

SPECIFICATIONS FOR STANDARD ENERGY PACKAGE FIELD PROCEDURES

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SECTION 1- SCOPE

- 1.1 The purpose of this S.E.P. Manual is to provide guidance where the procedures for insulation and sealing of the structure must be clearly defined.
- 1.2 Where any material is identified, the subcontractor providing that material is required to meet the specifications as outlined in this manual.
- 1.3 Where any material or procedure is identified, no alteration or substitution is authorized. If any conflict occurs with local code jurisdictions, such conflicts must be brought to the attention of the Regional Production Manager or Director of Production. A field change shall not be made until the circumstances have been investigated and it has been confirmed that the local code official is within the bounds of his authority.
- 1.4 In such cases, the Regional Production Manager or Director of Production shall provide an alternate specification deemed suitable for the purpose of providing the desired thermal protection. The Regional Production Manager or Director of Production will be responsible for notifying the Mechanical Systems Manager at Architectural Services of all conflicts or substitutions so revisions can be made to this document if necessary.
- 1.5 References in this manual may be made to variation in insulation specification by “Design Conditions”. The “Design Condition” for any NVR Operation is determined by IRC Chapter 11 or IECC climate zones.
- 1.6 Editorial revisions to this document will be submitted through the Product Action Report (PAR) process. Technical revisions and requests for procedure changes will be submitted to the Mechanical System Manager at Architectural Services for discussion at the Architectural Committee Meeting. Changes agreed to by the Committee will be reviewed at the Regional Production Manager meeting.
- 1.7 Refer to drawings SEP-1, SEP-2, SEP-3 or SEP-4 for details specified throughout document.

SECTION 2- FOUNDATION & CONCRETE FLOORS

2.1 FOUNDATION WALLS -- BLOCK

The top course of all block foundation walls shall be cap block, solid block, or filled block.

2.2 FOUNDATION WALL -At Entry Panels to Bi-Level Houses where top course changes size, such as at entry panel openings, both the top course and the last course of full size block must be cap block, solid block, or filled block. **See Detail 2-2 / SEP-1.**

2.3 BRICK TO GRADE - At brick-to-grade situations where brick is in place before framing, the finger space between brick and foundation must be sealed with mortar prior to framing. **See Detail 2-3 / SEP-1. NOTE:** Where brick is applied after framing, air infiltration paper must be in place. (See Section 3.8)

2.4 CONCRETE SLABS - R-VALUE REQUIREMENTS

NOTE: Perimeter insulation requirements may be traded-off using REScheck or REMDesign.

1. Slab on Grade Construction - where all or part of the main living area is slab on grade, the minimum R-Value requirement for slab edge is R-5. **NOTE:** State or local energy codes may require higher R-values (i.e. New York State)
2. Basement or lower levels - when required*, the minimum R-value for slab edge insulation of basements or lower levels is R-5 for all Design Conditions.***See Section 2.6 to determine requirements for basements and lower levels.**

2.5 SLAB ON GRADE PROCEDURE - Perimeter insulation requirements may be traded-off using REScheck or REMDesign.

1. All slab on grade construction shall be insulated to the minimum R-value required above, using rigid board placed at the edge of the slab and either extending 2' down the foundation as shown in **Detail 2-5a / SEP-1**, 2' under the slab as shown in **Detail 2-5b / SEP-1**, or, at monolithic slabs, method 1 or 2 as shown in **Detail 2-5c (A=2'-0")** and **Detail 2-5d (A+B=2'-0")**. Slab edge insulation is also required between the garage slab and living space unless calculations are provided to trade-off this requirement. Refer to **Detail 2-5e / SEP-1** and **Detail 2-5f / SEP-1**.

Note: Notch 4"x4" opening at 4'o.c. in insulation edge to allow for bearing onto foundation or footer.

The top of the slab edge insulation installed between the exterior wall and the edge of the interior slab may be cut at a 45-degree angle away from the exterior wall. Carpet tack strips should be held away from the baseboard by a minimum of 1/2" to avoid cracking the thin portion of concrete over the edge insulation. **Detail 2-5g / SEP-1**

2.6 BASEMENTS OR LOWER LEVELS PROCEDURE

NOTE: Perimeter insulation requirements may be traded-off using REScheck or REMDesign.

1. R-5 slab edge insulation shall be provided for any slab that falls at or above the frost line in areas that are available as conditioned living space. That is, regardless of whether or not

the area is finished by NVR, if it is available as conditioned space from NVR, and the slab falls at or above the frost line, it shall be insulated. **See Detail 2-6a / SEP-1** for the extent of required insulation in sloping grade conditions. **Note:** Notch 4"x4" opening at 4' o.c. in insulation edge to allow for bearing onto foundation or footer.

2. The insulation should be placed at the edge of the slab and extended 2' under the slab as shown in **Detail 2-6b / SEP-1**.
- 2.7 All concrete slabs, in both finished and unfinished areas including basements, shall have a 6-mil polyethylene vapor barrier installed between fill and concrete. Coverage must be complete and poly should overlap by 12" min. Poly not required in garage area unless by local code.

