

Joint Appendix JA7

RESERVED –

~~Appendix JA7 Installation Procedures for Medium-Density, Closed-Cell Spray Polyurethane Foam (SPF)~~

~~—[[Derived from RACM RH]]~~

~~JA7.1 Purpose and Scope~~

~~—Joint Appendix JA7 details a procedure for quality installation of Medium-Density, Closed-Cell Spray Polyurethane Foam (SPF) insulation and verification that the protocols have been followed. All applications of SPF insulation shall meet the procedures detailed in JA7. A compliance credit for quality insulation installation is available when this procedure is followed for SPF insulation installation in low rise-residential buildings and is verified by a certified HERS rater. The procedure and credit applies to wood or metal framed wall, ceilings, and/or roof assemblies insulated with SPF insulation. High-rise residential, hotel/motel, and nonresidential buildings~~

~~are required to follow the same procedures if SPF Insulation is installed.~~

~~JA7.2 Terminology~~

~~—Air Barrier~~

~~—An air barrier is needed in all thermal envelope assemblies to prevent air movement. SPF insulation is designed to stop air movement so an additional air barrier is not required in areas where SPF insulation is applied.~~

~~—Air-tight~~

~~—Thermal envelope assemblies (such as wall assemblies) shall be built to minimize air~~

~~movement. Air movement can move unwanted heat and moisture through or into the assembly. For these procedures air-tight shall be defined as an assembly or air barrier with all openings greater than 1/8 inch caulked, or sealed with expansive or minimally expansive foam.~~

~~—Closed-Cell SPF~~

~~—See Medium Density SPF~~

~~—Draft Stops~~

~~—Draft stops are installed to prevent air movement between wall~~

~~cavities, other interstitial cavities and the attic. They are typically constructed of dimensional lumber blocking, drywall or plywood. Draft stops become part of the attic air barrier and shall be air-tight. Fire blocks constructed of porous insulation materials cannot serve as draft stops since they are not air tight. Draft stops become part of the attic air barrier and shall be air-tight.~~

~~—Gaps~~

~~—A gap is an uninsulated area at the edge of an insulated area or penetration of the insulation. Gaps in insulation are avoidable and are not permitted.~~

~~—Hard Covers~~

~~—Hard covers shall be installed above areas where there is a drop ceiling. For example, a home with 10 ft ceilings may have an entry closet with a ceiling lowered to 8 ft. A hard cover (usually a piece of plywood) is~~

~~installed at the 10 ft. level above the entry closet. Hard covers become part of the ceiling air barrier and shall be air-tight.~~

~~—Medium Density SPF~~

~~—A structural spray polyurethane foam (SPF) having a nominal density of 2.0 ± 0.5 pounds per cubic foot.~~

~~—Minimally Expansive Foam~~

~~—A polyurethane foam system typically in a can formulated to fill construction gaps and crevasses~~

~~without
distorting
adjacent
framing.
Minimally
expansive foam
typically
expands only 2
to 5 times its
dispensed
volume.~~

~~—Net Free-
Area~~

~~—The net free-
area of a vent
cover is equal
to the total vent
opening less
the interference
to air flow
caused by the
screen or
louver.
Screened or
louvered vent
opening covers
are typically
marked by the
manufacturer
with the "net
free-area." For
example a 22.5~~

~~in. by 3.5 in. eave vent screen with a total area of 78.75 square inches may have a net free-area of only 45 square inches.~~

~~—Nominal Thickness~~

~~—Medium-Density SPF insulation typically exhibits surface undulations due to the insulation's expansion in the cavity. SPF insulation thicknesses will, therefore, vary from point to point and from side to side of construction cavities (typically thickness will~~

~~be greater at the perimeter of construction cavities where the SPF is filled onto framing members and thinner toward the center of the cavity). Since the R-value of the SPF insulation is measured by its thickness, it is important that the average thickness of the SPF insulation be sufficient to meet the requirements of the project. However, the minimum thickness at any given point should be no more than $\frac{1}{2}$ inch less than~~

