

Residential - Appendix RA10 - 2008

Appendix RA10 – Eligibility Criteria for Energy Efficiency Measures

RA10.1 Purpose and Scope

This appendix contains the eligibility requirements which must be met when any of the following features are installed to achieve compliance with the residential building energy efficiency standards.

RA10.2 Building Envelope Measures

RA10.2.1 Cool Roofs

Cool roofs shall meet specific eligibility and installation criteria to receive credit for compliance. All products qualifying for compliance with Sections 141, 143(a)1 or 149(b) 1 B,151(b), 151(f)11, or 152(b)1G shall be rated and labeled by the Cool Roof Rating Council in accord with Section 10-113 of the standards. The use of a cool roof shall be listed in the Special Features and Modeling Assumptions listings of the CF-1R and described in detail in the ACM Compliance Supplement.

RA10.2.2 Radiant Barriers

Radiant barriers shall meet specific eligibility and installation criteria to be modeled by any compliance software and receive energy credit for compliance with the energy efficiency standards for low-rise residential buildings.

The emittance of the radiant barrier shall be less than or equal to 0.05 as tested in accordance with ASTM C-1371 or ASTM E408.

A Installation shall conform to ASTM C1158 (*Standard Practice for Installation and Use of Radiant Barrier Systems (RBS) in Building Construction*), ASTM C727 (*Standard Practice for Installation and Use of Reflective Insulation in Building Constructions*), ASTM C1313 (*Standard Specification for Sheet Radiant Barriers for Building Construction Applications*), and ASTM C1224 (*Standard Specification for Reflective Insulation for Building Applications*), and the radiant barrier shall be securely installed in a permanent manner with the shiny side facing down toward the interior of the building (ceiling or attic floor). Moreover, radiant barriers shall be installed at the top chords of the roof truss/rafters in **any** of the following methods:

- i. Draped over the truss/rafter (the top chords) before the upper roof decking is installed.
- ii. Spanning between the truss/rafters (top chords) and secured (stapled) to each side.
- iii. Secured (stapled) to the bottom surface of the truss/rafter (top chord). A minimum air space shall be maintained between the top surface of the radiant barrier and roof decking of not less than 1.5 inches at the center of the truss/rafter span.
- iv. Attached [laminated] directly to the underside of the roof decking. The radiant barrier shall be laminated and perforated by the manufacturer to allow moisture/vapor transfer through the roof deck.

In addition, the radiant barrier shall be installed to cover all gable end walls and other vertical surfaces in the attic.

B The attic shall be ventilated to:

- i. Conform to the radiant barrier manufacturer's instructions.
- ii. Provide a minimum free ventilation area of not less than one square foot of vent area for each 150 square feet of attic floor area.
- iii. Provide no less than 30 percent upper vents.

Ridge vents or gable end vents are recommended to achieve the best performance. The material should be cut to allow for full airflow to the venting.

- C The radiant barrier (except for radiant barriers laminated directly to the roof deck) shall be installed to have a minimum gap of 3.5 inches between the bottom of the radiant barrier and the top of the ceiling insulation to allow ventilation air to flow between the roof decking and the top surface of the radiant barrier have a minimum of six (6) inches (measured horizontally) left at the roof peak to allow hot air to escape from the air space between the roof decking and the top surface of the radiant barrier.
- D When installed in enclosed rafter spaces where ceilings are applied directly to the underside of roof rafters, a minimum air space of 1 inch shall be provided between the radiant barrier and the top of the ceiling insulation, and ventilation shall be provided for every rafter space. Vents shall be provided at both the upper and lower ends of the enclosed rafter space.
- E The product shall meet all requirements for California certified insulation materials [radiant barriers] of the Department of Consumer Affairs, Bureau of Home Furnishings and Thermal Insulation, as specified by CCR, Title 24, Part 12, Chapter 12-13, Standards for Insulating Material.

The use of a radiant barrier shall be listed in the Special Features and Modeling Assumptions listings of the CF-1R and described in detail in the ACM Compliance Supplement.

