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8. Performance Method

8.1 Overview

This chapter explains the performance method of complying with the *2016 Building Energy Efficiency Standards* (Energy Standards). The method works by calculating the time-dependent valuation (TDV) energy use of the proposed design and comparing it to the TDV energy use of the standard design (the budget). The standard design is a building with the same surface areas as the proposed design but incorporates all the features of Prescriptive Package A. The energy budget includes water heating, space heating, space cooling, and indoor air quality (IAQ) fan energy. Lighting energy is not included in the performance calculations because all residential lighting measures are mandatory and therefore not eligible to be traded-off using the performance method. If the proposed design uses equal or less TDV energy than the standard design, then the building complies.

Computer programs used for compliance are approved by the Energy Commission as being capable of calculating space-conditioning and water-heating energy use in accordance with a detailed set of rules. The computer programs model the thermal behavior of buildings by calculating heat flows into and out of the various thermal zones of the building. The computer programs approved by the Energy Commission must demonstrate accuracy in analyzing annual space-conditioning and water-heating energy use of different building conservation features, levels and techniques. This method provides maximum flexibility because the building designer may trade-off the energy performance of different building components and design features to achieve compliance. Making a building more efficient will result in lower utility bills and improved comfort. The performance approach provides the ability to test different options and choose the best strategy to reduce the overall energy budget. With today’s wide choice of high-efficiency materials, equipment, and controls, there are many opportunities to make a building more energy-efficient. Improving the building envelope provides several opportunities for improving efficiency, in particular with measures related to window placement, location, and efficiency. In space conditioning, there is not only equipment with very high efficiency for space heating and cooling, but many innovative system types that eliminate the need for ducts, combine space and water heating together, or use advanced designs that can dramatically improve the overall performance of the building. Improved water heating system efficiency includes a wide range of equipment that can significantly increase efficiency along with improvements to the distribution system design, which can drastically reduce energy losses.

The performance method is the most popular compliance method under the Energy Standards, with more than 95 percent of building permit applications for newly constructed buildings being submitted in this manner. The method is especially popular with production homebuilders because they can optimize performance and achieve compliance at a lower cost. This chapter provides a general overview of the performance method. Each computer program that is approved by the Energy Commission is required to have a compliance supplement that provides more detailed information regarding the use of the software for compliance purposes. The requirements for the compliance supplement along with other requirements for approved computer programs are documented in the *2016 Residential ACM Approval Manual*.

For a detailed discussion of the performance method with additions and alterations, see Sections 9.5, 9.6, and 9.7.

8.2 Compliance Basics

8.2.1 Compliance Process

Any approved computer program may be used to comply with the Energy Standards using the performance method. The following steps are a general outline of the typical computer program procedure:

1. Collect all necessary data on each component.
   a. For the building envelope, the area of each fenestration, wall, door, roof, ceiling and floor is needed. For each component, the applicable energy characteristics needs to be defined including U-factor, solar heat gain coefficients (SHGC), solar reflectance, and thermal mass values.
   b. For HVAC systems, the type and efficiency of space conditioning equipment are required. For hydronic space heating, the specific water heater type and efficiency are required. For fan-forced conditioning systems, the location and amount of insulation of the duct system are needed.
   c. For domestic hot water systems, the water heater type, quantity, efficiency, and area served will be required, along with the water heating distribution system. Additional information will be required for "built-up" systems.

   Other efficiency measures and options can be used to improve building efficiency.
2. Start by entering the building envelope basic data such as square footage, number of stories, occupancy type, and climate zone. Define each opaque surface with the related orientation, area, and thermal performance properties. Add the fenestration that is associated with each opaque surface, including any fixed shading such as overhangs and side-fins. Enter the data of the equipment and distribution systems for the space conditioning and water heating systems. The input values and assumptions must correctly correspond to the information on the final approved plan set and inputs must be equal to or more energy-efficient than required mandatory measures.
3. Launch a computer simulation to calculate automatically the TDV energy of the standard design and the proposed design.

For existing buildings where the values of installed features are unknown, default values may be used based on the year of the construction. Refer to the Default Assumption for Year Built, Table 8-1 at the end of this chapter.

The building energy efficiency complies if all the mandatory measures are met and the total TDV energy use of the proposed design is the same as or less than the standard design TDV energy budget.

