Chapter 12. Air Sealing and Insulation

Tools needed by volunteers:

Nail apron
Tape measure
Utility knife
Pencil

Tools and equipment needed:

Extension cord
Lighting
Flashlight/headlamp
Hammer tacker stapler
Hand saw
Caulk gun
Hand stapler
Stainless steel straightedge
6' Level
Stepladder
Push broom
Black felt tipped pen
Red marking crayon
Red utility knife blade disposal tube
Vacuum

Materials needed:

24" R-21 Fiberglass insulation
Staples
Air sealing tape
HVAC tape
Air sealing caulk
Clear finish caulk
Tongue depressor
Spray foam
Poly vapor barrier
Foamboard scrap
White soffit nails
1½" Siding nails
1¼" Sheetrock screws
Tapered shims
Cardboard shims
OSB and 2x scrap
Garbage bag

Personal Protection Equipment:

Safety glasses (required)
Work gloves (recommended)
Dust mask (recommended)
Hearing protection (recommended)

Safety First! Review the Safety Checklist before performing tasks in this chapter.

12.1. BUILDING SCIENCE FACTS

1. All of the affiliate's homes are Focus on Energy New Homes Program and Energy V3 certified. The average air leakage of homes built in 2011 was 53% better than certification requirements. This was achieved by focusing on the details of energy conservation at every step of the building process, from framing to installing appliances. These efforts provide a great end product that benefits not only the families but the environment as well.

2. The primary leakage concern is the building envelope, which is any surface between conditioned and unconditioned air. The building envelope should be a closed system, which means that all air/moisture flowing in or out of the building is "intentional" and controlled. Capping the "lid" (ceiling to the attic) is the most critical because it is the highest pressure point of the building envelope. For the walls, creating a completely sealed, 6-sided box for each wall cavity ensures that no air/moisture can be transported through the wall cavity. Maximum insulation efficiency (R-value) is ONLY achieved within "dead" air space. ANY airflow through the fiberglass batt insulation can reduce the R- value by 50% or more.

3. The average home experiences a 30% heat loss as a result of warm air leaking out of the house. Therefore, it is important to control both air and moisture movement by being VERY intentional about sealing every penetration and hole in the building envelope as well as from one level to the next. The most common leakage areas are doors and windows, foundation cracks, sump pits, sill/rim board areas, floor to wall seams, floor to ceiling seams, interior penetrations (i.e. one level to another) and exterior penetration (i.e. inside to outside).

4. It is critical to keep moisture where it can be seen (not hidden in walls or attics) by using appropriate air/moisture barriers/retarders. All building materials (e. g. OSB, sheetrock, plaster, fiberglass insulation, rigid or spray foam, poly/plastic, paint etc.) qualify as air and/or moisture barriers or retarders with varying permeability ratings (the rate at which moisture can pass through). Following is an example of how a moisture barrier/retarder can easily be compromised:

   EXAMPLE: A 4'x8' area of ½" sheetrock has a permeability rating of 90 (6 mil poly is rated at 0.06). At 70°F and 40% RH, ⅓ quart of water will diffuse through this sheet over a given amount of time. By simply adding a 1" square hole, moisture diffusion increases to 30 quarts of water over the same amount of time (i.e., several gaps around electrical boxes could easily add up to this 1" square).

12.2. PREPARATION

1. Mark all stud center locations on the floor with a red crayon prior to installing poly vapor barrier.

2. Mark the location of all HVAC ducts, basement ceiling duct dampers, and plumbing pipes that will protrude through the sheetrock using a red marking crayon. Draw a 6"-8" rectangle directly beneath ceiling heat vents, and in front of cold air return ducts and mark an "X" across corners. Draw a red circle for each pipe on the floor directly in front of the pipe or directly beneath the damper for HVAC damper controls.

3. Verify that all wall and ceiling electrical boxes are identified by a spray-painted pattern, about equal to the width of the box on the floor. If there are any electrical boxes that are not marked, use a red marking crayon and draw a rectangle the approximate size of the box on the floor, directly beneath or in front of the box.