~~the required thickness.~~

~~—~~

~~—Spray Polyurethane Foam (SPF)~~

~~—A foamed plastic material formed by the reaction of an isocyanurate and a polyol that uses a blowing agent to develop a cellular structure. SPF insulation may be a two-component reactive system mixed at a spray gun or a single-component system that cures by exposure to humidity. SPF insulation can be formulated~~

~~to have specific physical properties (such as density, compressive strength, closed cell content, and R-value) appropriate for the application requirements.~~

~~—Voids~~

~~—An uninsulated space within an enclosed building assembly created when the assembly has been insulated by partial filling of the framed cavity. The partial fill~~

~~results in an air space (void) between the insulation surface and the assembly cover or sheathing. Voids are permitted under this Procedure. (Contrast with the definition for Gaps.)~~

~~JA7.3 General Requirements Walls Ceilings and Floors~~

~~.SPF insulation shall be applied by SPF applicators trained and experienced in the use and maintenance of high-pressure, plural-component equipment. SPF applicators shall be certified by the SPF insulation manufacturer for the application of SPF insulation systems.~~

~~.SPF insulation shall be spray-applied to fully adhere to the joist and other framing faces to form a complete air seal within the construction cavity.~~

~~•SPF insulation shall be installed in conformance with the manufacturer's specifications, recommendations and temperature/humidity limitations.~~

~~•Substrates to which SPF insulation is applied shall be secure and free of surface moisture, frost, grease, oils, dirt, dust or other contaminants that would adversely affect SPF adhesion.~~

~~•SPF insulation shall be separated from occupied spaces by an approved thermal barrier such as 0.5 inch gypsum wallboard in accordance with California Building Code (CBC) Section 2603.~~

~~•Medium-Density SPF insulation shall be installed at the average thickness to achieve the specified R-value of the assembly. Nominal thickness of the SPF insulation shall be such that (1) the average thickness shall be equal to or greater than that required R-value documented in the Certificate of Compliance (CF-1R), and (2) the minimum tested thickness at any point shall be no more than 1/2 inch less than the required thickness for the R-value.~~

~~•The HERS rater shall verify that the manufacturer's nominal insulation thickness has been installed and certified that determination on the Certificate of Field Verification and Diagnostic Testing (CF-4R).~~

~~JA7.4 Raised Floors and Floors Over Garages~~

~~JA7.4.1 Raised Floors~~

~~•SPF insulation shall be spray-applied to fully adhere to the bottom side of the floor sheathing; and~~

~~•SPF insulation installation shall uniformly cover the cavity side-to-side and top-to-bottom.~~

~~JA7.4.2 Floors Over Garages~~

~~—Two Story Homes with Conditioned Space over the Garage~~

~~—The floor over the garage shall be insulated by spraying SPF insulation to fully adhere to the subfloor of the conditioned space. The garage and the adjacent conditioned space (house) shall~~

~~be insulated up to the subfloor including any gaps between the header and the floor joist and should be fully air tight.~~

~~—Two Story Homes with No Conditioned Space over the Garage~~

~~—The band joist where the garage transitions to an attic above conditioned space shall have an air barrier installed in contact with the edge of the attic insulation with no gaps. SPF insulation may serve as the air barrier as long as there are no gaps.~~