When creating a computer input file, use the space provided for the project title information to concisely and uniquely describe the building being modeled. User-designated names should be clear and internally consistent with other orientations and/or buildings being analyzed. Title names and explanatory comments should assist individuals involved in both the compliance and enforcement processes.

8.2.2 Defining the Standard Design

Each approved compliance software program must automatically calculate the TDV energy use of the standard design. The standard design is created based upon data entered for the proposed design using all the correctly fixed and restricted inputs.

The computer program defines the standard design by modifying the geometry of the proposed design and inserting the building features of Table 150.1-A of the Energy Standards. This process is built into each approved computer program, and the user cannot access it. Key details on how the standard design is created and calculated by the computer programs, including the listing of fixed and restricted input assumptions, are documented in the *2016 Residential ACM Reference Manual*.

The standard design assumes the same total conditioned floor area and volume as the proposed design and the same gross exterior wall area as the proposed design except that the wall area in each of the four cardinal orientations is divided equally. The standard design uses the same roof/ceiling area, raised floor area, slab-on-grade area, and perimeter as the proposed design but uses the standard insulation R-values required in Table 150.1-A of the Energy Standards.

Total fenestration area in the standard design is equal to the proposed design if the fenestration area in the proposed design is less than or equal to 20 percent of the floor area; otherwise, the fenestration area of the standard design is equal to 20 percent of the floor area. Fenestration area in the standard design is evenly distributed among the four cardinal orientations. SHGC and U-factors are the same as those listed in Package A, and no fixed shading devices such as overhangs are assumed for the standard design.

The standard design includes minimum efficiency heating and cooling equipment, as well as the minimum duct R-value and the location of the ducts, depending on whether Option A, B, or C is used from Table 150.1-A of the Energy Standards. Ducts are assumed to be sealed as required by §150.0(m). The standard design also assumes correct refrigerant charge as required by §150.1(c)7A**.**

For water-heating systems that serve dwelling units, the standard design is a 50 gallon gas storage water heater with an energy factor equal to the federal minimum standard. The standard design has a trunk-and-branch distribution system that includes the assumption that all mandatory measures are met (that is, the first 5 feet of hot and cold water piping from heating source) and that all piping ¾- inch or larger is insulated and the entire length of piping to kitchen fixtures are insulated as specified in §150.0(j)2A or §150.0(j)2B.

For multiple dwelling-unit buildings, either a central distribution system may be used or a water heater may be installed in each unit. The standard design system type is based on what the proposed design uses. However, the standard design does include a pumped recirculation system that is controlled by hot water demand and hot water return temperature.

8.2.2.1 **Standard Reports**

For consistency and ease of enforcement, the manner in which building features are reported by compliance software programs is standardized. Energy Commission-approved compliance software programs must automatically produce compliance reports in this standard format. The principal report is the certificate of compliance (CF1R-PRF-01-E).

The CF1R-PRF-01-E has two highly visible sections, one for special features and modeling assumptions, and a second for features requiring field verification and/or diagnostic testing by approved HERS Raters. These two sections serve as a punch list for special consideration during compliance verification by the local enforcement agency and the HERS Rater. Items listed in the Special Features and Modeling Assumptions section indicate that unusual features or assumptions are used for compliance, and they call for special care by the local enforcement agency. Items listed in the HERS Required Verification section are for features that rely on diagnostic testing and independent verification by approved HERS

Providers/Raters to ensure proper field installation. Diagnostic testing and verification by HERS Providers/Raters is in addition to local enforcement agency inspections.

8.2.3 Professional Judgment

Some modeling techniques and compliance assumptions applied to the proposed design are fixed or restricted. There is little or no flexibility to choose input values for energy compliance modeling. However, other aspects of energy modeling remain for which some professional judgment may be acceptable or necessary. In those instances, the compliance software user must exercise proper judgment in evaluating whether a given input is appropriate.

Enforcement agencies have discretion to reject a particular input if the permit applicant cannot substantiate the value with supporting documentation or cannot demonstrate that appropriate professional judgment has been applied.