SECTION 3- FRAMING

- 3.1 SILL SEALER - Listed below are the specific joints that require the application of sill sealer.
1. Under the mud sill, **Detail 3-1a / SEP-1.**
 2. Between the foundation or concrete kneewall and the frame kneewall, **Detail 3-1b / SEP-1.**
 3. Under full height exterior wood wall, slab or walkout panels, **Detail 3-1c / SEP-1.**
 4. Under garage common wall that goes from a conditioned to an unconditioned space, **Details 3-1d / SEP-1. Note:** Seal any gaps at sill sealer with adhesive or foam.
- 3.2 ANGLE BAY INSULATION - Framing carpenter is responsible for installing insulation, kraft side up, in areas that are not accessible after framing. Framers to leave joist bays in angled deck areas accessible per **Details 3-2a, b, c, and d / SEP-1. NOTE: Insulation to be provided by builder.**
- 3.3 HOUSE WRAP – GENERAL
1. House wrap shall be installed per the manufacturer’s specifications and per sections 3.3 through 3.9. Starting 2’ from the corner at the lowest point of the house, secure the house wrap with capped nails or minimum 1” crown, ½” leg staples. Roofing nails, siding nails, or the practice of holding paper in place by siding corners, soffit, etc., is not acceptable. Wrap the house wrap around the corner and continue fastening at each stud and 6”o.c. or per manufacturer’s guidelines.
 2. House wrap is to be a continuous plane over the entire exterior surface of the house to the eaves and under all fascia boards and brick lookouts including exterior walls concealed by garage or morning room roofs. Install house wrap “shingle-lap” fashion (with the higher piece lapped over the outside of the piece below. All horizontal overlaps of house wrap should be at least 2 inches and 6 inches for vertical overlaps. Seams/joints between overlapping layers should be taped or sealed to provide continuity. At roof sections, lap the house wrap over the entire top of any stop flashed areas against the wall.
 3. Repair all tears and holes in house wrap with flashing tape and house wrap as required. All damaged house wrap shall be repaired or replaced prior to siding installation.
- 3.4 RING AND END JOISTS AT FOUNDATION - House wrap to be placed over all exterior panels or field framed walls. This material shall be installed to cover ring joist and mud sill as shown in **Detail 3-5 / SEP-1.**
- 3.5 RING & END JOISTS (Other than at Foundation) - House wrap shall be installed in accordance with **Detail 3-6 / SEP-1.**
- 3.6 AIR INFILTRATION PAPER – CANTILEVERS - Plant will install 36" air infiltration paper to top of wall panel below (Field apply with stick framing). Paper must be stapled to the bottom edges of the floor joist and to the face of the ring. (Folded square at corner joint). House wrap to be placed over the upper panel and pulled down over the ring and fastened per **Details 3-2d / SEP-1.**

- 3.7 AIR INFILTRATION PAPER _ BRICK TO GRADE – In brick to brick grade or other options that create brick lookout conditions, a separate piece of loose-shipped infiltration paper shall be installed as shown in **Details 3-8a and 3-8b / SEP-1.**
- 3.8 HOUSE WRAP - PANEL JOINTS AND CORNERS - House wrap shall be used to cover all panel joints and all corner joints where sheathing does not lap.
- 3.9 MISCELLANEOUS
1. Plant applied (field applied with stick framing) air infiltration paper shall be used at the bottom of 2nd floor exterior panels or stick framed walls that are adjacent to attic spaces such as garages, porches, morning rooms, etc. per **Detail 3-10a / SEP-1.**
 2. House wrap shall be used at rings and corners of bay windows and fireplace chases. In addition, loose-shipped 36” air infiltration paper shall be installed to the underside of these cantilever areas per **Detail 3-10b and 3-10c / SEP-1.**
 3. Air infiltration paper is required on the ring joist area and panel joints that occur over a contiguous garage. This paper must be applied before garage roof trusses are erected. The rough carpenter must be responsible for installing the paper, as it cannot be applied by any other trade. In addition, care must be exercised to assure the application of air infiltration paper over the cantilevered decks that are enclosed by a porch roof. **See Details 3-10d, e, f, g, h, & i / SEP-1. IMPORTANT** – The areas identified in **Detail 3-10d / SEP-1** are the most commonly overlooked of all requirements for air infiltration paper and are among the most critical in impact. Take extreme care to assure that these steps are followed.
- 3.10 BLOCKING, CONSTRUCTION ADHESIVE - Construction adhesive shall be used at the joints listed below. **Note:** Application of adhesive for item #1 shall be such that a moderate and uniform squeeze out is visible when joint is made.
1. Between floor deck material and the ring and end joist of all floor systems.
 2. Any other joint where daylight is observed or where framing leaves an otherwise unprotected path for air infiltration.
 3. Insulation panel at common wall to mudsill. **Detail 3-1d / SEP-1.**
 4. Adhesive at bottom of ring and mudsill on beam in garage. **Detail 3-10f / SEP-1.**
 5. Block between bottom chords of attic trusses and between joists above common wall to separate conditioned space from unconditioned floor space. **Detail 3-11b / SEP-1.**
 6. Adhesive at bottom plate of panel to sub floor in conditioned space above a garage. **Details 3-10e, 3-10f, 3-10g / SEP-1.**
- 3.11 CAULKING
1. Caulking shall be installed under all window flanges and brick mould.
 2. Entrance Doors, Service Doors, Sliding Doors, Garage Common Wall Doors, and Patio Doors – All doors shall be installed with a bead of caulking under the thresholds and caulk behind brick mould or behind trim of garage common wall doors. **Detail 3-12 / SEP-1.**

- 3.12 AREAS OVER VOIDS IN FRAMING - Areas over voids in framing must be blocked tightly with a suitable material to prevent the passage of air into the attic or the loss of attic insulation into the void. Joints between blocking material and framing shall have a bead of adhesive applied. Areas requiring this procedure include mechanical chases and bulkheads. **Detail 3-13 / SEP-1.**
- 3.13 DRYWALL BACKER - GARAGE COMMON WALLS - Provide drywall clips or drywall backer on garage common walls so that drywall return may be made to first stud in garage per **Detail 3-17 / SEP-2.**
- 3.14 DRYWALL BACKER – CEILINGS - If wood must be used as a drywall backer at gable trusses, the carpenter shall limit the length of material so it will not interfere with ceiling baffle installation per **Detail 3-18 / SEP-2.**
- 3.15 HORIZONTAL BLOCKING - Minimum horizontal blocking shall be used in exterior walls. Horizontal blocking at trusses shall be held a minimum distance of 2'-0" from exterior walls to avoid conflict with ceiling baffles per **Detail 3-19 / SEP-2.**
- 3.16 HEATING DUCT/PLUMBING BULKHEAD – GARAGES - Any bulkhead provided for heating ducts or plumbing in garages shall terminate before reaching the gable wall to avoid entry of air into the end of the bulkhead thru the stud space of the exterior per **Detail 3-20 / SEP-2.**
- 3.17 BASEMENT INSULATION FURRING (WHEN USED AT BLOCK WALLS) - At block walls, 2x2 Basement wall furring shall be installed to allow for 3-1/2" R-11 insulation per **Details 3-21a and b / SEP-2.** As an alternate method, the insulation may be secured using powder actuated fasteners.
- 3.18 ATTIC ACCESS OPENINGS - Attic access openings shall be framed with material that is adequate to retain the type of attic insulation in use per **Details 3-23a and b / SEP-2.**
- 3.19 SHEATHING REPAIRS - Carpenter shall re-nail or re-staple any sheathing that is not securely in place against framing members. Any holes in sheathing shall be repaired by gluing a patch from stud to stud on the exterior per **Detail 3-25 / SEP-2.** **Note:** Adhesive should be used around patch.
- 3.20 SHEATHING REPAIRS - NON-RECTANGULAR WINDOWS - Where brick mould of non-rectangular windows (i.e. round, hexagon, etc.) cannot be sealed to sheathing -- per section 3.10 -- due to oversized routing, voids shall be sealed with pieces of sheathing applied with construction adhesive per **Detail 3-26 / SEP-2.**
- 3.21 OVERSIZE TUBS ON EXTERIOR WALLS - Oversize tub areas located on exterior walls must be insulated by the framing carpenter per the drawings shown in **Details 3-28a and b / SEP-2,** prior to the installation of the deck support framing and/or the oversize tub. **Note: Insulation provided by Builder**
- 3.22 LARGE VOIDS IN FRAMING - In all construction, judgment must be exercised as to when large or unusual voids may require alternate means of closure. Typical examples are as follows:
1. Unusually wide panel joints due to foundation irregularities.