4. Verify that the wall studs behind the countertop are all in the same plane to ensure the countertop will fit flush to the wall. Using the edge of a stainless-steel straightedge, orient it to a horizontal position and hold it against the inside edges of the wall studs about 41" above the floor. Use cardboard shims to fill any gaps until all studs are in line at that level and secure the shims to the studs with staples. If the gap is ¼" or more, taper off each shim to a zero thickness upward about 20" and downward about 10" from the 41" height. Use tapered or cardboard shims, or a combination of the two. Attach tapered shims with white soffit nails and cardboard shims with staples.

5. Before checking studs for level and plumb, use one of these two methods to verify the accuracy of the 6' level.

    a. Place the level on the sub-floor and draw a pencil line along the floor at the front of the level and make a mark on the floor at level center. Observe all the bubbles in the level. Their positions should all be equally spaced within the level lines. Flip the level end for end and align to the pencil marks. The level is accurate if all the bubble positions are the same and their position did not change. Repeat with the opposite side of the level. If a level is not providing consistent readings, give it to the Construction Supervisor.

    b. Place the level on the 1½" edge of a kitchen or door stud. Make a mark at the top of the level and at the center of the level. Observe all the bubbles in the level. Their positions should all be equally spaced within the level lines. Flip the level end for end and align to the pencil marks. The level is accurate if all the bubble positions are the same and their position did not change. Repeat with the opposite side of the level. If a level is not providing consistent readings, give it to the Construction Supervisor.

6. Verify that the Jack studs of sliding door openings are straight and plumb. Using a 6' level on the face of the Jack stud, verify Jack studs on all sliding door frames are straight and plumb to within 1/16". Check for plumb first. Add cardboard shims to the top or bottom until the level reads plumb and staple the shims. With the level in place, fill in any gaps due to bowing with whole or peeled layers of cardboard shims to straighten the face. When completed, or if no shimming is required, mark "OK" with a red crayon or marking pen on the Jack stud face to indicate the studs have been checked.

7. Verify that exterior wall studs adjacent to flush sliding doors are straight, plumb and in the same plane. Use a 6' level to check the two closest studs to the eventual door location for plumb and straightness, as described in Step 5 above. Then turn the level to horizontal and check the three closest studs to the door location about 41" off the floor to determine if the exterior wall stud faces are in the same plane. If off by more than ⅛", use cardboard shims, centered on the 41" mark to bring the faces in line. When completed, or if no shimming is required, mark "OK" with a red crayon.

8. Verify that all blocking has been installed per Section 10.6.3. Complete blocking as required.

9. Remove the temporary 2x4 plenum support block positioned across the range plenum.

10. Vacuum debris from all wall cavities and from sub-floor areas along exterior wall bottom plates prior to caulking and installing insulation.

11. Vacuum debris from the sub-flooring around all in-floor heating ducts as well as the inside area around the top of the duct. Also, vacuum inside the cold air return boots, particularly the joint between the duct and the boot. This will create clean surfaces for flashing and HVAC tape application.

12. Verify that foamboard has been installed along the basement foundation walls and the foam has been pushed tight to the exterior walls using scrap 1" foamboard. If foamboard has not been secured, cut to approximately 5"x5"-8" long", slide along wall studs to push foamboard tight to the wall and secure to the studs with two 1½" siding nails. Some foamboard may require more than one 5"x5" piece to snug the sheets to the wall.

13. Verify folded coil strip has been nailed to the bottom of the common wall garage studs. If not, see instructions for installing in Section 11.1.4.5.

14. Verify exterior door reveals on strike side are between ⅛"- 3/16" wide. A wider reveal results in too little engagement of the latch into the strike plate. To correct, try backing off on the 2½" exterior screws adjacent the latch area and, if necessary, add shims behind the jam to reduce the reveal along the latch area. Verify operation of the latch and deadbolt.

12.3. AIR SEALING

12.3.1. Main Level

1. Install scrap foamboard in the following exterior wall areas:

    a. Above exterior wall window and door headers. Use 2" foamboard and cut to fill header cavities flush to the inside face of the wall studs. See Step 8 below for instructions on sealing the perimeter of this foamboard.

b. Between any two exterior wall studs with a gap of 3" or less. Cut and install flush to interior stud faces. If gaps exist between foamboard layers, seal with air sealing tape.