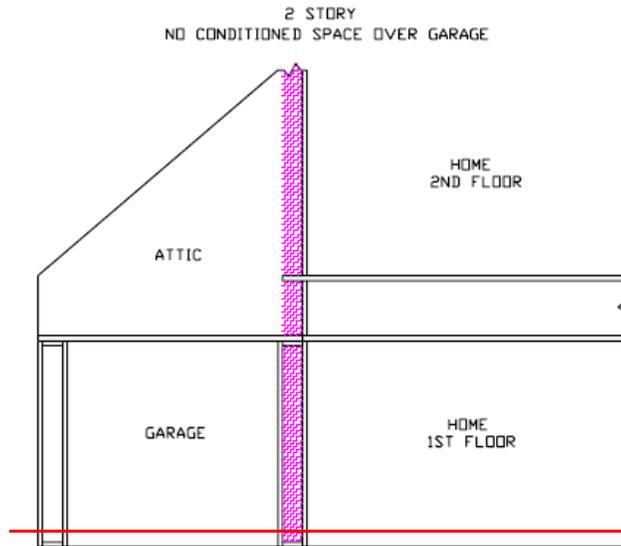


FIGURE 1

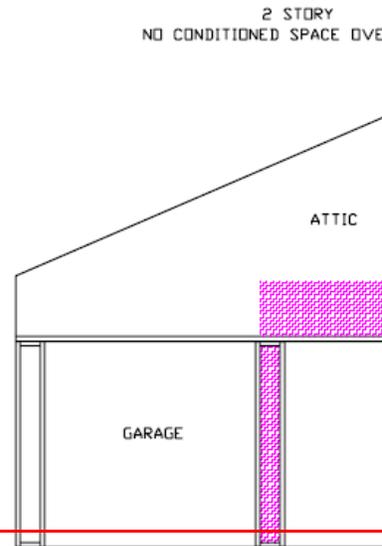


FIGURE 2

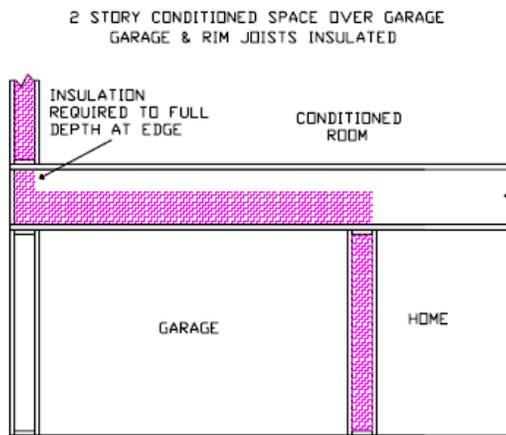


FIGURE 3

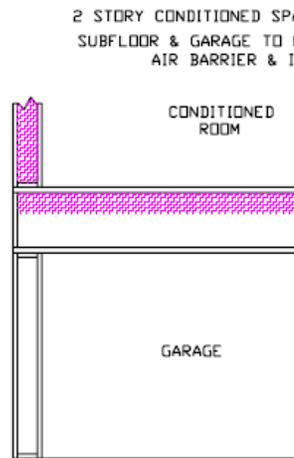


FIGURE 4

~~JA7.5~~ **Wall Insulation**

~~JA7.5.1~~ **SPF Application**

~~In wall cavities, SPF insulation shall be applied to provide an air-tight envelope to~~

~~the outdoors, attic, garage and crawl space. Special attention shall be paid to plumbing and wiring penetrations through the top plates, electrical boxes that penetrate the sheathing, and the sheathing seal to the bottom plate.~~

~~—SPF insulation installation shall uniformly cover the cavity side-to-side and top-to-bottom. An air space may be left between the surface of the Medium-Density SPF insulation and the interior sheathing/drywall provided the appropriate thickness of SPF insulation has been applied to achieve the specified R-value and the SPF insulation is installed to cover and form an air barrier on the framing at the top, bottom and sides of each cavity.~~

~~JA7.5.2 Narrow-Framed Cavities~~

~~•Non-standard width cavities shall be filled with SPF insulation at a depth consistent with the SPF thickness required to achieve the specified R-value.~~

~~•Narrow spaces (2 inches or less) at windows and door jambs shall be filled with minimally expansive foam.~~

~~•Narrow spaces (2 inches or less) between studs at the building corners and at the intersections of partition walls shall be filled shall be filled with batt insulation snugly fitted into the space (without excessive compression), loose fill insulation, or expansive or minimally expansive foam.~~