2. Pre-established tolerance voids such as townhouse fire separation walls to main framing joints, garage common wall to foundation joints, etc.
3. Recommended practice is as follows:
 - a) Joints less than 3/8" wide - use construction adhesive (or foam sealant).
 - b) Joint greater than 3/8" wide:
 - (a) Rip a slightly wedge shaped block of 1" material to best fit, then glue into place per **Detail 3-29 / SEP-2**.
 - (b) Cover joint with house wrap on the exterior.
- 3.23 TOWNHOUSE FLOOR DECKS - Joints between fire separation walls or closure panels and decks of townhouses must be sealed tightly at front and rear wall to prevent air from entering space between the decks and fire separation wall. Use adhesive and filler strip as necessary per **Detail 3-31 / SEP-2**.
- 3.24 DOOR AND WINDOW WITH FLASHING TAPE - Framers to install flashing tape in proper sequence as shown in **3-33 / SEP-2**. Refer to standard company details and manufacturers guidelines for more information.
- 3.25 MECHANICAL CHASE – Provide an air barrier such as house wrap, air infiltration paper, or FS-25 along inside edge of exterior wall of mechanical chases as shown in **8-28 / SEP-3**.

SECTION 4- WIRING PHASE

- 4.1 This includes Security, Intercom, Cable, Telephone, Network, and Electricians.
- 4.2 All electric boxes installed in exterior walls or in ceilings under unconditioned spaces (i.e.: attics) shall be plastic.
- 4.3 All wiring installed in walls, which will be insulated, shall be routed to minimize compression of insulation. Holes in top and bottom plates shall be drilled as close as possible to sides of studs. Horizontal wires shall be run as shown in **Detail 4-2 / SEP-2**.
- 4.4 Wiring running through cathedral ceilings (or any ceiling where the batt insulation is used) shall be routed to allow a minimum of 12" clearance from the bottom of truss chords. Wiring shall exit ceiling boxes vertically to maintain this clearance and shall be stapled to webs if necessary to maintain this clearance. **See Detail 4-3 / SEP-2**.
- 4.5 Exterior wall cavities including garage common walls shall not be used for multiple wires. Wires running to panel boxes shall be routed through interior panels where possible. Garage separation walls may be used for multiple wires if nailers are provided to form a wire chase behind the insulation (**Detail 4-4a / SEP-2**). Insulation is required in the furred wall as shown in **Detail 4-7 / SEP -2**. The furred wall shall be finished with drywall.
- 4.6 CAULKING OR FOAM SEALANT (May be completed as part of Section 7 "Foam Sealant Phase" per division) - The following holes shall be sealed with caulking or foam sealant. Sealant shall be packed tightly into holes so that no openings are visible around wires. **IMPORTANT:** Holes in exterior walls must be sealed from the inside. Exterior walls include any wall between conditioned and unconditioned space such as garage common walls and finished attic kneewalls. Exterior caulking alone is not adequate (*items h,i,j).
1. Holes where wire enters box, exterior walls only.
 2. Wires in all top and bottom plates in exterior wall.
 3. All interior partition top plates where wire enters into attic space.
 4. All holes in ceiling light boxes.
 5. All holes in electrical boxes for weather proof boxes.
 6. Wiring holes in bottom plates in interior partitions when wire enters integral garage ceiling or an unconditioned crawl space.
 7. Holes at end studs of interior partitions that intersect with exterior walls.
 8. Holes where entrance cable enters house.*
 9. Holes where air conditioner wires exit house.*
 10. Holes where wires exit sheathing for exterior fixtures in brick veneer.*

11. All holes in sheathing around exterior electric boxes must be sealed with caulking or foam sealant per **Detail 4-6 / SEP-2.**
- 4.7 **PANEL BOXES IN CONDITIONED SPACES** - Panel boxes shall be installed in such a manner to allow full insulation behind. For masonry walls, fur out box by 3-1/2" fill cavity with insulation and finish with drywall. See **Detail 4-7 / SEP-2.**
- 4.8 **PANEL BOXES ON COMON WALLS IN INTEGRAL GARAGES** - In areas where wiring enters the ceiling where panel boxes are installed in integral garages, a wiring chase shall be formed with 2x4 material to allow drywall to extend from ceiling to top of box. See **Detail 4-8 / SEP-2.**
- 4.9 **RECESSED CEILING LIGHTS/ SPEAKERS** - Recessed lights in insulated ceilings shall be IC Rated Fixtures that have passed the ASTM E-283 Test for Air Leakage. Speakers shall be installed with an air tight box in insulated ceilings. See **Detail 4-9 / SEP-2.**