2. Install batt insulation behind electrical boxes along exterior walls only. Cut insultation to extend ½" beyond each box dimension and wedge it behind the box. Slide the batt all the way to the stud.

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3. Use air sealing caulk to fill the following areas:

   a. All holes in each of the wall and ceiling electrical boxes. Use a flashlight or headlamp to check filled holes. Re-seal where light penetrates through holes.

      NOTE: It is not necessary to caulk the attic light electrical box.

   b. The bottom of the windows. Use a tongue depressor to push caulk into the joints.

   c. The inside joint between all exterior wall corners. Use a tongue depressor to push caulk into the joints and remove excess caulk from the corners.

   d. The inside joint between the subfloor and the exterior wall bottom plates. Use a tongue depressor to push caulk into the joints.

4. Use air sealing tape to seal the gap between the poly vapor barrier and the bottom perimeter of the bath fan housing to prevent moisture transfer to the attic.

5. Use air sealing tape to seal all flat 2x seams (e.g., door and window components) and between upper and top plates.

6. Use air sealing caulk or spray foam to seal the areas listed below. Unless specified, use air sealing caulk for gaps less than ¼" wide and spray foam for gaps greater than ¼" wide.

   a. All holes in **exterior** wall studs.

   b. All holes, including unused holes, in the top and bottom plates on interior and exterior walls.

   c. All holes (being used or not) or gaps in the OSB that are visible from inside the house.

   d. Perimeter gaps around pipes extending through the sub-floor and bottom and top plates (e.g., water lines, drains, vent stack).

   e. The gap between the windows and the window framing (rough opening). Partially fill the cavity until the exterior sheathing (blue foamboard or OSB) is no longer visible. DO NOT FILL THE ENTIRE DEPTH to the inside of the

window frame. Trim any excess foam ONLY AFTER it has dried thoroughly. If more than one pass is required, wait 15-20 minutes between passes to allow foam to fully expand before applying the next layer.

TIP: It is best to have only one experienced volunteer do the spray foaming.

7. Use spray foam to fill the following areas:

   a. The gap between the exterior door jambs and the door framing (rough opening). Fill in multiple passes (waiting 15-20 minutes between each pass) to allow foam to fully expand before applying the next layer. Continue filling until FULLY EXPANDED foam reaches the inside edge of the framing. Trim any excess foam ONLY AFTER it has dried thoroughly.

   b. Around the range plenum duct exit to the exterior. Seal as much gap between the bottom of the plenum duct and the foamboard as can be accessed from inside the house. The gap will be spray foamed again from outside the house before the vent cover is installed later in the build cycle.

   c. The gap in the sub-floor around the perimeter of cold air return boots.

8. Use air sealing tape, air sealing caulk or spray foam to seal perimeter gaps between foamboard covering exterior door and window headers. If foamboard is tight to component framing (no gaps), seal with air sealing tape. If gaps are less than ¼", seal with air sealing caulk. If gaps are greater than ¼", cover perimeter with air sealing tape, poke holes every 6 – 8" and seal with spray foam. Do not remove the tape.

9. Apply CLEAR FINISH CAULK (stored with the finishing supplies) to the inside joint between the sub-floor and inside edge of each exterior door threshold plus the inside bottom perimeter of both adjoining door jambs.

12.3.2. Basement Level

1. Use air sealing caulk to fill the following areas:

   a. All holes in wall and ceiling electrical boxes. Use a flashlight or headlamp to check filled holes. Re-seal where light penetrates through holes.

   b. All holes in the top plates on interior and exterior walls.

2. Use air sealing caulk or spray foam to fill the areas listed below. Unless specified, use air sealing caulk for gaps less than ¼" and spray foam for gaps greater than ¼"

   a. All holes in exterior wall studs.

   b. All sillbox penetrations such as dryer vent, plumbing pipe, gas line, etc.

