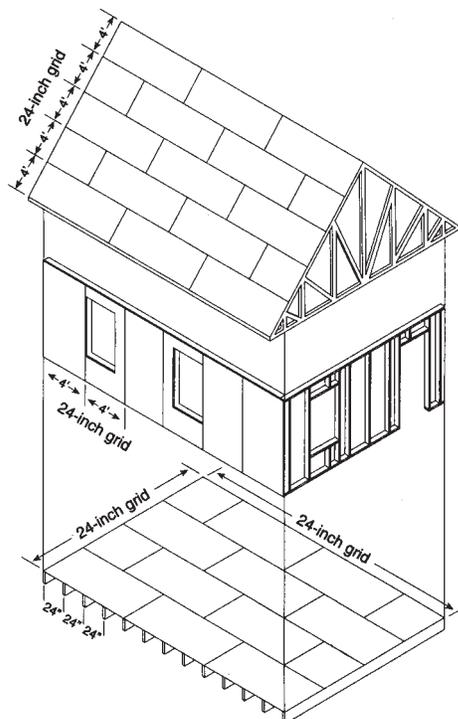
The total conditioned floor area of the house shall be between 1800 and 2100 sq. ft.

Total floor area of house between 2100 and 2500 sq. ft.

The total conditioned floor area of the house shall be between 2100 and 2500 sq. ft.

Outside dimensions of floor plan adheres to 2-ft dimensions

The perimeter of the house shall comply with 2-ft dimensions to minimize material waste.



Floor joists at 24-inch centers

A minimum of 80% of all floor joists shall be spaced at 24 inches on center.

Floor joists at 19.2-inch centers

A minimum of 80% of all floor joists shall be spaced at 19.2 inches on center.

Non-load bearing wall studs at 24-inch centers

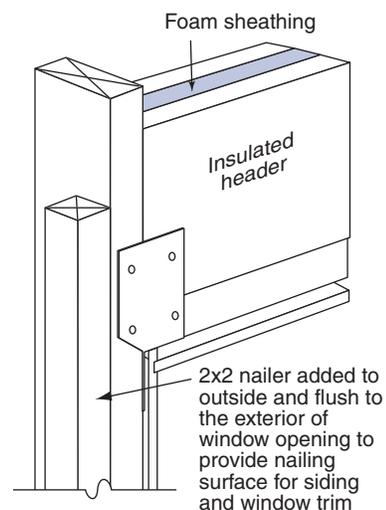
Non-load bearing wall studs shall be spaced at 24 inches on center.

All wall studs at 24-inch centers

All non-load and load bearing wall studs shall be spaced at 24 inches on center.

Window rough openings eliminate jack stud

Framing shall not include jack studs to support header. Header hangers or other support as required by code shall be used.



Non-structural headers in non-load bearing walls

Non-load bearing walls shall not have structural window and door headers.

Single top plate with stacked framing

Roof rafters and ceiling joists shall align within 2 inches of exterior wall studs such that a single top plate can transfer loads to the wall framing.

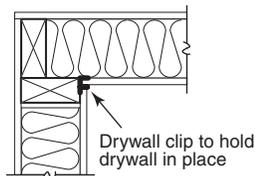
2-stud corners with drywall clips or alternative framing

Corner framing shall eliminate non-structural studs and allow for full corner insulation through the use of drywall clips, horizontal nailers or other means to support drywall.

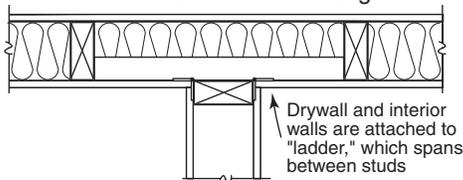
T-walls with drywall clips or alternative framing

The intersection of exterior and interior walls shall eliminate non-structural studs and allow for full exterior wall insulation through the use of advanced ladder T-wall framing or other technique.

Advanced corner



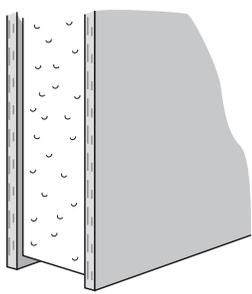
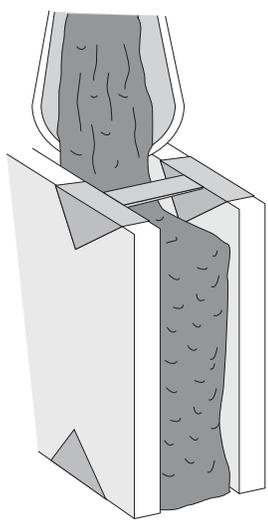
Advanced ladder T-wall framing



Advanced framing techniques allows for more complete insulation.

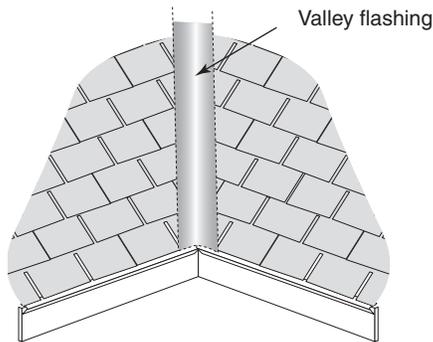
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| <p>RESOURCE EFFICIENT BUILDING MATERIALS</p> | <p>Cork or bamboo flooring</p> |
| <p>RECYCLED AND NATURAL CONTENT MATERIALS</p> | <p>Home shall contain at least 10% of the floor area as cork or bamboo flooring, rapidly renewable and durable materials.</p> |
| <p><i>Required: All materials must be approved by local building code for use in residential construction.</i></p> <p>Sustainably harvested lumber (50%)</p> | <p>Carpet</p> <p>All floor carpeting shall have a minimum of 50% recycled material content for face fibers and backing.</p> |
| <p>The house shall be constructed of at least 50% lumber that meets criteria for sustainable harvesting as set by the Forestry Stewardship Council (FSC). The lumber shall come from forests that are managed to maintain ecological health and biodiversity. Builder must present documentation that the lumber meets the criteria of a sustainable harvest.</p> | <p>Biodegradable carpet</p> <p>The carpet shall be constructed of organic materials that readily biodegrade when exposed to moisture and sunlight.</p> |
| <p>Concrete with fly ash or slag</p> <p>A minimum of 25% of the cement in all concrete used for footings, foundation and basement walls, and slabs shall be replaced with fly ash or slag.</p> | <p>Outdoor decking and porches</p> <p>A minimum of 80% of outdoor floor decking shall have a minimum of 40% recycled material content. Recycled content must be certified by Scientific Certification System or the manufacturer.</p> |
| <p>Recycled concrete used as aggregate</p> | <p>M Natural flooring materials in kitchens and bathrooms</p> |
| <p>Demolished concrete shall be used as an aggregate in poured concrete structures.</p> <p>Insulation</p> | <p>Flooring in kitchens and bathrooms shall be natural material.</p> |
| <p>All insulation materials shall have a minimum of 25% recycled material content. Recycled content must be certified by Scientific Certification Systems (SCS) or the manufacturer. SCS is on the web at www.scs1.com.</p> | <p>Air conditioner condensing unit pad</p> <p>The outdoor pad for an air conditioner or heat pump condensing unit shall have a minimum of 50% recycled material content (such as plastic or rubber tires). Recycled content must be verified by the manufacturer.</p> |
| <p>Reclaimed wood flooring</p> <p>A minimum of 50% of wood flooring shall be re-used wood.</p> | <p>ADVANCED PRODUCTS</p> |
| <p>Recycled content tiles</p> <p>A minimum of 50% of tile floors shall contain a minimum of 30% recycled material content.</p> | <p>Engineered floor framing</p> <p>A minimum of 80% of floor joist framing shall be non-dimensional (engineered) structural wood, such as trusses or I-beams, or non wood material.</p> |