SECTION 5- HEATING PHASE

- 5.1 HEATING DUCTS - INTEGRAL GARAGE CEILINGS - Heating ducts installed in joist spaces of integral garage ceilings shall be rectangular, circular or oval in shape to allow the installation of R-13 insulation with 8" floor joist, R-19 insulation with 10" floor joist or 9 1/4" I-joists, and R-30 insulation with 11 7/8" or 14" I-joists kraft face down without compression. When insulated flex ducts are used, insulator will fill remainder of joist bay solid with batt insulation as required without compressing.
- 5.2 HEATING BOOTS - 12" - 16" CANTILEVERS - Heating boots shall not be installed in 12" or 16" cantilevers, but shall be installed with rear of boot at edge of wall below. **See Detail 5-2 / SEP-3.**
- 5.3 HEATING BOOTS - 24" CANTILEVERS - In 24" cantilevers or other situations where heating boots must be installed in cantilevers, a rectangular or oval duct shall be used to allow a maximum thickness of insulation to be installed with air barrier stapled behind and around the boot per **Detail 5-3 / SEP-3. IMPORTANT** – HVAC Contractor must place R-30 batt and air barrier as shown. See Section 8.17 for additional detail.
- 5.4 TRUNK DUCTS - Trunk ducts in unconditioned areas shall be fiberglass or insulated sheet metal. Where duct work is installed in an attic, ducts shall be routed and supported 14" above the bottom of truss chords. As a regional option, ducts may be located within the ceiling insulation. **See Detail 5-4 / SEP-3.**
- 5.5 TRUNK & BRANCH DUCTS – SEALING TAPING - All joints in trunk ducts and branch ducts - supply and return - shall be completely taped with UL 181 tape or painted w/ mastic. All branches will use take off fittings. (Hand notched Dove tail tap connections without flanges not permitted). All riveted boot joints shall be sealed w/tape or mastic.
- 5.6 REFRIGERANT LINES - Hole where refrigerant lines exit building, shall be sealed with caulking or foam sealant from the interior of the framing in addition to caulking or duct seal used around hole in siding. **Note:** Lines must never be run in an exterior wall. This can be completed as part of Section 7 the Foam Sealant Phase per division.
- 5.7 EXHAUST FANS - Exhaust fan ducts must exit building through designated roof jack or ring joist per design. Holes in ring around duct shall be sealed with caulking or foam sealant from the interior. **Note:** Any exhaust fan duct vented through unconditioned attic shall be insulated. This can be completed as part of Section 7 the Foam Sealant Phase per division.
- 5.8 DRYER VENTS - Holes for dryer vents shall be sealed with caulking or foam sealant from the interior. Vent pipe shall be temporarily covered with duct tape over the opening from the inside. **Note:** This can be completed as part of Section 7 the Foam Sealant Phase per division.
- 5.9 TOP OF DUCT OR FLUE CHASES - The top of any duct or flue chase where open to the attic, must be covered with a tight fitting firestop. No gaps or cracks shall be permitted in these fire stops. **See Detail 5-11 / SEP-3.**
- 5.10 FURNACE FLUES - Flues for gas furnaces shall be wrapped with 3-1/2" R-13 unfaced batt where flue enters the attic and shall extend a minimum of 14" above the ceiling line. **NOTE:** Required only if cellulose ceiling insulation is to be used

- 5.11 DUCT SYSTEMS IN CRAWL SPACES - All duct penetrations through sub-floor shall be sealed with caulking or adhesive per **Detail 5-13 / SEP-3**.
- 5.12 DUCT SYSTEMS IN UNCONDITIONED ATTIC SPACES – All duct penetrations through the ceiling shall be sealed with caulking or adhesive per **Detail 5-4 / SEP-3**.
- 5.13 CLOSED CRAWL SPACES
 - 1. Install air supplies as shown on Mechanical Plans. All ductwork must be insulated and all crawl supplies must have back flow dampers installed.
 - 2. If plans are not available, provide 50 CFM per square foot of crawl area. Install a minimum of one supply for every 1000 ft² of crawl area.
 - 3. Only heat pumps or direct vent furnaces should be installed in closed crawl spaces.

SECTION 6- PLUMBING PHASE

- 6.1 TUB/SHOWER AREA - FIBERGLASS ASSEMBLIES (FULL SURROUND) - Where a complete fiberglass shower enclosure is installed with either the back or any end against an outside wall, the exterior wall shall be insulated with R-13 insulation (un-faced) and an air barrier shall be face stapled to the inside face. **See Detail 6-1 / SEP-3.**
- 6.2 TUB /SHOWER AREAS – CERAMIC TILE - Where a steel or fiberglass tub is installed with ceramic tile surround, the wall shall be insulated with R-13 insulation (un-faced) and an air barrier shall be face stapled to the inside face of the wall adjacent to the tub. **See Detail 6-2 / SEP-3.**
- 6.3 ROUTING OF VENTS AND DRAINS - Where possible (code permitting), vent and drain lines shall be routed to interior partitions to avoid installation in exterior walls. Where exterior wall locations are unavoidable, but a transition from exterior to interior walls is practical between floors, it shall be done. **See Details 6-4a and b / SEP-3.**
- 6.4 SEALING OF HOLES (May be completed as part of Section 7 “Foam Sealant Phase” per division) - The following holes around pipes or vents shall be sealed with caulking or foam sealant:
 1. Where vents pass through top plates into attic.
 2. Holes in sheathing or framing where hose bibbs penetrate. **NOTE:** Pipes to be secured at point of exit to prevent movement during operation. Seal from interior.
 3. Where gas line enters building - seal from interior.
 4. Any other penetrations for plumbing related purposes shall be sealed from interior.

SECTION 7- FOAM SEALANT PHASE

7.1 GENERAL - By division option, various sealing responsibilities listed in carpentry and mechanical phases in sections 3 thru 6 may be transferred to a foam sealant phase. Specifications for a foam sealant phase are as follows and as specified in sections 3 thru 6. Upon completion of mechanical and prior to insulation stage, expansive closed cell urethane foam shall be applied to the areas listed below. **NOTE:** All penetrations through exterior walls are to be sealed from the inside of the exterior sheathing.