3. Use spray foam to seal the following areas:

   a. The gap in the sub-floor around the perimeter of the cold air return boots. Fill the gap from the main floor first. Once the foam has expanded, fill from the basement to ensure a complete perimeter seal

   b. The sub-floor opening under the tub. If the plumber has run drainpipe and water lines for the tub, cover the sub-floor hole for the bathtub plumbing with scrap OSB from the basement side of the drain, fasten with several 1¼" sheetrock screws, and seal tight with spray foam from the main floor side of the drain.

   c. All gaps between the top of the foundation wall foamboard and the wall upper plate.

      REQUIREMENT: This is a Building Code and a Focus on Energy New Homes program requirement.

   d. If there is a 6" bath fan vent duct (for a future bathroom) exiting through the sill box, use spray foam to seal the vent perimeter around the sillbox foam-board. Push a garbage bag into the duct from the inside (see Figure 12-1). Completely fill the duct and the sill box around the vent with fiberglass insulation (see Figure 12-2).

Figure 12-1. Plastic Bag Inserted Into Future Fan Vent Duct.

Figure 12-2. Insulation Filled Around Future Fan Vent Duct.

4. Install fiberglass insulation in all sillboxes. For long walls, cut insulation into 19" lengths, rotate 90°, then cut these in half to yield two 11.5" x 19" pieces. For short walls, cut to 32" lengths, rotate 90°, then cut these in half to yield two 11.5" x 32" pieces. Install tight to the rim board. Do not compress. Manipulate insulation to cover sillbox corners.

12.3.3. HVAC

1. Secure every in-floor heating duct to the OSB sub-floor by nailing it with two white soffit nails – one at each end (see Figure 12-3). Prior to nailing, adjust the duct up or down as needed so the top edge is flush with the top of the sub-flooring or slightly below. Add extra nails to duct sides if gaps between the sub-floor cutout and the duct are greater than ⅛".

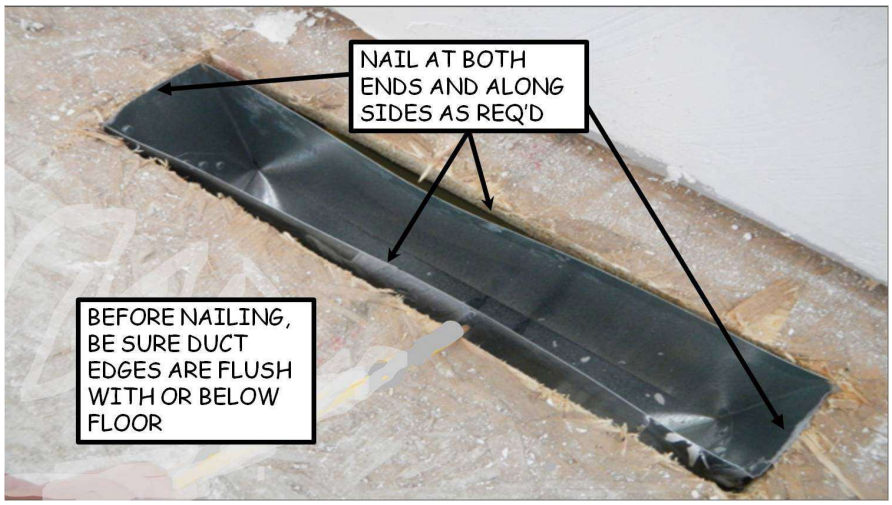

Figure 12-3. Securing In-Floor Heating Duct.

2. Seal gaps between in-floor heating ducts and OSB sub-flooring with 6" wide HVAC tape. (Use two side-by-side pieces if the roll is less than 6" wide.) Cut the tape 3" longer than the duct width. **Make sure the area is dust free before applying the tape.** Remove the peel strip, center the tape over the duct and apply

wrinkle-free to the OSB. Make a cut down the center of the tape (long direction), stopping 1" short of each duct side. Make four short diagonal cuts from each corner to each end of the center cut, (e.g. cut looks like this [>----<]. If a gap exists between the duct and the floor, pull the long sides of the duct outward to contact the sub-floor cut-out, then fold the cut ends down and seal to the duct (see Figure 12-4).