~~JA7.6~~ **Special Situations**

~~JA7.6.1~~ **Installations Prior to Exterior Sheathing or Lath**

~~•Hard to access wall stud cavities such as corner channels, wall intersections, and behind tub/shower enclosures shall be insulated to the required R-value. This may have to be done prior to the installation of the tub/shower or the exterior sheathing or stucco lath.~~

~~JA7.6.2~~ **Obstructions/Wall Penetrations**

~~•SPF insulation shall be spray-applied to fully adhere and seal around wiring and plumbing.~~

~~•SPF insulation shall be spray-applied to fully seal between the sheathing and the rear of electrical boxes and phone boxes.~~

~~•In cold climates, where water pipes may freeze (Climate Zones 14 and 16) pipes shall have at least two-thirds of the insulation between the water pipe and the outside. If the pipe is near the outside, as much insulation as possible shall be placed between the pipe and the outside and no insulation (minimal amounts of SPF overspray are acceptable) shall be allowed between the pipe and the interior wall.~~

~~JA7.6.3~~ **Rim Joists**

~~•All rim joists shall be insulated to the same R-value as the adjacent walls.~~

~~•The insulation shall be installed without gaps.~~

~~JA7.6.4~~ **Kneewalls and Skylight Shafts**

~~•All kneewalls and skylight shafts shall be insulated to a minimum of R-19 or a higher level as specified in the compliance documentation.~~

~~•The insulation shall be installed without gaps.~~

~~•The interior side of the SPF insulation is not required to be in contact with the drywall or other wall finishes.~~

~~•The SPF insulation shall be fully adhered and self-supporting so that it will remain in place.~~

~~JA7.6.5 HVAC/Plumbing Closet~~

~~•Walls of interior closets for HVAC and/or water heating equipment that require combustion air venting, shall be insulated to the same R-value as the exterior walls.~~

~~JA7.7 Ceiling and Roof Insulation~~

~~JA7.7.1 General Requirements~~

~~•SPF insulation shall be spray-applied to fully adhere to the substrate (roof deck or ceiling).~~

~~•SPF insulation shall be spray-applied to fully adhere to the joist and other framing faces to form a complete air seal within the construction cavity.~~

~~•SPF insulation shall be installed in a continuous and fully adhered manner to form an air barrier.~~

~~•SPF insulation shall be spray-applied to fully adhere to and seal around wiring and plumbing.~~

~~•Hard covers or draft stops shall be placed over all drop ceiling areas and interior wall cavities to keep insulation in place and stop air movement. If hard covers or draft stops are missing or incomplete, they shall be in place before insulation is installed.~~

~~•In vented attics, required eave ventilation shall not be obstructed; the net free-ventilation area of the eave vent shall be maintained.~~

~~•SPF insulation shall not be applied directly to recessed lighting fixtures. Recessed light fixtures must be either insulated by methods other than SPF (such as mineral fiber) or enclosed in a box fabricated from 1/2-inch plywood, 18 gauge sheet metal, 1/4-inch hard board or drywall. The exterior of the box may then be insulated with SPF. If the fixtures are~~

~~not air tight or not rated for insulation contact (IC), the fixtures shall either be replaced or eliminated.~~

~~.All recessed light fixtures that penetrate the ceiling shall be IC rated and air tight rated and shall be sealed with a gasket or caulk between the housing and the ceiling.~~

~~JA7.7.2 Enclosed Rafter Ceilings~~

~~.SPF insulation shall be kept away from combustion appliance flues in accordance with flue manufacturers' installation instructions or labels on the flue for clearance.~~

~~.Prior to installation verify that the building official in your area permits SPF insulation directly applied to the underside of the roof.~~

~~JA7.7.3 HVAC Platform~~

~~.A minimum of 3 inches of SPF insulation shall be placed below any plywood platform or cat-walks installed in vented attics for HVAC equipment and access to assure that the overall assembly meets~~