1. Joint of base plate to concrete slab.
2. All vertical panel joints.
3. All holes in top plates where wires enter attic space.
4. All holes in bottom plates where wires enter integral garage or crawl space.
5. All holes where electric wires enter electric boxes on exterior or garage common walls.
6. All holes where electric wires enter electric boxes for ceiling fixtures or fans.
7. All holes around electric boxes mounted in exterior sheathing (for outdoor light or receptacles).
8. All holes where plumbing lines penetrate top plates into attic areas (water, vent, or gas lines).
9. All holes where plumbing lines penetrate bottom plates into integral garages or unconditioned crawl spaces.
10. All holes where plumbing lines penetrate exterior walls (water, vent, or gas lines).
11. Dryer vent or exhaust fan duct penetrations through top plates or exterior walls.
12. All holes where refrigerant lines penetrate top plates or exterior walls.
13. Any holes in end stud adjacent to exterior walls.
14. Seal anywhere that daylight is visible thru rough framing.
15. Blocking in garage at 2nd floor rim (3-sides).

SECTION 8 ---- INSULATION

8.1 MATERIAL SPECIFICATIONS

The following list identifies the type and R-value of insulation to be used at various areas of the home. Insulators shall provide materials to these specifications. Section numbers indicate the section of this manual that provides details of installation.

INSULATION MATERIAL	USE	SECTION
R-5 (1" Thick-may vary) Rigid Foam Insulation	<ul style="list-style-type: none"> • Slab perimeter edge 	2.4, 2.5, 2.6
R-11 (2" Thick-may vary) Rigid Foam Insulation	<ul style="list-style-type: none"> • Masonry walls in full closed crawl spaces 	9.1
R-11 Perforated FS-25 (Flame Spread)- Or Equivalent (3 ½" Thick)	<ul style="list-style-type: none"> • Masonry walls in basements (including walls at garage) • Masonry walls in partial closed crawl spaces • Masonry walls in fireplace chases 	3.17, 9.4, 9.5 9.1 8.25
R-13 Kraft-faced (3 ½" Thick)	<ul style="list-style-type: none"> • All 2x4 exterior walls including finished attics and truss walls at cathedrals. • Garage Common walls • Cathedral Ceiling knee walls adjacent to an attic • Under heating branch ducts in garages w/2x8 floor system • Fireplace studded wall above masonry opening • Wall attic or concealed space access doors and panels • Finished Basement stud walls when vapor barrier required by code. 	8.4, 8.22, 8.31 3.1, 3.13, 8.1, 11.4 8.22 5.1, 8.18 8.26 12.5 8.1, 9.6
R-13 Unfaced (3 ½" Thick) w/ FS-25 (Flame Spread) Covering Or Equivalent	<ul style="list-style-type: none"> • 2x4 Exterior stud walls in unfinished basements • Exterior stud walls of fireplace enclosures • Ring Joists and End Joists when exposed to unfinished areas 	9.7 8.26 8.13, 8.14, 8.15
R-13 Unfaced with <i>no</i> vapor barrier (3 ½" Thick)	<ul style="list-style-type: none"> • Behind ceramic tile on exterior walls • Behind fiberglass tub/shower enclosure on exterior wall • Finished Basement stud walls when no vapor barrier required per code (2006 IRC) • Gas furnace flue wrapping where flue enters attic 	6.2 6.1 8.1, 9.6 5.10
R-19 Kraft Faced (6 ¼" Thick)	<ul style="list-style-type: none"> • Floors over vented crawl spaces. • Under heating branch ducts in garages w/10" joists or 9 ¼" I-joist floor systems • Garage ceiling below living area w/2x8 floor system (Hold tight to underside of sub-floor) • All 2x6 exterior walls 	9.2 5.1, 8.18 8.12 8.1
R-19 Unfaced (6 ¼" Thick) w/ FS-25 (Flame Spread) Covering Or Equivalent	<ul style="list-style-type: none"> • 2x6 exterior stud walls at unfinished basements 	9.7

SECTION 8 ---- INSULATION

8.1 MATERIAL SPECIFICATIONS (cont'd)

The following list identifies the type and R-value of insulation to be used at various areas of the home. Insulators shall provide materials to these specifications. Section numbers indicate the section of this manual that provides details of installation.

INSULATION MATERIAL	USE	SECTION
R-30 Unfaced (9 ½" Thick)	<ul style="list-style-type: none"> • Cathedral ceilings with soffit venting • Any vented ceiling not accessible for blown insulation • On top of fireplace fire stops • Portions of coffered / tray ceilings 	8.20, 8.21 8.20, 8.21 8.25 8.24
R-30 Kraft Faced (9 ½" Thick)	<ul style="list-style-type: none"> • Cathedral ceilings with no soffit venting • Hip roof corners • Ceilings of bay windows and unvented roofs of room extensions • Under heating branch ducts in garages w/ 11 7/8" or 14" I-joist floor systems • Cantilevers w/ 2x10 or 9 ¼" I-joist floor systems • Ceiling attic/concealed space access panels and pull down stairs • Garage ceiling below living area w/ 10" joists or 9 ¼" I-joist floor systems • Fire sprinklers in attic • Vented sloped and flat ceilings at finished attics 	8.20, 8.22 8.28 8.20, 8.22 5.1, 8.18 3.2, 3.6, 8.17 12.1, 12.6 8.12 8.29 8.31
R-30 Loose Fill Fiberglass or Blown Stabilized Cellulose	<ul style="list-style-type: none"> • Flat ceilings in attic areas 	8.30
R-38 Kraft Faced (12" Thick)	<ul style="list-style-type: none"> • Garage ceiling below living area w/ 11 7/8" I-joist floor systems • Cantilevers w/ 11 7/8" I-joist floor systems 	8.12 3.2, 3.6, 8.17
R-19 Kraft-faced up (6 ¼" Thick) with R-30 Unfaced (9 ½" Thick)	<ul style="list-style-type: none"> • Garage ceiling below living area w/ 14" I-joist floor systems • Cantilevers w/ 14" I-joist floor systems <p>NOTE: R-13 kraft face out at ring joist, R-19 kraft face up against underside of floor, and R-30 unfaced to fill void. Extend beyond sill or wall plate.</p>	8.12 3.2, 3.6, 8.17
R-38 Kraft Faced (12" Thick) with R-38 Kraft Unfaced (12" Thick)	<ul style="list-style-type: none"> • Garage ceiling below living area w/ 24" truss floor systems 	8.12 3.2, 3.6, 8.17