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| <p>Engineered roof framing</p> | <p>Engineered wall framing (25% of studs)</p> |
| <p>A minimum of 80% of roof framing shall be non-dimensional (engineered) structural wood, such as trusses or I-beams, or non wood material, such as steel.</p> | <p>A minimum of 25% of the total wall framing shall be manufactured from non-solid sawn wood, such as laminated or finger-jointed studs. Exterior steel studs are not eligible for this credit unless the entire exterior surface of the studs is covered with a minimum R5 insulated sheathing.</p> |
| <p>Oriented Strand Board (OSB) roof decking</p> | |
| <p>A minimum of 80% of roof decking shall be OSB.</p> | |
| <p>M Outdoor structures made from non-CCA pressure treated lumber</p> | <p>M Engineered wall framing (50% of studs)</p> |
| <p>Outdoor structures and amenities including picnic tables, mail kiosks, playground equipment, gazebos, etc. shall contain no CCA treated materials.</p> | <p>A minimum of 50% of the total wall framing shall be manufactured from non-solid sawn wood, such as laminated or finger-jointed studs. Exterior steel studs are not eligible for this credit unless the entire exterior surface of the studs is covered with a minimum R5 insulated sheathing.</p> |
| <p>M Outdoor structures made from materials with recycled content</p> | <p>Engineered wall framing (80% of studs)</p> |
| <p>Outdoor structures and amenities including picnic tables, mail kiosks, playground equipment, gazebos, etc. shall contain a minimum of 40% recycled content.</p> | <p>A minimum of 80% of the total wall framing shall be manufactured from non-solid sawn wood, such as laminated or finger jointed studs. Exterior steel studs are not eligible for this credit unless the entire exterior surface of the studs is covered with a minimum R5 insulated sheathing.</p> |
| <p>All beams are steel, engineered wood, or trusses</p> | <p>Engineered interior trim</p> |
| <p>A minimum of 80% of the total beams shall be manufactured from non-solid sawn wood, such as laminated wood, or steel beams.</p> | <p>A minimum of 80% of interior wood trim shall be non-solid sawn wood (such as finger-jointed) or non wood material.</p> |
| <p>All headers are steel or engineered wood</p> | <p>Engineered exterior trim</p> |
| <p>A minimum of 80% of the total headers shall be manufactured from non-solid sawn wood, such as laminated wood, or steel beams.</p> | <p>A minimum of 80% of exterior trim, including soffit, fascia, and trim, shall be non-solid sawn wood or non-wood material.</p> |
| | <p>Steel interior walls</p> |
| | <p>While exterior steel walls suffer potential thermal bridging, interior walls can be framed using steel studs. Steel studs shall have a 30% recycled content. A minimum of 80% of interior walls is required.</p> |

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| <p>Structural Insulated Panels (exterior walls)</p> | <p>DURABILITY</p> |
| <p>A minimum of 80% of all exterior walls shall be structural insulated panels to a minimum of R15. Structural insulated panels must be installed according to manufacturer's specifications.</p>  | <p>Roofing (25-year warranty)</p> <p>Shingle or other exterior roofing material shall have a minimum 25-year manufacturer's warranty. Warranty documentation must be provided to the home buyer.</p> |
| <p>Structural Insulated Panels (roof)</p> <p>A minimum of 80% of all roof area shall be structural insulated panels with a minimum of R30. Structural insulated panels must be installed according to manufacturer's specifications.</p> | <p>Roofing (30-year warranty)</p> <p>Shingle or other exterior roofing material shall have a minimum 30-year manufacturer's warranty. Warranty documentation must be provided to the home buyer.</p> |
| <p>Precast Autoclaved Aerated Concrete</p> <p>A minimum of 80% of above grade exterior area shall be precast autoclaved aerated concrete. Walls must be installed according to manufacturer's specifications.</p> | <p>Roofing (40-year warranty)</p> <p>Shingle or other exterior roofing material shall have a minimum 40-year manufacturer's warranty. Warranty documentation must be provided to the home buyer.</p> |
| <p>Insulated Concrete Forms</p> <p>A minimum of 80% of foundation or exterior walls shall be insulated concrete forms with a minimum of R14. Walls shall be installed according to manufacturer's specifications and meet state termite protection guidelines for ground contact insulation.</p>  | <p>Light roof color (tile or metal)</p> <p>Metal roofing or white tile roofing shall have a solar reflectance of 60% or more.</p> <p>Roof drip edge</p> <p>The outer edge of all roof decking shall be protected with a metal or plastic drip edge.</p> |

M Flashing or self-adhering underlayment at roof valleys and penetrations

All valleys and penetrations in the roofing system shall be reinforced with either metal flashing material or a self-adhering underlayment designed and approved for use with the installed roofing system. (graphics here)



M Freeze prevention for all water pipes

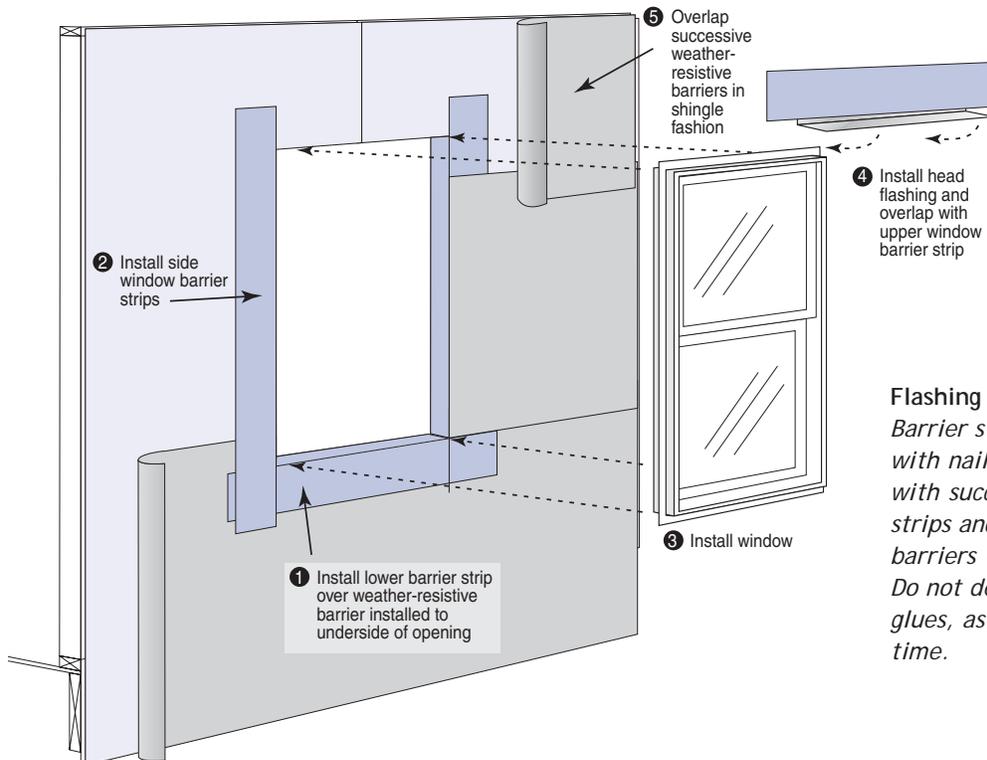
Insulate all water pipes in climates and building conditions susceptible to freezing temperatures and conditions. Avoid locating plumbing in exterior walls.