Two questions may be asked to resolve whether professional judgment has been applied correctly in any particular case:

1. Is a simplified input or assumption appropriate for a specific case? If simplification reduces the predicted energy use of the proposed building or reduces the compliance margin when compared to a more explicit and detailed modeling assumption, the simplification is not acceptable. That is, simplification must reflect the same or higher energy use than a more detailed model and reflect the same or lower compliance margin when comparing the standard and proposed TDV energy.
2. Is the approach or assumption used in modeling the proposed design consistent with the approach or assumption used by the compliance software when generating the standard design energy budget?

One must always model the proposed design using the same assumption and/or technique used by the compliance software manager when calculating the energy budget unless drawings and specifications indicate specific differences that warrant energy compliance credits or penalties.

Any unusual modeling approach, assumption, or input value should be documented with published data and should conform to standard engineering practice.

For assistance in evaluating the appropriateness of particular input assumptions, call the Energy Hotline or call the vendor of the compliance software program.

Example 8-1

Question

Three different-sized windows in the same wall of a new home are designed without exterior shading, and they have the same National Fenestration Rating Council (NFRC) rated U-factors and SHGC values. Is it acceptable professional judgment to simplify the computer model by adding the areas of the three windows together and inputting them as a single fenestration area?

Answer

Yes. The compliance software will produce the same results whether the windows are modeled individually or together as one area because the orientation, fenestration U-factors, and SHGC values of the windows are identical. However, if overhangs and side-fins are modeled, the correct geometry of fixed shades must be modeled for each window.

8.3 Mixed Occupancy Buildings

§100.0(f)

Some residential buildings have areas of other occupancies, such as retail or office, in the same building. An example of this might be a three-story building with two floors of apartments above ground-floor shops and offices. The first thing to consider when analyzing the energy compliance of a mixed occupancy building is the type and area of each occupancy type.

Depending on the area of the different occupancies, you may be able to demonstrate energy compliance as if the whole building is residential for the space-conditioning and water-heating requirements. This is allowed if the residential occupancy accounts for at least 80 percent of the conditioned floor area of the building (or permitted space). Lighting compliance must be based on the requirements for each actual occupancy type.

Note: Mandatory measures apply separately to each occupancy type regardless of the compliance approach used. The residential envelope is subject to §150.0(a), (b), (c) and (d), while nonresidential envelope is subject to §120.7(a), (b) and (c).

For example, if complying under the mixed-occupancy exception, both residential and nonresidential documentation for mandatory measures must be submitted with other compliance documentation.

If the building design does not fit the criteria described above for a dominant occupancy, then the low-rise residential occupancy type must be shown to comply by itself. The remaining occupancy types must be shown to comply separately either by independent compliance for each occupancy or (for the nonresidential performance approach) by combining nonresidential occupancies in accordance with the rules of the *Nonresidential ACM Reference Manual*. This may be done by using any of the approved prescriptive or performance methods available for each occupancy type. As a result, documentation for each occupancy type must also be considered separately, and a certificate of compliance must be submitted for each occupancy type. Mixed high-rise and low-rise residential occupancies will not occur in the same building because the designation applies to the building.

8.4 Multifamily Buildings

§100.1(b)

Envelope, HVAC equipment, and outdoor lighting requirements for high-rise multifamily buildings (four or more habitable stories) are covered by the *Nonresidential Energy Standards*. These requirements are explained in the *Nonresidential Compliance Manual.* Indoor lighting in dwelling units and water-heating requirements for high-rise multifamily buildings are covered under the *Residential Energy Standards* and this compliance manual.

Low-rise multifamily buildings that are one to three habitable stories are covered by the *Residential Energy Standards,* which are covered in this manual. Compliance for a low-rise multifamily building may be demonstrated either for the building as a whole or on a unit-by-unit basis. Rental apartment buildings are usually modeled as a whole building. For multifamily buildings designed for dwelling units to be owner-occupied, the project developer may favor providing a separate, unique Title 24 compliance report for each dwelling unit. Floors and walls between dwelling units are considered to have no heat transfer and may be ignored in performance calculations.

8.4.1 Whole-Building Compliance Approach

The simplest approach to compliance for a multifamily building is to treat the building as a whole, using any of the compliance paths described in earlier chapters. In practice, this process is similar to analyzing a single-family residential building, except for some differences in water-heating budgets and internal gains, as described in the *2016 Residential ACM Reference Manual*.