Figure 12-4. Sealing In-Floor Heating Duct.

3. Install the temporary floor vent covers into the newly sealed floor vents.

   WARNING: Covers should be installed after taping to prevent ladder accidents.

4. Seal the joints between the cold air return ducts and the cold air return boots with HVAC tape. Try sealing the outside surface of the joint first, which is accessed from the basement. If this is too difficult to reach, seal from the inside. Cut tape into 3" wide pieces, 4"-6" long and apply to the joint in shingle fashion (see Figure 12-5).

Figure 12-5. Sealing Cold Air Return Joints

12.4. INSTALLING INSULATION IN WALL CAVITIES

1. Before insulating exterior walls with fiberglass batt insulation, check behind all exterior wall electrical outlets to ensure insulation is installed behind all these boxes. Foamboard insulation can be installed behind all outlets except the kitchen sink base cabinet outlet and the outlet above the stove. These outlets must be insulated with fiberglass insulation. See Section 12.3.1.2.c. for instructions on installing foamboard behind exterior wall outlets.

2. Insulate all outside walls with (R-21) fiberglass batt insulation. Install loosely, never pack it in. Batt type insulation performs best when installed properly. Failure to seal all air leaks can cause the insulation to lose up to half of its insulation R-value.

3. While installing insulation, check to make sure the top of the insulation batt is tight to the bottom of the wall upper plate. The gap shown in Figure 12-6 is excessive and results from the batt sliding down slightly during installation.

   TIP: To prevent the air gap shown in Figure 12-6, lift up the batt and hold it so its top is about 1" above the bottom of the upper plate before tucking in about 2' of each of the sides. Then tuck the top of the batt underneath the top plate.

Figure 12-6. Air Gap Between Insulation and Upper Plate.

4. Insulate around vertical PVC piping by cutting a batt into two pieces, such that the cut is directly behind the center of the pipe. Place the insulation behind the pipe and split the length along each side of the cut slightly to cover the pipe. If the pipe has a horizontal run, make another cut behind the horizontal section and split to cover.

5. Failure to fluff the insulation in the wall cavity, or compressing it as little as an inch, can significantly reduce its insulation value.

6. Split the batt in half to fit it around electrical wires (see Figure 12-7).

Figure 12-7. Insulating Around Electrical Wires.

7. For those areas where the batt needs to be "cut to size", cut the batt ¾" larger than the size of the area.

   EXAMPLE: If an area is 18" x 30", cut the batt to 18¾" x 30¾".

8. Cut out around electrical boxes, as tightly to the box as possible (see EXAMPLE below and Figure 12-8).

   EXAMPLE: If the box measures 4" for the height, 3" for the width and 3" for the depth, cut out the insulation only to that size. Be sure to install insulation behind the box.

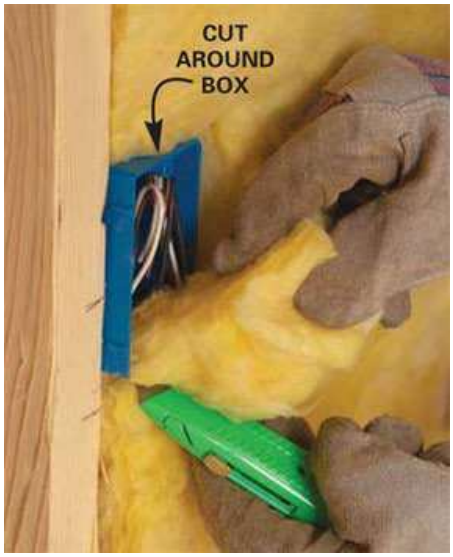

Figure 12-8. Insulating Around Electrical Box.

9. Do not insulate any ceiling areas.

10. **Do not cover thermostat and doorbell chime wires with insulation.** Feed them through the insulation, at the height they are attached to the studs, so they are visible for the crews installing vapor barrier and sheetrock.

    NOTE: The chime wire is typically located above the thermostat wire.