SECTION 8- INSULATION: WALL, FLOOR, CEILING

- 8.1 SIDEWALL INSULATION - The installation of insulation in sidewalls, garage common walls, and finished attic walls shall follow the procedures shown in 8.2 thru 8.11 to avoid compression or the creation of voids between drywall and insulation.
- 8.2 LENGTH OF BATTS - Cut insulation batts 1" longer than stud spaces to prevent compression. **Detail 8-3 / SEP-3.**
- 8.3 WIDTH OF BATTS - Cut insulation for odd width stud spaces 1/2" wider than stud space. **Detail 8-4 / SEP-3.**
- 8.4 FACE STAPLING OF KRAFT OR FOIL FACED INSULATION – WALL ASSEMBLES. (Not required when staple free friction fit insulation is used). In any situation where a Kraft or foil faced batt is used, the insulation shall have the stapling flaps stapled to the face of framing. **See Detail 8-5 / SEP-3.**
- 8.5 When placing batts, fluff if necessary to bring face of insulation to the inner edge of studs.
- 8.6 Trim insulation to fit behind corner studs. Avoid larger pieces that may cause compression or poor fit of batts in the corner.
- 8.7 Cut scrap of insulation approximately 2-1/2" by 4-1/2" to place behind electric boxes. Avoid larger pieces or torn pieces as this causes compression or poor fit of batt around these boxes per **Detail 8-8 / SEP-3.**
- 8.8 Cut insulation batt to fit neatly around electric boxes. REMOVE cutout; do not compress beside box.
- 8.9 AT BLOCKING - Cut strip of insulation for placement behind horizontal blocking or other obstructions. Cut batt for stud space to assure a tight butt joint to the block. **See Detail 8-10a / SEP-3.**
- 8.10 ALTERNATE TREATMENT OF BLOCKING - Split insulation at block to pull the end of the insulation flush to the inner edge of studs. **See Detail 8-10b / SEP-3.**
- 8.11 Avoid compression of insulation by wires or pipes by fitting and/or splitting of insulation as required.
- 8.12 GARAGE CEILINGS WITH LIVING SPACE ABOVE – Kraft faced batts must be installed to completely fill joist bays in garages with kraft face up.
1. R-19 Kraft faced insulation shall be installed (with kraft side up) in garage ceilings with a 2x8 floor system.
 2. R-30 Kraft faced insulation shall be installed (with kraft side up) in garage ceilings with a 2x10, or 9 1/4" I-Joist floor system.
 3. R-38 Kraft faced insulation shall be installed (with kraft side up) in garage ceilings with an 11 7/8" I-Joist floor system.

4. R-19 Kraft faced insulation (with kraft side up) and R-30 unfaced insulation shall be installed in garage ceilings with a 14" I-Joist floor system.
 5. R-38 Kraft faced insulation shall be installed (with kraft side up) and R-38 unfaced insulation shall be installed in garage ceilings with a 24" truss floor system.
- 8.13 RING JOISTS - 15-1/2"x3-1/2" R-13 Kraft faced batts shall be installed at ring joist with kraft facing stapled on all four sides. (Use 23-1/2"x3-1/2" batts for truss joists or any other space wider than standard 16" o.c.) Do not overlook the ring area beneath entry panels. NOTE: If ring joist will be exposed (unfinished area), facing must be FS-25. **See Detail 8-13 / SEP-3.**
 - 8.14 END JOIST - End joist over gable kneewalls or over gable walls of first floors of two story houses shall be insulated as follows: R-13 Kraft faced batts with insulation trimmed to provide a stapling flap, then stapled to top plate of wall or nailer below and to underside of floor. **See Detail 8-14 / SEP-3. NOTE:** This procedure is not used for end joist over masonry foundations (See Section 8.15) or end joist in integral garages. If end joist will be exposed (unfinished area), facing must be FS-25.
 - 8.15 RING JOISTS AND END JOISTS OVER FOUNDATIONS - Use R-13 Kraft faced batts behind ring joist and over top of mud sill and foundation wall to edge of wall insulation. NOTE: If ring joist will be exposed (unfinished area), facing must be FS-25. **See Details 8-15a and b / SEP-3.**
 - 8.16 ANGLE BAY INSULATION – If not installed during the framing phase, install insulation in bay floors kraft side up. Framers to leave joist bays in angled deck areas accessible per **Details 3-2a, b, c, and d / SEP-1.**
 - 8.17 CANTILEVERS at SECOND FLOOR - Kraft faced batts to be installed to fill joist bays in cantilevers with kraft face up per **Details 3-2d / SEP-1.** Cover exposed end with an air barrier such as T-ply or air infiltration paper sealed at four sides.
 - 8.18 GARAGE CEILING OR VENTED CRAWL SPACE CEILING JOIST CAVITIES CONTAINING HEAT DUCTS - Joist cavities containing heat ducts shall be insulated with R-13 with 8" joists, R-19 with 10" joists or 9 1/4" I-joists, or R-30 with 11 7/8" or 14" I joists. Kraft faced batts. On these spaces only -- it is acceptable to install the insulation with the paper down to allow face stapling. When insulated flex ducts are used, fill remainder of joist bay solid with batt insulation as required without compressing. **See Detail 8-18 / SEP-3.**
 - 8.19 INSULATION SUPPORT - Normally, friction fit insulation used in 16" joist spacing is adequate to retain insulation until drywall is applied (typical garage ceiling). If support must be provided, one of the following methods shall be used.
 1. Use fiberglass reinforced, or any other durable type of strapping material, stapled to the underside of joists on 2' centers.
 2. Use spring wire supports (tiger teeth). Spring wire supports shall be installed with the arc in a flat horizontal position to prevent compression or uplifting and separation of the insulation. **See Detail 8-19 / SEP-3.**
 - 8.20 CEILINGS WITH BATT INSULATION – GENERAL - In ceilings where positive soffit ventilation is provided at both front and rear soffits, R-30 unfaced batts shall be used. In

ceilings where soffit ventilation is not possible (i.e. turned gables) R-30 Kraft faced, kraft side down, shall be used.