Exterior cladding

A minimum of three sides of exterior wall cladding shall have a 40-year manufacturer's warranty or be a durable natural material such as masonry stucco, stone, brick or most fiber cement siding. Warranty documentation must be provided to the home buyer.

Walls covered with builder paper or housewrap

A minimum of 80% of exterior wall area shall have a building paper, housewrap or similar material. The material shall be installed shingle fashion, integrated with flashing, and be designed to protect the wall from water moving beyond the exterior cladding.



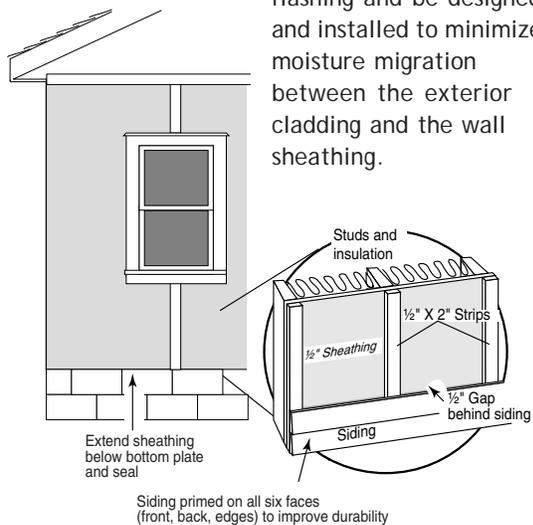
Flashing Detail

Barrier strips are attached with nails and overlapped with successive barrier strips and weather-resistant barriers in shingle fashion. Do not depend on tapes or glues, as they may fail over time.

Siding with vented rain screen

A minimum of 80% of exterior wall area shall have building paper, housewrap or similar material designed to protect the wall from water moving past the exterior cladding, and have an air space between the exterior cladding and wall sheathing. The system shall be integrated with

flashing and be designed and installed to minimize moisture migration between the exterior cladding and the wall sheathing.



Vented rain screen

Back-primed siding and trim

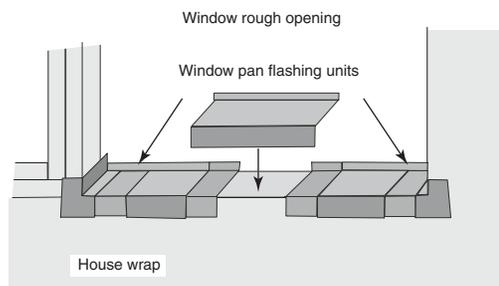
All six sides of painted or stained exterior siding and trim shall be primed prior to installation.

10-year warranty on insulated glazing

Insulated glazing units for exterior windows and doors shall have a minimum 10-year manufacturer's warranty against sealed glass failure. Warranty documentation must be provided to the home buyer.

Window and door pan and sill flashing

All windows and exterior doors shall have a water-resistant flashing installed on the side and base of window and door rough openings to direct water leaks out of the framing.



Window and door head flashing

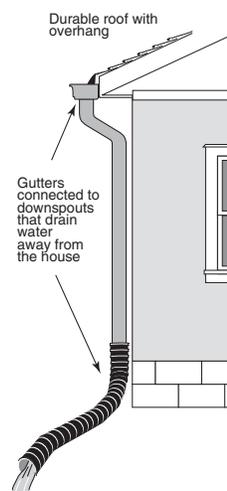
All windows and exterior doors shall have a metal or plastic flashing installed a maximum of six inches above the top of the window or door.

Continuous foundation termite shield

A continuous termite shield shall cover 100% of the foundation stem wall, piers, and other potential entry points. The termite shield can be fabricated from metal, rubberized membrane or similar material that forms a physical barrier to termites. All seams and penetrations in the termite shield shall be sealed to prevent termite entry.

Roof gutters that discharge water 5 feet away from foundation

All rain from the roof shall be collected in a roof gutter system and directed via downspouts such that water is discharged at least 5 feet away from the foundation. Gutters and downspouts that drain water to the base of the foundation are not eligible for these credits.

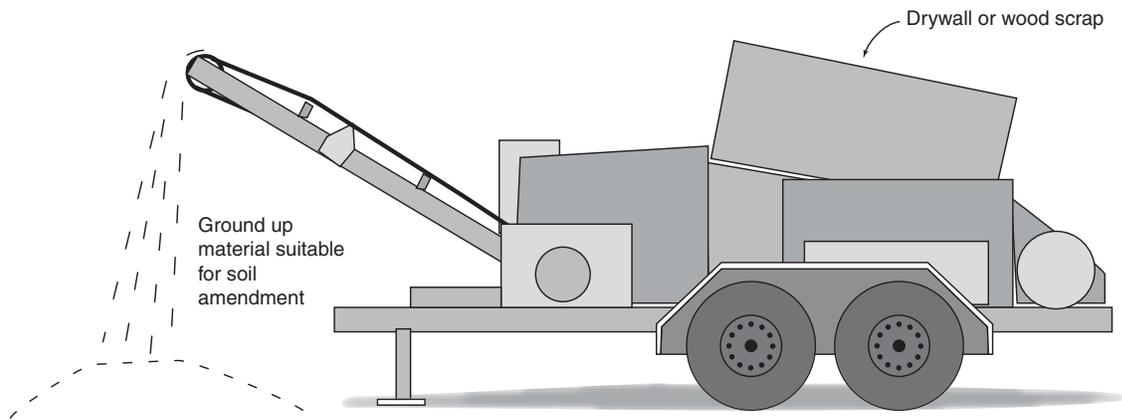


Covered entryways

Home shall be equipped with covered entry ways that extend three feet out from every exterior door.

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| <p>WASTE MANAGEMENT</p> <p><i>Required: No construction materials shall be burned or buried on a job site or other area other than a state approved construction and demolition landfill.</i></p> | <p>Donation of excess materials or re-use</p> |
| <p>WASTE MANAGEMENT PRACTICES</p> | <p>Builder shall avoid disposal of excess construction materials by donating excess to a nonprofit 501c(3) organization or by re-using the construction materials for another job. The value of donated or re-used materials must be \$500 or greater. <i>Builder must provide receipt of donation with EarthCraft House™ final worksheet</i></p> |
| <p>Job site framing plan and cut list</p> | <p>RECYCLE CONSTRUCTION WASTE</p> |
| <p>A plan shall be submitted that designates all structural framing for two of the following: floors, roof, and walls. The plan shall be reviewed with framing crew to ensure minimization of unnecessary framing.</p> <p>Job site framing plan with stud locations, joist locations, and roof structure and cut list</p> | <p>Posted job site waste management plan</p> |
| <p>A plan that designates all structural framing for the roof, walls, and floors shall be prepared and reviewed with framing crew to ensure minimization of unnecessary framing. Builder must submit documentation of framing plan with EarthCraft House™ scoring worksheet.</p> <p>Central cut area</p> | <p><i>A minimum of 75% of 3 of the following materials must be recycled. See NAHB Research Center's "Builder's Field Guide to Residential Construction Waste Management" publication for more information. Points for a "waste management plan" are in addition to points for each recycled material if 3 are recycled.</i></p> <p>Job site shall have a construction waste management plan posted and each subcontractor shall be educated on the aspects of the plan that pertains to their work and these measures shall be enforced by the general contractor. Waste management plan must either provide for on-site separation of materials to be recycled or provide for separation of recyclable materials by clean-up or waste hauling firms. See NAHB Research Center's "Builder's Field Guide to Residential Construction Waste Management" publication for more information. The NAHB Research Center is on the web at www.nahbrc.org</p> <p>Wood</p> |
| <p>Framing contractor shall use a central cutting area and store wood end cuts for re-use.</p> | <p>Builder shall avoid disposal of a minimum of 75% of solid sawn wood by recycling at a state or county approved program or by on-site grinding and application of wood chips as mulch. Pressure treated wood shall be exempt from this requirement and may not be milled or applied as mulch.</p> |