11. If the bathroom vanity light is not running through an electrical box, feed the wire through the insulation (so it visible at the height it is attached to the stud) and leave it hanging in the stud bay. The electricians will drill a hole later and fish out vanity wire through the wall rock.

12. Take time to ensure insulation is fluffed/pulled out so it is flush to the interior face of the wall studs. Make sure insulation fills the entire space from top plate to bottom plate and from stud to stud. The sharp end of a pencil inserted into the edges of the insulation works well to fluff the batts.

13. Place extra pieces of batt insulation around the outside of tub enclosure for additional sound barrier.

12.5. INSTALLING POLY VAPOR BARRIER

12.5.1. General Poly Installation Rules

1. Minimize the number of staples (more is not better) to reduce the number of holes in the poly. An adequate stapling interval is 2'.

2. Use air sealing tape to seal any holes or punctures in the poly.

3. All poly overlaps must cover two studs (including corner stud) or trusses.

4. BEFORE STAPLING CORNERS at wall intersections, be sure to "tuck" poly COMPLETELY into the corners and tight to the framing or blocking. Use a hand stapler to push the poly into the corners before stapling. A folded poly corner not cleanly conforming to the shape of the corner framing and may result in a tear that will compromise the barrier or could break off a corner of the sheetrock upon installation. More details on stapling are included in Section 12.5.4.

5. Use nominal 12' wide poly for ceiling areas; 8' wide poly for walls.

6. Install all ceiling poly before installing wall poly.

7. After installing poly, cut an X across corners of each electrical box. Cut slightly smaller than the inside of the box (staying ¼"–½" away from the corner) and push the poly up ½" around the outside of the box for a snug fit. Pushing the poly up keeps it out of the way of the spiral saw bit. TAPE WITH AIR SEALING TAPE ONLY IF THE FIT IS NOT TIGHT.

12.5.2. Installing Ceiling Poly Vapor Barrier in Bedrooms and Bathrooms

1. Install poly in bedrooms and kitchen/dining/living room first. Bathrooms, closets and hallway areas are generally completed last, often utilizing scrap pieces of poly.

2. Create a reference chalk line on the bottom of the trusses. A reference line is used to keep the poly straight during installation, and to ensure a nominal 6" poly covering along the top of all walls. Determine the width (parallel to the trusses) of the ceiling area to be covered with poly. Divide this measurement in half and make a midpoint mark on the bottom of both end trusses in the room. Snap a chalk line between the marks.

3. Measure the width of each room to determine the best utilization of the poly. In general

    a. If the room width is > 10', cut the poly 1' longer than the room width (parallel to the trusses). Fold the cut length of poly in half. Use a felt marking pen to draw a straight, continuous line across the fold. Unfold the layers underneath this line and extend the line across all folded layers. This poly line will be used to align the poly to the reference chalk line created in Step 2 above.

    b. If the room width is < 10', cut the poly 1' longer than the room length (perpendicular to the trusses). Use the factory crease line down the middle of the 12' wide sheet to align the poly to the reference chalk line created in Step 2 above.

4. Begin installation at room center, at an exterior wall that is parallel to the trusses. Unfold the poly sheet, and at the poly reference line, or the center crease line, grab the poly in a cape-like (or tent-like) fashion, behind the shoulders, and walk it up a step ladder to the ceiling. Extend the poly forward so it hangs down the top of the wall about 6" and align the poly reference/crease line to the reference chalk line. Starting at one end, staple at room center. Add one additional staple on each side of center. Continue down the center toward the opposite wall, making sure to align the poly reference/crease line with the chalk line, stapling the center area only with three staples per truss.

5. Once the center is stapled, use push brooms to support the poly and keep it tight while stapling toward the walls. Verify that at a minimum, the top and upper plates of all walls are completely covered with ceiling poly.

6. The wall portion above closets with flush sliding door headers should be completely covered with ceiling poly. Because these areas are exposed to the exterior wall, they require a vapor barrier.

    a. Extend poly down from the ceiling to cover the header, then staple the poly to the top plate, header and jack stud. Trim any extra poly along the bottom of the closet header with a utility knife, or the extra can be wrapped around to cover the inside of the header (see Figure 12-9).