RA10.3 HVAC Measures

RA10.3.1 Thermal/Ice Storage DX AC Systems Eligibility Criteria

With the TDV energy, introduced in the 2005 Standards, TES systems including the DES/DXAC are eligible for significant credits depending on climate zones and building design. The following sections describe the requirements for obtaining the credit for DES/DXAC systems.

New or existing residential buildings can obtain compliance credits for the DES/DXAC for space cooling if the following eligibility criteria are met:

1. Eligible systems shall have:

- Direct expansion air conditioning unit with a SEER of at least 13
- A storage capacity not to exceed 100 Ton Hours
- Power consumption not to exceed 150W per Ton during Ice Melt mode.
- Compatibility with standard condensers and evaporator coils.

2. Integrated controls shall be installed which are capable of:

- Establishing Nighttime and Daytime time periods.
- Initiating the ice make process as late as possible, but in time to build a full store of ice before the end of the Nighttime period.
- Initiating the DES/DXAC ice melt process whenever there is a cooling load during the factory-set Daytime period in the non-Winter months. Provide Direct Cooling to serve a cooling demand at all other times.
- Prohibiting any user configurable option which could impact TDV performance or compliance
- Operating with (being controlled by) a standard HVAC thermostat.
- Providing for a factory-set period of time during which the system disables Ice Make and Ice Melt modes.

3. User Interface

- Must operate without any direct user interaction.

- User's operation of HVAC system must be identical to how it would be without a DES/DXAC system.
- 4. Performance data is provided by manufacturer based on the test procedures described later in this document.
- 5. No TXV credit.
- 6. Building types low-rise residential

RA10.3.2 Evaporatively-Cooled Condensing Units

The eligibility criteria require the measures listed below. These measures must be certified by the installer on the CF-6R and verified by a HERS rater and certified on the CF-4R.

- EER at 95°F dry bulb and 75°F wet bulb temperature is listed with ARI (generally called EERa).
- EER at 82°F dry bulb and 65°F wet bulb temperature is submitted to ARI and published by the manufacturer in accordance with ARI guidelines (generally called EERb).
- Presence of TXV is verified, if the ARI certified EERs are based on equipment with TXVs.
- Ducts are tested and sealed in all installations of this equipment.
- Proper refrigerant charge is verified if compliance credit is taken for this measure when TXVs are not installed.

RA10.4 Water Heating Measures

RA10.4.1 Pipe Insulation

Pipe insulation on the first five feet of hot and cold water piping from storage gas water heaters is a mandatory measure as specified in Section 150 (j) of Title 24, Part 6. Note that exceptions 3, 4 and 5 to Section 150 (j) apply to all pipe insulation that is required to meet the mandatory measure requirement or that is eligible for compliance credit.

Pipe insulation credit available if all remaining hot water lines are insulated. Insulation shall meet mandatory minimums in Section 150 (j).

Overhead Plumbing for Non-Recirculation Systems. All plumbing located in attics with a continuous minimum of 4 in. of blown insulation coverage on top of the piping will be allowed to claim the "all lines" pipe insulation credit, provided that:

1. Piping from the water heater to the attic, and
2. Piping in floor cavities or other building cavities are insulated to the minimum required for pipe insulation credit.

RA10.4.2 Point of Use [rh1] (POU)

Current requirements apply. All hot water fixtures in the dwelling unit, with the exception of the clothes washer, must be located within 8' (plan view) of a point of use water heater. To meet this requirement, some houses will require multiple POU units.

RA10.4.2 Recirculation Systems

All recirculation systems must have minimum nominal R-4 pipe insulation on all supply and return recirculation piping. Recirculation systems may not take an additional credit for pipe insulation.

The recirculation loop must be laid out to be within 8 feet (plan view) of all hot water fixtures in the house (with the exception of the clothes washer).

Approved recirculation controls include "no control", timer control, time/temperature control, and demand control. Time/temperature control must have an operational timer initially set to operate the pump no more than

16 hours per day. Temperature control must have a temperature sensor with a minimum 20°F deadband installed on the return line.