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| <p>Cardboard</p> | <p>Plastics</p> |
| <p>Builder shall recycle a minimum of 75% of cardboard.</p> | <p>Builder shall recycle a minimum of 75% of construction plastic and beverage containers.</p> |
| <p>Metal</p> | <p>Shingles</p> |
| <p>Builder shall recycle a minimum of 75% metal generated from construction waste and beverage cans by recycling at a state or county approved recycling program.</p> | <p>Builder shall recycle a minimum of 75% of shingle waste.</p> |
| <p>Drywall</p> | |
| <p>Builder shall avoid disposal of a minimum of 75% of drywall through an approved recycling program, or by on-site grinding and application of drywall as soil amendment.</p> | |

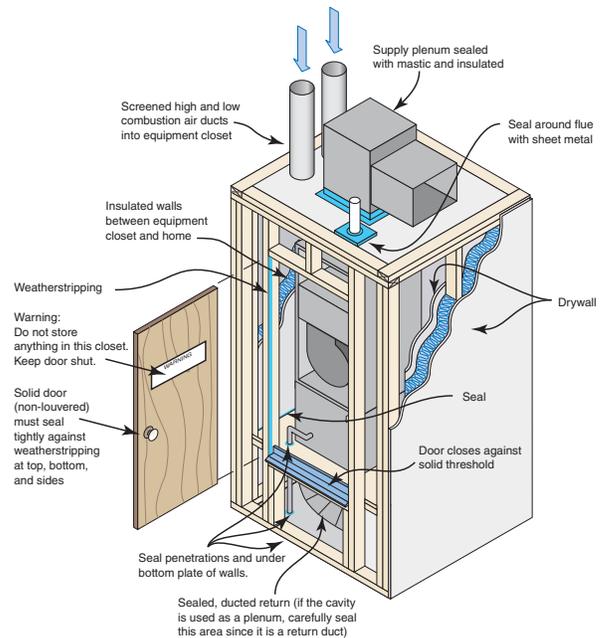


Onsite grinding helps to reduce the amount of construction waste that goes to the landfill. Consult your local jurisdiction for allowable materials and appropriate practices.

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| INDOOR AIR QUALITY |
| COMBUSTION SAFETY |
| <p><i>Required: No unvented combustion fireplaces or space heaters are permitted by the EarthCraft House™ program.</i></p> <p><i>Required: No duct runs from house HVAC systems may serve garage.</i></p> |
| Detached garage or no garage |
| <p>The garage shall be completely isolated by a minimum of 6 inches from the exterior walls or floor of any conditioned area of the house. Any connecting breezeway shall be sealed at both ends to prevent fire-spread. An open carport or no garage is eligible for these points.</p> |
| Attached garage—air sealing |
| <p>The bottom plate and all penetrations (such as plumbing or electrical lines) in the connecting wall between an attached garage and house shall be sealed with caulk, spray foam, gasket or construction adhesive to prevent air movement.</p> |
| Attached garage—exhaust fan |
| <p>An attached garage shall have an exhaust fan rated at a minimum of 100 cubic feet per minute of air flow and be controlled by a timer or motion detector if operated intermittently, or the fan shall be rated at a minimum of 25 cubic feet per minute if operated continuously.</p> |
| Direct vent, sealed combustion fireplace |
| <p>All fuel-burning fireplaces shall be sealed combustion, direct vent units, as rated by the American Gas Association (AGA), that draw in combustion air from outdoors and vent combustion by-products directly outdoors. AGA is on the web at www.aga.org</p> |
| Heat pumps located within conditioned space |
| <p>All heat pumps shall have their air handlers located within the conditioned space.</p> |

Sealed combustion furnace or furnace isolated from conditioned area

All furnaces shall be sealed combustion, installed in isolated contained closets, or outside the building envelope. Closets shall be sealed between the bottom plate and subfloor, contain sealed sheathing covering the interior walls and insulation in wall if loose, and ceilings separating the combustion closet from conditioned space, and have a solid (non-louvered) access door that has weatherstripping and a threshold. Combustion air for closets and sealed combustion furnaces shall be provided from outside the house in compliance with the mechanical code.



Power vented water heater

If an atmospheric combustion water heater is located within conditioned space, the water heater shall have power venting.

Direct vent water heater or water heater isolated from conditioned space

If an atmospheric combustion water heater is located within conditioned space, the water heater shall direct venting or be installed in an isolated, contained closet. The closet shall be sealed between the bottom plate and subfloor, contain drywall covering the interior walls, and have a solid (non-louvered) access door that has weatherstripping and a threshold. Combustion air for the closet shall be provided from outside the house in compliance with the mechanical code. *Water heaters in unconditioned spaces such as garages and attics are eligible for these points.*

Carbon monoxide detector

If the house has an attached garage or combustion appliance, a carbon monoxide detector shall be installed at a minimum of one per floor.

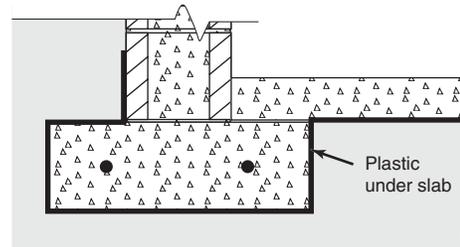
Backdraft depressurization test

A “worst case house depressurization test” shall be performed by an independent third party. The test shall verify that house mechanical equipment, including exhaust fans, clothes dryer, power vented water heater, and air handler, does not create negative indoor pressures (with respect to outdoors) of more than 3 Pascals. Differing atmospheric conditions or additional exhaust appliances may alter the results of this test.

MOISTURE CONTROL

Plastic as footing wrap or capillary break between footing and foundation

Plastic shall be installed to form a capillary break between the ground and the footing. The purpose of the plastic is to prevent groundwater from wicking into the concrete and evaporating into the conditioned space of the house. The plastic shall be continuous from the edge of footing to the slab with an overlapping seam.

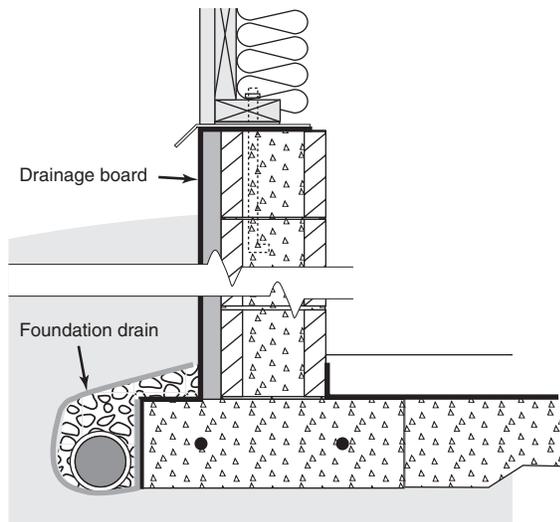


Foundation drain on top of footing

Foundation drain shall be installed around entire foundation and covered with silt protection fabric, gravel, or both. All drain lines shall be connected away and downhill from the foundation.