8.21 CEILING WITH UNFACED BATT INSULATION – INSTALLATION

1. Normally, unfaced batts will require no support and will remain in place until drywall is applied. If support is required, 4" wide strips of infiltration paper, reinforced fiberglass or shipping strap material may be stapled to the underside of trusses on 2' centers.
2. Insulation shall be pushed through truss spaces from below, then pushed or pulled to the bottom of truss to allow top to spread over top of bottom chord. **See Detail 8-21a / SEP-3.**
3. **IMPORTANT** - Insulation should sag slightly below bottom of truss with ends butted tightly together. When drywall is applied, insulation should be resting on the drywall. Under no circumstances should wire rods (such as tiger teeth) be used for cathedral ceilings.
4. Insulation must be cut to fit around all blocking, lath backers or any other obstructions so that when completed no voids will exist between insulation and drywall per **Detail 8-21b / SEP-3.**

8.22 CEILINGS WITH KRAFT FACED BATTS (AS REQUIRED)—INSTALLATION

1. Kraft faced ceiling insulation may be side stapled to trusses. Stapling must be done at the extreme bottom edge of truss chord and insulation shall be pushed down to assure that a minimum void is created at the stapling flange. **See Detail 8-22 / SEP-3.**
2. Unusual components such as triangular panels within dormered windows shall have Kraft faced insulation, faced stapled to furring strips. There shall be no void between the batt and the drywall.

8.23 FILLER PANELS - Kraft faced R-13 batt insulation shall be stapled to studs of kneewalls (filler panels) at cathedral areas that are adjacent to an attic. **See Detail 8-23 / SEP-3.**

8.24 STUDDER TRUSSES (TRUSS WALLS) / TRAY CEILING - Studded trusses adjacent to cathedral ceiling shall have kraft faced insulation face stapled to a point that is a minimum of 10" above the firestop or ceiling line. **See Detail 8-24a / SEP-3.** Where close proximity of a tray ceiling to a roof rafter or truss top chord does not allow sufficient space to blow in insulation, use batt insulation per **Detail 8-24c / SEP-3.**

8.25 BASEMENT FIREPLACES - Foundation walls of fireplace chases shall be insulated prior to fireplace installation. 48" wide R-11 Perforated FS25 insulation stapled to bottom plate of frame above and draped to floor. Frame panels shall be insulated with R-13/FS-25 face stapled to studs up to fire stop. R-30 unfaced shall be placed on top of fire stop. **See Detail 8-27 / SEP-3.**

8.26 MECHANICAL FIREPLACES - Joints between the firebox and framing shall be sealed with fireproof adhesive or packed with mineral wool to prevent the infiltration of cold air from the area behind the firebox into the room. **See Details 8-29a, 8-29b (raised hearth) or 8-29c (Direct Vent Gas) / SEP-3.**

- 8.27 CEILING INSULATION – BLOWN - Blown ceiling insulation shall be installed by a bag count of sufficient quantity to result in R-30 at settled density. Blowing materials vary in installed R-value, so no specific depth is assumed as meeting this standard. (Some areas may require greater R-values) *Insulation shall be blown to an even depth and not be over-blown into ventilation space of ceiling baffles.*
- 8.28 HIP ROOF CORNERS - Install R-30 batt insulation kraft face down at corner 3'-0" per **Detail 8-31 / SEP-4.**
- 8.29 FIRE SPRINKLERS IN ATTICS - Fire sprinklers that are run in attic spaces must be insulated with R-30 kraft faced insulation (kraft side down) per drawings shown in **Details 8-32a, b, c, and d / SEP-4.** Insulation to extend 24" beyond termination of sprinkler lines. 4' length of R-30 Batt to run parallel to direction of sprinkler line.
- 8.30 CEILING BAFFLES
1. Ceiling baffles shall be positioned at cardboard flange depth (about 1") below roof sheathing and should extend to the outside of the plate. Staples should be placed along the entire length of the stapling flange. The 1" tab at the base is to be folded onto the face of the top plate and stapled behind the polyethylene. Baffles are to be installed in all roof trusses or roof rafters where a vented soffit is used. This includes cathedral ceilings or ceilings where batt insulation will be used per **Detail 8-34a / SEP-4.**
 2. CAUTION - When installing baffles extreme care must be taken to maintain the rear panel of the baffle in an exactly vertical position. Over insertion of the top of this panel will restrict the flow of ventilation air over the baffle and under insertion may reduce thickness of the insulation at the top plate per **Details 8-34b and c / SEP-4.**
- 8.31 FINISHED ATTICS - Finished attic walls shall be insulated with R-13 kraft faced insulation with kraft face towards the conditioned space (Extend insulation down to bottom of truss bottom chord or floor joist to cover blocking.) Vented sloped and flat ceilings above finished attics shall be insulated with R-30 kraft faced insulation. Ceiling baffles shall be installed in sloped ceiling.
- 8.32 CEILING INSULATION GAUGES - Material such as 1x2 shall be cut to length equal to the depth of ceiling insulation in use, and shall be nailed perpendicular to truss bottom chords at 3 per 500 sq. ft. to provide a gauge block for inspection of blown insulation.
- 8.33 MECHANICAL CHASE – Insulate the exterior wall of mechanical chases with R-13 insulation and provide an air barrier such as house wrap, air infiltration paper, or FS-25 along the inside edge of exterior wall as shown in **8-28 / SEP-3.**

SECTION 9- INSULATION: CRAWL SPACES/BASEMENT**9.1 CLOSED CRAWL SPACES**

1. FULL CLOSED CRAWL (Crawl below all conditioned spaces above) - By division option, if approved by local code, crawl spaces may be closed by insulating the crawl space walls. FS-25 perforated faced R-13 insulation at ring joist and top of foundation wall per section 8.14 and **Detail 8-7 / SEP-3**. Install 2" R-11 expanded polystyrene extruded foamboard with smooth finish (approved for exposure in crawl spaces) fastened to wall with masonry washer nails. Provide termite shield or 3" inspection gap at top of insulation as required by local codes. **See Detail 9-1a / SEP-4**. All floor deck insulation and all crawl space ventilators shall be omitted. Ducts and pipes in the crawl space must be insulated.
2. PARTIAL CLOSED CRAWL (Crawl below some conditioned spaces above) – When a partial crawl is used in conjunction with a full basement, crawl spaces shall be conditioned by insulating the crawl space walls. FS-25 perforated faced R-11 insulation shall be stapled to the mud sill and run to the floor of the crawl space then if necessary, out onto the crawl space floor to a total distance of 48 inches measured from the exterior grade. **(A+B per Detail 9-1b / SEP-4.)** All floor deck insulation and all crawl space ventilators shall be omitted. Ducts and pipes in the crawl space must be insulated.