Figure 12-9. Extend Ceiling Poly to Cover Flush Closet Header.

b. Slit the poly that extends beyond the closet along the front corner of the 25" closet wall, extend it back toward the interior wall and staple it to the trusses. Fold the poly at the corner where the header meets the exterior wall and tape with air sealing tape.

NOTE: There is no blocking around the exterior wall end of headers supporting flush sliding doors, so these corners cannot be stapled unless there is an exterior stud very close to the header. Make sure the unstapled poly corners are loose enough to allow installation of sheetrock without stretching the poly.

c. Use a separate piece of ceiling poly on the inside of bedroom closets. Make sure the piece is large enough to extend at least 6" down the back and sides of the closet, and if the inside of the closet header is not wrapped per Section 12.5.2.a to completely cover the inside front down to the bottom of the header. Fold and staple all inside corners tight to the framing.

7. If the poly length is insufficient to cover the entire ceiling area of a room, cut an additional piece and overlap the seam a minimum of two trusses. Make sure to include this overlap and the 6" extension down the wall in the measurement prior to cutting. Center the overlap end of the new poly piece on the bottom chord of the truss, complete the stapling, then tape the seam along the truss chord with air sealing tape to ensure a good seal.

NOTE: All ceiling poly seams should be parallel to the trusses, with the exception of outside corners, support posts, entry areas into bedrooms, etc.

8. Tape all ceiling seams with air sealing tape.

   NOTE: When taping the ceiling poly where two intersecting walls and the ceiling meet to form a corner, make sure the poly is tucked tightly into the corner so the poly does not interfere with the installation of ceiling sheet rock.

9. After covering the bathroom ceiling, cut the poly over the bath fan by slicing through the poly along the inside edge of the fan housing with a utility knife. Seal the air gap by attaching the poly to the fan housing perimeter using air sealing tape.

10. If the house has a scuttle, cut an X opening for the scuttle hole, wrap poly around rough opening and staple to the scuttle framing. Trim any excess.

12.5.3. Installing Ceiling Poly Vapor Barrier in Kitchen/Living Rooms

1. Create a reference chalk line 72” in from the exterior long wall by marking the bottom of the trusses located at opposite ends of the room and snapping a continuous chalk line between these marks.

2. Measure the room width (parallel to the trusses) at one end of the room. Unwind the poly from the bottom of the roll and cut off a length 1’ longer than the measured room width with a utility knife. Do not unfold the poly at this point.

3. Create a reference line on the top of the folded poly. Using a felt marking pen, draw a straight line across the top of the folded poly using a T-Square, 78” in from one end. Then carefully unfold the poly around the reference line area and extend the reference line across the entire unfolded width of the poly.

4. Orient the 78” referenced end toward the exterior long wall used to create the reference line in Step 1 above. Unfold the entire length of the cut poly sheet.

5. Begin installation on the 5th or 6th truss in from an exterior wall, depending on the spacing of the first truss to the wall. Measure the distance from the bottom of the 6th truss to the exterior wall and add 6”. If the 12’ poly is too short to completely cover both the top and upper plates from the 6th truss, start installation on the 5th truss.

6. Lift the poly up to the starting truss and align the poly reference line with the chalk line. Align one factory edge along the back edge of the truss and staple directly under the chalk line. Aligning the reference line on the poly to the chalk line will keep the poly straight and ensure a nominal 6” of poly extension down the top of the bearing walls as the poly is installed. Add one additional staple on each side of the line. Continue stapling down the reference line toward the opposite end while

superimposing the reference line over the chalk line. **Staple the entire sheet width along the poly line first**, then staple outward toward the bearing walls.

7. Use push brooms to support the unstapled poly and keep it tight while pulling the poly toward the walls. Continue stapling every 2'.

8. Continue with more pieces until the room is completely covered. Measure the room widths required and mark a reference line 78" from the utility knife cut end of each additional piece. All additional poly sections must overlap the previous poly a minimum of two trusses. Center the overlap end of the new poly piece on the bottom chord of a truss, complete the stapling, then tape the seam along the truss chord with air sealing tape.