Foundation drain at outside edge of footing

Foundation drain shall be installed flush with the bottom of the footing and covered with silt protection fabric, gravel, or both. All drain lines shall be connected away and downhill from the foundation.



Drainage board for below grade walls

All below grade walls shall be damp-proofed and feature a drainage plane material that channels water down to the drain tile.

M Complete gutter system, all buildings

All buildings shall have roof gutter systems that capture the bulk water from all roof surfaces and manage the release of that water away from the building foundations.

M Roof gutters that discharge water 5 feet away from foundation

Gutter system discharges water a minimum of 5 feet from any foundation wall, or into a captured system, ie. rainbarrel or cistern.

Gravel bed beneath slab

A minimum four-inch deep gravel bed shall be installed beneath all concrete floor slabs. If plastic vapor barrier is installed, plastic must be on top of gravel.

Vapor barrier beneath slab (above gravel) and in crawl space

A minimum 6 mil polyethylene vapor barrier shall be continuously installed beneath all concrete floor slabs, and over all exposed earth in crawl spaces. 100% coverage is mandatory.

Plastic in crawl space 100% coverage and all seams sealed to piers, walls

A complete vapor barrier shall be installed. All seams shall be sealed including the seam between the vapor barrier and the foundation. Mastic is recommended for sealing because tape will fail over time.

M Condensation prevention for cold water pipes

Insulate cold water pipes in climates and building conditions susceptible to moisture condensation. Avoid locating plumbing in exterior walls.

M Mold resistant materials at tub/shower enclosures

Use highly durable moisture resistant materials in areas behind tub/shower enclosures, such as materials without a paper-facing. Alternative materials for tub and shower enclosures include cement board, fiber cement board, fiberglass-reinforced board, or cement plaster.

M Water heater overflow and leaks captured by drains

Water heaters with tanks are installed so that overflow or leaks are captured by drains.

M Materials management plan posted and enforced

Protocols for the order, delivery, acceptance and on-site protection of materials shall be clearly posted and communicated to responsible representatives on-site. The intent of the management plan is to minimize the exposure of the building materials to moisture, UV and other factors that may degrade the materials or promote mold growth on the materials and in the building after installation.

The plan should, at a minimum, include proper storage descriptions for the materials that will be used on the project and maximum time limits for storing materials in unprotected and unconditioned areas on site.

M Roofing completion and penetration plan posted and enforced

A requirement of the completion of the roofing system to prevent bulk water intrusion prior to the installation of any insulation material, including HVAC ductwork, shall be implemented by the developer or its contractor.

Protocols for the immediate repair of any roof penetrations during the course of construction shall be posted, coordinated and enforced so as to prevent bulk water intrusion after "dried-in" conditions have been achieved in the building.

Capillary break between foundation and framing

A capillary break shall be installed between a concrete foundation wall and sill plate. A complete framed wall width sill gasket, EPDM-type rubber, sheet metal or other suitable membrane shall be installed to prevent moisture from wicking through the foundation into the framing.

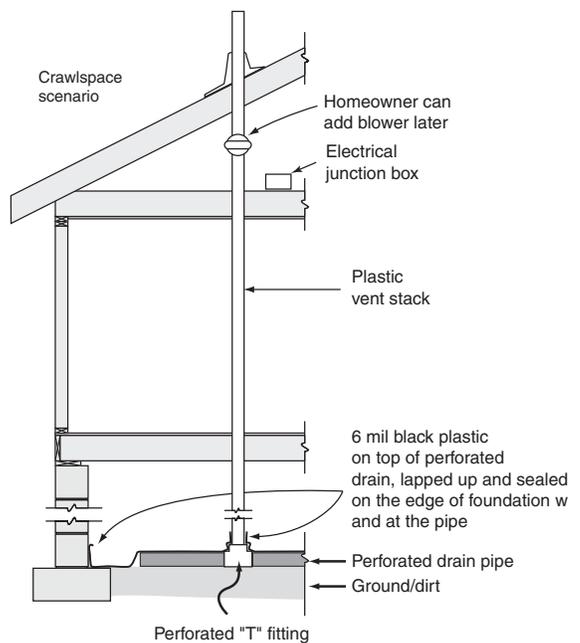
VENTILATION

Required: Bathroom exhaust fans and clothes dryers must be ducted to outside.

Multi-family requirement: Outside air intake with dampers (10 cfm/person)

Radon/soil gas vent system

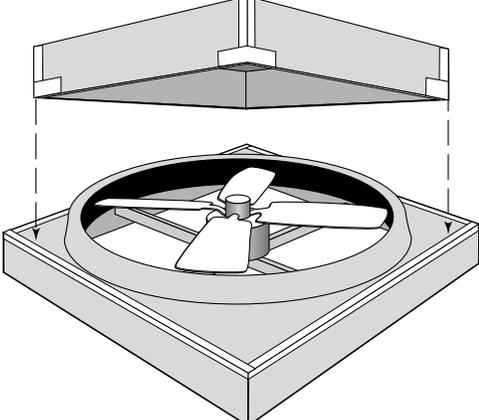
A passive radon vent system shall be installed in compliance with EPA guidelines for "Model Standards and Techniques for Control of Radon in New Residential Buildings."



Radon test of home prior to occupancy

Builder shall conduct a radon test of house after final construction is complete and provide test results to home buyer. Radon test must comply with EPA guidelines. If test indicates greater than 4 picocuries per liter radon concentration, builder must follow EPA guidelines to reduce radon levels.

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| <p>Energy Star bath fans</p> |
| <p>All bath fans shall be Energy Star rated. This rating requires that fans 75 cfm or smaller be no louder than 2.0 sones and move a minimum of 1.4 cfm/watt. Fans 76 cfm or larger must be no louder than 1.5 sones and move a minimum of 2.8 cfm/watt.</p> |
| <p>Bath fans ducted with rigid duct</p> |
| <p>All bath fans shall be ducted with rigid material.</p> |
| <p>Automatic tub/shower room fan controls</p> |
| <p>All bath fans installed in rooms with tubs or showers shall have timer or humidity controls.</p> |
| <p>M Exhaust fan wired with lights in bathrooms</p> |
| <p>The bathroom exhaust fans in each unit shall be wired so that the exhaust fans operate when the main lighting for the bathroom is turned on.</p> |
| <p>Kitchen range hood or downdraft vented to exterior</p> |
| <p>All kitchen range or downdraft hoods shall be vented directly to the outdoors. Intentional make-up air shall be provided for any kitchen vent fan rated at greater than 150 cfm.</p> |
| <p>Ceiling fans</p> |
| <p>A minimum of three (3) ceiling fans shall be installed. Each fan shall be installed in the center of the room with at least 6" fan-to-ceiling clearance and have a minimum diameter of 48".</p> |

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| <p>Whole house fan</p> |
| <p>Whole house fan shall be installed with an insulated cover. A cover shall be constructed to air seal and insulate the whole house fan. Homeowner shall be instructed to remove cover before operating the fan and replace cover during seasons when not in use. Attic ventilation must provide at least one square foot of net free vent area per 750 CFM of fan air flow (CFM= Whole House Fan ACM Capacity x Volume of House).</p> |
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| <p><i>A low-cost insulated whole house fan cover should be used during the off season.</i></p> |
| <p>Basement or crawlspace dehumidification system</p> |
| <p>A dedicated dehumidification system shall be operable in the basement. This system may be a stand alone, portable unit provided it is furnished new to the occupants.</p> |
| <p>Vented garage storage room</p> |
| <p>A separate storage room shall be provided in the garage with a lockable door and vented directly to the outdoors with a minimum of 100 square inches of net free vent area per 100 square feet of floor area. No combustion equipment or HVAC equipment shall be in the storage room.</p> |
| <p>No power roof vents</p> |
| <p>No electrically-powered roof exhaust vents shall be installed.</p> |

M Vented storage room outside building envelope

A separate storage room shall be provided for each dwelling unit outside of the building envelope vented directly to the outdoors with a minimum of 30 square inches of net free vent area per 10 square feet of floor area.