9.2 VENTED CRAWL SPACES

1. The floor above vented crawl spaces shall be insulated with R-19 Kraft faced batts. (Kraft facing will be up.)
2. Insulation of floors of vented crawl spaces may be supported with suitable material per section 8.19. **See Details 9-2a and b / SEP-4**.

9.3 FOUNDATION WALL – KNEEWALLS - Perforated FS-25 48" wide R-11 insulation shall be installed between furring strips or using powder actuated fasteners as shown in **Details 9-4a and 9-4b / SEP-4**. Insulation shall be trimmed for double stapling flange when using furring strips.

9.4 FOUNDATION WALL INSULATION (UNFINISHED) - Perforated FS-25 R-11 basement wall insulation shall be installed between 2x2 furring strips or by using powder-actuated fasteners. When using furring strips, insulation must be trimmed from each end to provide a stapling flap. It is required that the top and bottom flap be folded double when stapling to resist tearing when pulling tightly to the bottom furring. **See Details 9-5a and 9-5b / SEP-4**.

9.5 FOUNDATION WALL INSULATION – TOWNHOUSES - Insulation is not required on foundation walls between townhouses units except that foundation wall insulation shall be applied on offset common walls and shall extend two feet (2') onto non-exposed walls. **See Detail 9-6 / SEP-4**.

9.6 BASEMENT WALL INSULATION (FINISHED LOWER LEVEL) - Unfaced R-13 batt insulation shall be used in furring panels of finished lower levels. (No vapor barrier unless required by local codes.)

- 9.7 BASEMENT EXTERIOR STUD WALL INSULATION (UNFIN. LOWER LEVEL) -
Unfaced R-13 Batt insulation (R-19 if 2x6) with FS-25 covering shall be used in all exterior
basement stud walls.

SECTION 10- VAPOR BARRIER**10.1 CRAWL SPACES**

1. **VENTED AND PARTIAL CLOSED-** Crawl space floors shall be covered with a minimum 6-mil polyethylene vapor barrier. Joints shall be lapped with a minimum of 12" and held firmly in place by gravel, galvanized spikes with nailing fins, or equivalent mechanical fasteners. Vapor barrier shall be turned 6" up exterior walls and be held in place by gravel.
2. **FULL CLOSED -** Crawl space walls and floors shall be covered with a minimum 6-mil polyethylene vapor barrier. Floor vapor barrier shall be held firmly in place by galvanized spikes with nailing fins, or equivalent mechanical fasteners. Joints shall be lapped with a minimum of 12" and sealed with tape and mastic or equivalent. Wall vapor barrier shall be mechanically attached at top and sealed with mastic. The wall vapor barrier shall be lapped over floor vapor barrier by 12". Extend vapor barrier up the interior columns a minimum of 4" above the crawl floor.

10.2 **SLAB FLOORS -** As prescribed in Section 2, all slab floors under both finished and unfinished areas (except garages unless required by local codes) shall have a minimum 6 mil polyethylene vapor barrier installed.

10.3 **EXTERIOR WALLS -** Kraft –faced insulation shall be installed on all exterior walls. This facing shall be installed to extend onto the top and bottom plate. Where wing walls or partitions join exterior walls, the kraft facing must extend behind the end stud of such a wall.
See Detail 10-3 / SEP-4.

10.4 **DAMAGED OR MISSING KRAFT-FACING -** Any missing or damaged area should be covered with additional material, lapped to framing members and stapled. Rips or tears shall be patched with duct tape.

10.5 **CEILINGS -** No vapor barriers shall be installed on ceilings since all attics are ventilated.

SECTION 11- DRYWALL

- 11.1 GENERAL - The drywall contractor shall refrain from covering any area that has obvious voids or missing insulation. Such areas shall not be covered with drywall and the Supervisor shall be notified of the discrepancy for immediate correction.
- 11.2 GARAGE CEILINGS - Garage ceilings shall have all joints taped. When exterior garage walls are not drywalled, the joint between exterior wall and drywall ceiling shall be sealed with adhesive.
- 11.3 PIPES, DUCTS & WIRES - Any pipes, ducts or wires penetrating garage common walls or ceilings shall be sealed by taping and caulking. Caulking is used as final seal between tape and pipes, ducts, etc. as drywall cement may crack with expansion, contraction or other movement.
- 11.4 GARAGE COMMON WALL - Drywall shall be installed from garage common wall to first stud in garage on kneewall houses or other frame situations. (Not required if walls meet at stud location.)
- 11.5 CEILING ELECTRIC BOXES, FANS, ETC. - Any openings in ceilings beneath attics for ceiling electric fixtures, exhaust fans, etc. shall be cut with care to minimize over sizing. These openings shall be sealed with caulking to prevent leakage into the attic.
- 11.6 PARTY WALL - Acoustical sealant shall be continuously applied between masonry party wall and gypsum party wall base plate and along outside edge of base plate on high side unit per **Detail 11-6 / SEP-4.**

SECTION 12- TRIM CARPENTER

- 12.1 ATTIC ACCESS INSULATION - Access panel shall be insulated with kraft faced R-30 insulation batt by stapling kraft facing to panel. Batt shall be sized correctly to fit opening. Weather strip panel perimeter. **See Detail 12-1 / SEP-4.**
- 12.2 FIREWALL DOOR - Firewall door threshold shall be set in caulking to assure a tight seal.
- 12.3 EXTERIOR DOOR FLOOR THRESHOLD - All exterior door floor thresholds must be adjusted to assure that no daylight can be seen entering the building.
- 12.4 WALL ATTIC ACCESS PANEL - Weather Strip or caulk panel perimeter and glue kraft facing of R-13 to back side per **Detail 12-4 / SEP-4.**
- 12.5 ATTIC ACCESS DOOR - Weather Strip and glue kraft facing of R-13 to back side per **Detail 12-5 / SEP-4.**
- 12.6 PULL DOWN STAIRS - Access panel shall be insulated with kraft faced R-30 insulation batt by stapling kraft facing to panel per **Detail 12-6 / SEP-4.** Weather strip around perimeter of pull down stairs.

END