9. When extending ceiling poly around an outside corner (e.g., around a corner leading into a hallway or a closet corner), align the main portion so it hangs parallel to the wall, as shown in Figure 12-10. Cut straight down from the top corner about 1" to the left side of the corner and peel back to create a convenient flange for tape sealing the corner area. Tape all outside corners where poly does not cover the joint between the upper and top plate.

Figure 12-10. Extending Poly Around a Corner.

12.5.4. Installing Wall Poly Vapor Barrier

1. Before installing wall poly, verify the centers of all stud locations are marked on the floor with a RED CRAYON. Mark any missing stud center references.

2. Poly should be installed on each exterior wall, plus wrapped around the corners of an intersecting wall to the first stud in from the corner. Measure the length of the exterior wall to be covered, plus the length required for each intersecting wall segment to be wrapped. Add one foot to this measurement to ensure sufficient length to wrap the corners and cut the poly to this length.

3. Start hanging wall poly at the top of a corner where two walls intersect. **Verify a sufficient free length exists to wrap the corner to the first stud on the wall,** but

fasten the free end last. Align the factory cut edge of poly along the top edge of the wall top plate. Staple along the top plate for at least four studs, then continue stapling down these studs to the bottom plate. When this initial four stud section is stapled top to bottom, the corner can be stapled per instructions below. Continue hanging the balance of the poly

4. To staple corners, start from the top of the corner and **staple one stud at a time**. Push the poly into the corner with one hand and staple the poly tight to the EXTERIOR WALL CORNER STUD FIRST with the other hand (see Figure 12-11). Continue down the EXTERIOR wall corner stud, pushing the poly into the corner and stapling down the stud to the bottom plate. After the exterior wall stud has been stapled, move to the top of the intersecting wall corner stud and repeat the process before stapling the free end. Try to keep staples 1" away from the corner to allow the poly to stretch a little without tearing staple holes during sheetrock installation.

   TIP: Folded and stapled corners should be checked early in the day by crew mentors to verify installers understand how to make tight corners. Poly corners not tight to the framing should be pulled out and re-stapled or slit and taped with air sealing tape.

Figure 12-11. Pushing Poly Into The Corner While Stapling.

5. Staple at every stud, plate and window/door rough opening, spacing staples about 2' apart.

6. To install poly around closets without a flush sliding door, wrap the poly around the front closet wall and staple to the Jack or King stud supporting the header. Use a separate piece to wrap the exterior wall corners inside the closet.

7. To install poly around closets with a flush sliding door, cut a 3½"-4" wide "U" shaped slot in the poly to fit around the header, enter the closet and continue wrapping to the first interior wall stud past the exterior/interior wall corner. Staple the corner tight to the framing before completing the attachment to the interior wall

stud in the closet. Use air sealing tape to seal the slot to the folded ceiling poly on each side of the header (see Figure 12-12).

Figure 12-12. Air Sealing Around a Flush Closet Header.

8. After the poly has been installed, remove the poly covering the windows. Cut out the center portion of the poly covering the window with a utility knife, leaving about 2" of poly inside the window frame perimeter. Place these cut-outs in the bathtub for use under paint trays on painting days. At each corner, slit the poly to the frame by making 45° cuts. Wrap the poly remaining around the windows into the rough openings and staple to the framing.

9. At each exterior door, cut poly along the outside edge of the door jamb sides. Roll poly up from the bottom and tape it above the door with a small piece of air sealing tape. This will be unrolled during plastering/painting to help protect the door surfaces and hardware from plaster and paint.

10. When installing poly over loose wires (e.g., bathroom vanity light, thermostat, etc.), push the wire through the poly at its stud attachment height and leave it hanging outside the poly. Seal the hole with air sealing tape if poly is not tight to the wire.

11. Install any unusable scrap pieces of poly (i.e., those less than 36") on any interior wall (except bathroom walls) to minimize waste and reduce contributions to the landfill.

12. Tape all seams that have less than a two stud overlap with air sealing tape.