M Outside air intake tied directly into return plenum

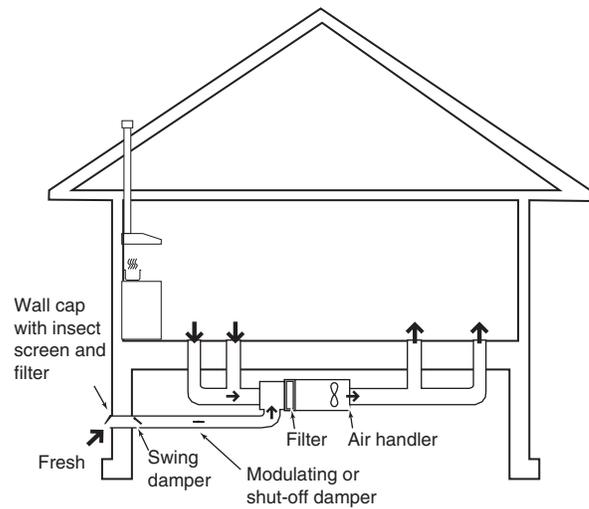
An outside air intake shall be connected to the return plenum. This detail is required in installations where air handlers have no open returns.

Outside air intake without damper

An outdoor air intake duct shall be connected to the return side of each air handler to bring in fresh outside air for ventilation. The air shall be filtered and the intake duct shall be sealed and insulated when run through unconditioned spaces. One way this can be accomplished is with a 4-inch duct attached to the return plenum of the air handler and connected to an outdoor inlet. The inlet must have a screen to deter birds, squirrels, etc.

Outside air intake with dampers

An outdoor air intake duct shall be connected to the return side of each air handler to bring in fresh outside air for ventilation. The air shall be filtered and a damper (barometric or motorized) should close automatically when the air handler fan is not operating. The intake duct shall be sealed and insulated when run through unconditioned space (such as attic or crawl space). One way this can be accomplished is with a 4-inch duct attached to the return plenum of the air handler and connected to an outdoor inlet. The inlet must have a screen to deter birds, squirrels, etc. Finally, the duct must have a damper to control the amount of fresh air.



Ventilation timer on outside air intakes

A control device shall be installed on a dampered outside air intake to allow the occupants to specify the desired operating time.

Energy Recovery Ventilator (ERV)

An Energy Recovery Ventilator shall be installed according to the manufacturer's specifications. An ERV transfers heat and moisture between incoming and exhaust air streams.

MATERIALS

Required: Ducts in floor covered and protected until floor finishing

Subfloor urea-formaldehyde free

Subflooring shall not contain urea-formaldehyde.

All cabinets, shelves, and countertops urea-formaldehyde free

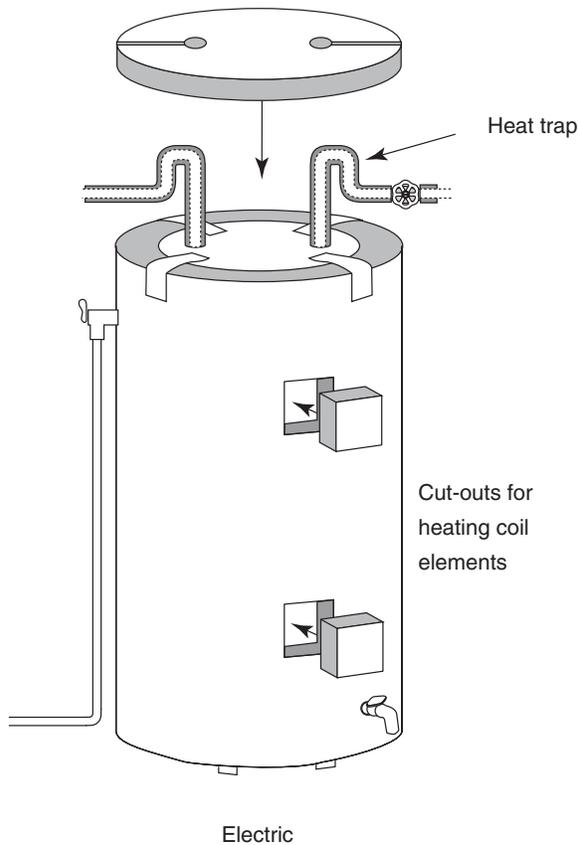
Cabinetry, shelves, and countertops shall not contain urea-formaldehyde.

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| <p>All surfaces of particle board in house sealed with water-based sealant</p> | <p>Alternative termite treatment</p> |
| <p>If urea formaldehyde materials are used in conditioned space, all 6 sides must be coated with a water based polyurethane sealant or a specialty formaldehyde sealant. Sealant shall have a maximum VOC (Volatile Organic Compounds) content of 250 g/L.</p> | <p>Acceptable termite soil treatments include borate application, termite baiting, stainless steel mesh, or basaltic sand. Homeowner shall be educated to type of system installed and maintenance or monitoring requirements.</p> |
| <p>Reduced VOC paints (less than 250 g/L)</p> | <p>Alternative pest control system</p> |
| <p>All interior paints shall have a maximum VOC content of 250 g/L</p> | <p>Alternative pest control system shall be installed in the home according to manufacturer's specifications.</p> |
| <p>Low VOC paints (less than 150 g/L)</p> | <p>Outdoor structures made from non-CCA pressure treated lumber</p> |
| <p>All interior paints shall have a maximum VOC content of 150 g/L</p> <p>Reduced VOC stains and finishes on wood floors</p> | <p>All outdoor decking and porches shall be constructed of lumber that has not been pressure treated with CCA (Copper Chromium Arsenate). Other types of pressure treated lumber or non-wood materials are eligible.</p> |
| <p>All interior wood floor stains and finishes shall have a maximum VOC (Volatile Organic Compound) content of 250 g/L.</p> <p>Reduced VOC sealants and adhesives</p> | <p>Central vacuum system with outside collection receptacle</p> |
| <p>All interior sealants and adhesives shall have a maximum VOC (Volatile Organic Compound) content of 250 g/L.</p> | <p>A central vacuum system shall be installed with storage receptacle located outside of conditioned space or sealed to prevent dust from entering the home.</p> |
| <p>Low VOC carpet certified by the Carpet & Rug Institute</p> | <p>Filter/air cleaner with minimum MERV 8</p> |
| <p>The builder shall provide a current letter from the Carpet and Rug Institute certifying that the specified carpet type to be supplied has been tested and meets all the requirements of the CRI Indoor Air Quality Carpet Testing Program.</p> | <p>The installed air filter/cleaner on all systems shall have a minimum MERV of 8 or higher. (Ozone generators are not permissible as air cleaners.)</p> |
| | <p>Filter, two-inch pleated or better</p> |
| | <p>The installed filter on all systems shall be at least a two-inch pleated media filter.</p> |
| | <p>Ducts protected until construction is completed</p> |
| | <p>Supply and return duct outlets shall be covered to stop construction trash and dust from contaminating new duct system.</p> |

WATER—INDOOR

Required: All fixtures must meet National Energy Policy Act low flow standards.