RA10.4.3 Demand Recirculation

Demand recirculation systems shall have a pump (maximum 1/8 hp), control system, and a timer or temperature sensor to turn off the pump in a period of less than 2 minutes from pump activation.

RA10.4.4 Solar Water Heating Systems

Solar Water Heating Systems for Individual Dwellings Rated with the OG 300 Procedure

In order to use the OG-300 method, the system must satisfy the following eligibility criteria:

1. The collectors must face within 35 degrees of south and be tilted at a slope of at least 3:12
2. The system shall be SRCC certified.
3. The system must be installed in the exact configuration for which it was rated, e.g. the system must have the same collectors, pumps, controls, storage tank and backup water heater fuel type as the rated condition.
4. The system must be installed according to manufacturer's instructions.
5. The collectors shall be located in a position that is not shaded by adjacent buildings or trees between 9:00 AM and 3:00 PM (solar time) on December 21.

RA10.5 Other Measures

RA10.5.1 Controlled Ventilation Crawlspace (CVC)

Drainage. Proper enforcement of site engineering and drainage, and emphasis on the importance of proper landscaping techniques in maintaining adequate site drainage, is critical.

Ground Water And Soils. Local ground water tables at maximum winter recharge elevation should be below the lowest excavated site foundation elevations. Sites that are well drained and that do not have surface water problems are generally good candidates for this stem-wall insulation strategy. However, the eligibility of this alternative insulating technique is entirely at the building officials' discretion. Where disagreements exist, it is incumbent upon the applicant to provide sufficient proof that site drainage strategies (e.g., perimeter drainage techniques) will prevent potential problems.

Ventilation. All crawl space vents must have automatic vent dampers to receive this credit. Automatic vent dampers must be shown on the building plans and installed. The dampers should be temperature actuated to be fully closed at approximately 40°F and fully open at approximately 70°F. Cross ventilation consisting of the required vent area reasonably distributed between opposing foundation walls is required.

Foam Plastic Insulating Materials. Foam plastic insulating materials must be shown on the plans and installed when complying with the following requirements:

Fire Safety—UBC Section 1712(b)2. Products shall be protected as specified. Certain products have been approved for exposed use in under floor areas by testing and/or listing.

Direct Earth Contact—Foam plastic insulation used for crawl-space insulation having direct earth contact shall be a closed cell water resistant material and meet the slabedge insulation requirements for water absorption and water vapor transmission rate specified in the mandatory measures.

RA10.5.2 Mineral Fiber Insulating Materials

Fire Safety—UBC Section 1713(c). "All insulation including facings, such as vapor barriers or breather papers installed within ... crawl spaces ... shall have a flame-spread rating not to exceed 25 and a smoke density not to exceed 450 when tested in accordance with UBC, Standard No. 42-1." In cases where the facing is also a vapor retarder, the facing shall be installed to the side that is warm in winter.

Direct Earth Contact—Mineral fiber batts shall not be installed in direct earth contact unless protected by a vapor retarder/ground cover.

Vapor Barrier (Ground Cover). A ground cover of 6 mil (0.006 inch thick) polyethylene, or approved equal, shall be laid entirely over the ground area within crawl spaces.

The vapor barrier shall be overlapped six inches minimum at joints and shall extend over the top of pier footings.

The vapor barrier should be rated as 1.0 perm or less.

The edges of the vapor barrier should be turned up a minimum of four inches at the stem wall.

Penetrations in the vapor barrier should be no larger than necessary to fit piers, beam supports, plumbing and other penetrations.

The vapor barrier must be shown on the plans and installed.

Studies show that moisture conditions found in crawl spaces that have minimal ventilation do not appear to be a significant problem for most building sites provided that the crawl-space floors are covered by an appropriate vapor barrier and other precautions are taken. The Energy Commission urges building officials to carefully evaluate each application of this insulating technique in conjunction with reduced ventilation because of the potential for adverse effects of surface water on crawl-space insulation that could negate the energy savings predicted by the procedure.

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