~~the required values listed in the compliance documentation.~~

~~.SPF insulation shall be installed in a continuous and fully adhered manner to form an air barrier.~~

~~JA7.7.4 Attic Access~~

~~.Apply a minimum of 3 inches of SPF insulation to the access door or permanently attach rigid foam with adhesive or mechanical fastener to assure that the overall assembly meets the required values specified in the Compliance Documentation.~~

~~JA7.7.5 Attics and Cathedral Ceilings~~

~~.Prior to installation verify that the building official in your area permits SPF insulation directly applied to the underside of the roof.~~

~~.In unvented conditioned attics where entry is made for the service of utilities, SPF applied in direct contact with the underside of the roof deck shall be protected from ignition in accordance with CBC Section 2603.~~

~~•In cathedral ceilings where restricted spaces do not allow entry, SPF insulation does not require protection from ignition.~~

~~JA7.8~~ **Materials**

~~•Materials shall comply with the CBC (including, but not limited to, Chapter 26) and installed to meet all applicable fire codes.~~

~~•Materials shall meet California Quality Standards for Insulating Material, Title 24, Part 12, Chapter 4, Article 3, and be listed in the California Department of Consumer Affairs Consumer Guide and Directory of Certified Insulating Materials.~~

~~•Materials shall comply with flame spread index and smoke developed index requirements of CBC Section 2603.5.4.~~

~~•Materials shall be installed according to manufacturer specifications and instructions.~~

~~JA7.9~~ **Equipment**

~~—Probes for Medium Density SPF:
Insulation thickness measurements shall~~

~~be accurate to within $\pm 1/8$ inch. A probe or a measuring device shall be left with the compliance information for use by HERS Raters to verify adequate insulation levels. Probes capable of penetrating the full thickness of Medium Density SPF insulation with measurements marked by $1/8$ inch increments shall be used by HERS Raters to verify proper thickness of insulation has been applied. The probes shall be designed to cause minimal damage to the insulation. HERS Raters shall measure in at least 6 random locations on various walls or ceilings to insure thickness levels specified on the Certificate of Compliance, CF-1R and CR-6R have been met.~~

~~JA7.10 R-Value and U-Value Specifications~~

~~—Insulation values shall be based on the following.~~

~~—For Medium Density SPF insulation the total R-value shall be calculated based on the nominal required thickness of the insulation multiplied by an R-value of 5.8 per inch. Based on this calculation for Medium Density SPF insulation, the overall assembly U-factor shall be~~

~~determined by selecting the assembly that matches the assembly type, framing configuration, and cavity insulation from the appropriate Reference Joint Appendix JA4 table. The thickness for the proposed required R-value of the SPF insulation shall meet or exceed the thickness specified in Table JA7-1 below.~~

~~Table JA7-1 – Required thickness of SPF Insulation to Achieve Particular R-values~~

<p>—Equivalent R-Values for standard SPF insulation</p>	<p>1 1</p>	<p>1 3</p>	
<p>—Required thickness of Medium Density</p>	<p>2. 0 0</p>	<p>2. 2 5</p>	

y-SPF Insulation on (inches)			
--	--	--	--

~~See the Certificate of Compliance for minimum R-value required for compliance.~~

~~JA7.11 Certificates~~

~~An Insulation Certificate (CF-6R) signed by the SPF applicator shall be provided that states that the installation is consistent with the plans and specifications for which the building permit was issued. The certificate shall also state the installing company name, insulation manufacturer's name and material identification, the labeled installed nominal thickness as specified in JA7.9, and the installed R-value for Medium-Density SPF insulation. The SPF applicator shall also attach a manufacturer's coverage chart for every insulation material used.~~

~~JA7.12 Certificates and Availability~~

~~The CF-6R with complete information, signed by the SPF applicator, and a measuring probe shall be available at the building site for the HERS rater's verification~~

~~inspection. Note: The HERS rater shall not verify compliance credit without these completed forms.~~