Required: Heat traps installed on all water heaters.



Heat traps are required on all water heaters.

M All units sub-metered

Install individual or sub-metered water meters in multifamily housing units.

Water filter

Primary kitchen faucet shall be installed with a water filter that meets National Sanitation Foundation specifications.

Front loading clothes washer

Installed clothes washer shall be a front-loading model.

Low-flow showerheads

At least 80% of all showerheads in the home must exceed the National Energy Policy Act (NEPA) by a minimum of 10% less flow. The NEPA requires flow of 2.5 gal/minute or less, so showerheads with 2.25 gal/minute or less qualify for this point.

Low-flush toilets

At least 80% of all toilets in the home must exceed the National Energy Policy Act (NEPA) by a minimum of 10% less flow. The NEPA requires flow of 1.6 gal/flush or less, so toilets with 1.45 gal/flush or less qualify for this point.

M Faucets with tamper-resistant strainer or flow control in fixture

Sink fixtures shall be equipped with tamper-resistant strainers or shall have flow controls incorporated into the fixture mechanism.

Hot water demand re-circulation

A hot water demand system shall be installed on the fixture furthest from the water heater. This recirculation pump will minimize wait time for hot water, thereby reducing waste. Remote switches to activate the system shall be installed on intermediate fixtures between the pump and water heater.

Manifold distribution system

A manifold distribution system shall be installed so that each plumbing fixture in the house, or unit has a dedicated water line back to the manifold. This design approach minimizes the diameter of the water pipes and reduces the amount of water wasted while waiting for hot water to reach the fixture.

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| <p>Shower drain heat recovery device</p> | <p>Water heater pipe insulation</p> |
| <p>A drain heat recovery device shall be installed on one shower in the home. This device recovers a minimum of 25% of the wasted heat from the shower drain water such a GFX.</p> | <p>The first two feet of cold and hot water pipe closest to the water heater tank shall be insulated with a minimum of ½ inch foam, preferably through the heat traps installed in the hot and cold water pipes.</p> |
| <p>High efficiency water heater</p> | <p>Heat recovery water heating</p> |
| <p>Tank type water heaters shall meet Energy Star standards or have an Energy Factor rating equal to or greater than 0.62 for natural gas, 0.62 for propane, or 0.92 for electric resistance.</p> | <p>A refrigerant-to-water desuperheating coil shall be used to recover waste heat from an air conditioner or heat pump to heat domestic water.</p> |
| <p>Tankless gas water heater</p> | <p>Solar domestic water heating</p> |
| <p>A tankless gas water heater shall be installed according to manufacturer's specifications.</p> | <p>A solar domestic water heater shall be installed according to manufacturer's specifications.</p> |
| <p>Water heater tank insulation</p> | <p>Heat pump water heater</p> |
| <p>Water heater tank shall have an insulating jacket equal to or greater than R5. Jacket must be installed according to manufacturer's recommendations.</p> | <p>A heat pump water heater shall be installed according to manufacturer's specifications.</p> |

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| <p>WATER—OUTDOORS</p> | <p>No irrigation system installed</p> |
| <p>HBA Water Smart Program</p> | <p>No irrigation system shall be installed on the property.</p> |
| <p>Builder shall comply with the HBA Water Smart Program.</p> | <p>Drip irrigation system</p> |
| <p>Xeriscape™ guidebook given to homeowner</p> | <p>A minimum of 50% of landscape planting beds shall have a drip irrigation system.</p> |
| <p>A copy of the University of Georgia Cooperative Extension Service's, "Xeriscape- A Guide to Developing a Water Wise Landscape" shall be provided to the home buyer.</p> | <p>Greywater irrigation</p> |
| <p>Xeriscape™ plan provided to homeowner</p> | <p>A greywater irrigation system shall be approved by local building and/or health departments, and at a minimum shall have a dedicated clothes washer box with 2-inch drain connected to a subterranean drain field. A separate clothes washer box shall be provided that connects to the sanitary drain system.</p> |
| <p>A drought tolerant landscape plan developed by a landscape architect, horticulturist or other professional shall be provided to the home buyer.</p> | <p>Rainwater harvest system</p> |
| <p>Soil tested and amended</p> | <p>Rain from the roof shall be collected and stored for irrigation use.</p> |
| <p>Soil shall be tested and amended to improve the growth of plants and grasses.</p> | <p>Permeable pavement</p> |
| <p>Drought tolerant plants incorporated</p> | <p>A minimum of 80% of paved surfaces for driveways, sidewalks, and patio areas shall have a pavement system that allows for infiltration of water.</p> |
| <p>Drought tolerant plants shall be incorporated into the landscape design. Adaptable plants withstand rainfall shortages and utilize less water for irrigation.</p> | |
| <p>Sod intentionally minimized</p> | |
| <p>Turf grass area shall be intentionally minimized to reduce the requirements for irrigation. The area shall be less than the home's footprint.</p> | |

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| <p>HOME BUYER EDUCATION</p> <hr/> <p>Guaranteed energy bills</p> <hr/> <p>The builder, utility or third party shall certify that the energy bills for a minimum two year period shall not exceed a baseline level. The guaranteed level shall be less than the energy use predicted for a home built to the standards of the current state energy code.</p> <hr/> <p>Review energy operations</p> <hr/> <p>The builder shall review the proper use and maintenance of all energy using systems, such as bath fans, fireplaces, filters, ventilation filters, and thermostats, with the home buyer and provide a manual that summarizes these procedures.</p> <hr/> <p>Review irrigation system operations</p> <hr/> <p>The builder shall review the proper use and maintenance of all irrigation systems with the home buyer and provide a manual that summarizes these procedures.</p> <hr/> <p>Built-in recycling center</p> <hr/> <p>The builder shall provide site-built or commercially manufactured recycling containers for newspaper, magazines, and at least one other material.</p> <hr/> <p>Local recycling contact</p> <hr/> <p>Builder shall provide the home buyer information on recycling facilities conveniently located to the home as well as a list of haulers that provide curbside service.</p> | <hr/> <p>Household hazardous waste resources</p> <hr/> <p>The builder shall provide the home buyer with information on the proper management of household hazardous waste.</p> <hr/> <p>Environmental checklist</p> <hr/> <p>Builder shall provide the home buyer a list of the selected environmental features for the EarthCraft House™.</p> |
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| <p>BUILDER OPERATIONS</p> | <p>Certified Professional Home Builder</p> |
| <p><i>Required: Builder must certify one (1) EarthCraft House every year.</i></p> | <p>Builder shall be a member of the Home Builder Association (HBA) and Certified Professional Home Builder program.</p> |
| <p>Builder commits 80% of total homes to EarthCraft House™ standards</p> | <p>Uses HBA Homeowner Handbook for warranty standards</p> |
| <p>The builder shall commit to building and certifying a minimum of 80% of total houses to EarthCraft House™ standards within the upcoming twelve month period.</p> | <p>Builder shall use the HBA Homeowner Handbook for warranty standards.</p> |
| <p>M Uses EarthCraft Operations and Maintenance Manual in management contract</p> | |
| <p>Developer uses EarthCraft Operations and Maintenance Manual in its scope of work for the management of the property.</p> | |
| <p>Markets EarthCraft House™ program</p> | |
| <p>Builder shall include EarthCraft House™ logo in all print materials, advertisements and other promotional materials.</p> | |
| <p>Environmental checklist provided to all subcontractors</p> | |
| <p>Builder shall provide and review the relevant EarthCraft House™ measures with each subcontractor to ensure their compliance with the program guidelines.</p> | |
| <p>M Approved construction materials order and management plan</p> | |
| <p>Protocols for the order, acceptance, and timely installation of building materials shall be required by the developer to minimize material waste and prolonged storage on site. Plan shall include a schedule of anticipated material order, delivery and installation for all major building components and protocols for proper storage and protection of the materials while on site.</p> | |

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| <p>BONUS POINTS</p> | <p>M Infill development</p> |
| <p>Site located within ¼ mile of mass transit</p> | <p>Locate the project within an existing community or previously built on property that is contiguous to existing development. Infill sites refer to new development on vacant, bypassed, and underutilized land within built-up areas of existing communities where infrastructure is already in place.</p> |
| <p>Bonus points shall be awarded for homes located within 0.25 mile of at least one type of mass transit, including bus, train, or ride share.</p> | <p>Solar electric system</p> |
| <p>Sidewalk connects house to business district</p> | <p>Bonus points shall be awarded for a solar electric system which is capable of producing 20% of the home's electrical load. All electrical inspections must meet the National Electric Code. The solar array must remain unshaded year round, be oriented to within 15 degrees of true south, and be angled horizontally within 15 degrees of latitude.</p> |
| <p>Bonus points shall be awarded where continuous sidewalk connects the house to the local business district, including grocery store, restaurants, and entertainment – maximum 2 miles.</p> | <p>M Solar electric system providing 10% of project requirements</p> |
| <p>M Street trees—minimum interval 40 ft.</p> | <p>Bonus points shall be awarded for a solar electric system which is capable of producing 10% of the housing unit's electrical load. All electrical inspections must meet the National Electric Code. The solar array must remain unshaded year round, be oriented to within 15 degrees of true south, and be angled horizontally within 15 degrees of latitude.</p> |
| <p>Plant or preserve shade trees at regular intervals along both sides of a least 75% of the total linear footage of streets.</p> | <p>Alternative vehicles: electric charging station or natural gas pump</p> |
| <p>Plant a diversity of species and include regionally-native or -adaptive trees whenever possible. Plant trees at a minimum interval of 40 feet and in planting strips or tree wells with a minimum dimension of 6 feet by 6 feet. If this dimension is not desirable in a specific context, demonstrate that a sufficient root path is created through the use of structural soil beneath the sidewalk or through another proven technique.</p> | <p>Bonus points shall be awarded for a home equipped with an electric charging station or natural gas pump for refueling alternative fuel vehicles.</p> |
| <p>Brownfield site</p> | <p>M Alternative transportation accommodation</p> |
| <p>Bonus points shall be awarded for homes built on a brownfield site. A brownfield site is defined as being an abandoned, idle, or under used industrial or commercial facility where expansion or re-development is complicated by real or perceived environmental contamination. Technical assistance for building on brownfield sites may be obtained by contacting the EPA's Division of Waste Management (see references).</p> | <p>Bike racks or other alternative transportation accommodations shall be provided for a minimum of 15% of number of dwelling units.</p> |

M Dedicated pedestrian and bicycle access to surrounding sites

Provide sidewalks that link the residential units to public spaces, open spaces, and adjacent development. Provide cyclists with either dedicated lanes or paths that link the development to the surrounding community.

M Infrastructure connectivity to surrounding sites

Connect streets to existing stub streets and stub out streets for future connections. Connect trails with offsite trail network and connect streets with offsite street network in at least two places.

M Housing affordability 5%

Develop 5% of all residential units as affordable housing for low-income households for a 10 year period.

Definition of low-income: Low-income households earn less than 80% of median household income in the county (HUD)

Definition of affordability: Housing cost less than 30% of household income (HUD)

M Housing affordability 10%

Develop 10% of all residential units as affordable housing for low-income households for a 10 year period.

Definition of low-income: Low-income households earn less than 80% of median household income in the county (HUD)

Definition of affordability: Housing cost less than 30% of household income (HUD)

M Average density greater than 15 units per acre

Total number of dwelling units after construction divided by the acreage of entire tract down to one decimal point, minus dedicated acreage of public street rights of way, buffered wetlands and dedicated open space down to one decimal point.

The size and scale of roads and streets will be based on the smallest allowable for residential community design and will incorporate all necessary traffic calming devices to assure a pedestrian safe and friendly community.

M Centralized community recycling center

The developer shall construct an area protected from weather for the acceptance of multiple containers for resident drop-off of recycled materials including newspaper, aluminum/metal, plastic and glass at a minimum.

M Community garden area

The developer shall dedicate land to community garden use, and preserve the plot with an agricultural easement or permanent restriction to insure its use in this manner for a minimum of 10 years. To qualify, the area of dedicated land must be greater than 10 square feet/dwelling unit.

In consultation with residents, community gardening plots shall be constructed, including soil improvements and raised accessible beds, and provide start-up gardening supplies. Encourage organic gardening techniques.

M Handicapped visitability at least 50% more than code minimum

The development shall have at least 50% more units that meet handicapped requirements than is required by local codes for the project type. Units that accommodate visually or hearing impaired residents or visitors also qualify towards this percentage.

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| <p>M Exterior lighting designed to reduce light pollution</p> | <p>Certified as an ENERGY STAR Home</p> |
| <p>Design outdoor lighting to eliminate light trespass from the building and site and to minimize impact on nocturnal environments. Use daylight sensors on all exterior lighting. Consult the Illuminating Engineering Society of North America Recommended Practice Manual: Lighting for Exterior Environments.</p> | <p>Home shall be certified energy star according to the requirements of Department of Energy (DOE) ENERGY STAR program available at www.energystar.gov.</p> |
| <p>M Proximity to regional bike path--existing</p> | <p>Certified as a LEED-H home</p> |
| <p>Locate the area of highest density in the community within ½ mile of a regional bike path and provide a continuous linkage and directional signage to the path.</p> | <p>Home shall meet the standards for the “certified” level or higher in the USGBC’s LEED-H guidelines and be certified by a LEED-H Provider. For more information, please visit www.usgbc.org.</p> |
| <p>M Proximity to regional bike path—planned</p> | <p>Exceeds ENERGY STAR</p> |
| <p>Locate the area of highest density in the community within ½ mile of a planned and funded regional bike path.</p> | <p>One bonus point shall be awarded for each one point exceeded in the ENERGY STAR rating for a home, for a maximum of 5 points. For example, an ENERGY STAR rating of 88 shall receive 2 bonus points. A HERS score of 86 is Energy Star, each point above 86 represents a 5% improvement.</p> |
| <p>M Common areas use alternative energy</p> | <p>Innovation points</p> |
| <p>Common area features, amenities, or fixtures use alternative energy sources to supplement their operation and demonstrate the technology. Examples include solar hot water heating for the community pool and photovoltaic systems for signage or parking area lighting.</p> <p>EasyLiving Home™ Program</p> <p>Builder shall be a member of the EasyLiving Home™ program and build homes that are accessible and earn the EasyLiving certification.</p> <p>American Lung Association Health House</p> <p>Bonus points shall be awarded for homes built according to the criteria and performance standards set forth by the American Lung Association® for the Health House Project.</p> | <p>Builder shall submit specifications for innovative products or design features to qualify for additional points.</p> |