Multifamily buildings that use efficiency measures that require HERS field verification must submit separate compliance documentation for each dwelling unit in the building as specified by Reference Residential Appendix Section RA2.3. This requirement does not prevent use of the whole-building compliance approach for submittal of the certificate of compliance to the enforcement agency; however, when the whole-building compliance approach has used a measure that requires HERS field verification, a separate copy of the whole-building certificate of compliance must be submitted to the HERS Provider for every dwelling unit to satisfy the requirements of the HERS Provider data registry documentation procedures. In practice, the certificate of compliance information may not need to be submitted to the HERS Provider more than once, but a relationship must be established in the HERS Provider data registry between the whole-building certificate of compliance and the corresponding dwelling-specific certificates of installation, and the dwelling-specific certificates of verification. Thus, for the whole-building compliance approach in a multifamily building that has used a compliance option that requires HERS verification, the required energy compliance documentation for each dwelling unit should consist of a whole-building certificate of compliance (CF1R-PRF-01-E), a dwelling-specific certificate of installation (CF2R), and a dwelling-specific certificate of verification (CF3R).

When the whole-building compliance approach is used for a multifamily building, some of the energy efficiency measures that require HERS field verification cannot be used for compliance credit in the performance calculations. These HERS measures are excluded from the whole-building compliance approach because they would require dwelling-specific data input into the compliance software.

The measures that cannot be used for the multifamily whole-building compliance approach, but can be used for credit when dwelling units are individually modeled, include:

1. Buried Ducts credit.
2. Deeply Buried Ducts credit.
3. Reduced Supply Duct Surface Area credit.
4. Maximum Rated Total Cooling Capacity credit.
5. Building Envelope Sealing credit (blower door test).

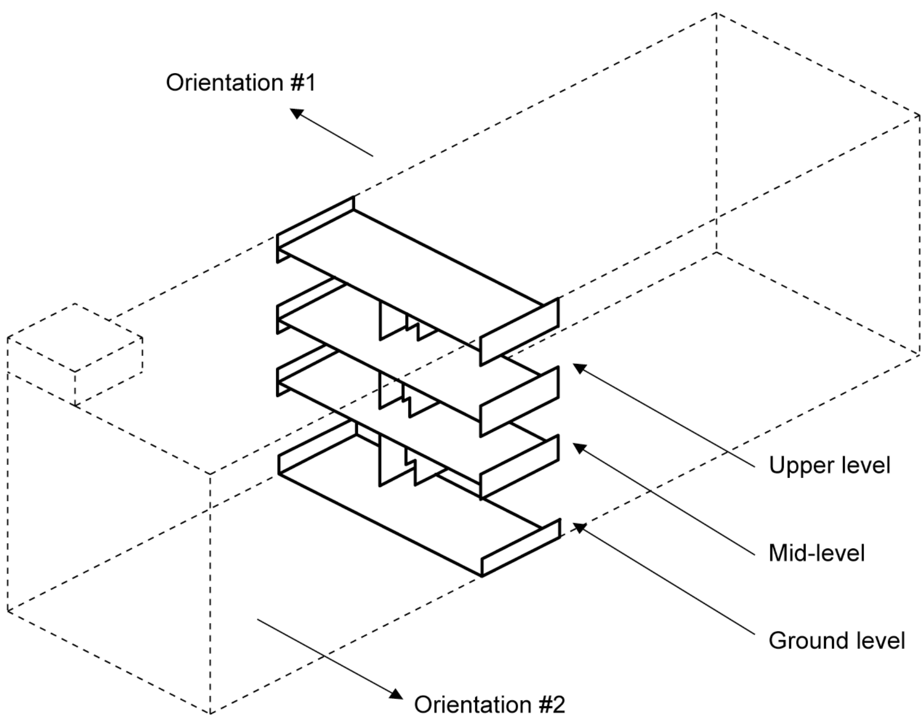
When the Energy Standards require registration of the compliance documents, the information for the certificate of compliance (CF1R), certificate of installation (CF2R), and certificate of verification (CF3R) must be submitted electronically to the HERS Provider data registry. Refer to Reference Residential Appendix RA2.3 for additional information on these document registration procedures.

8.4.2 Unit-by-Unit Compliance Approach – Fixed Orientation Alternative

The unit-by-unit compliance approach for multifamily buildings requires that each dwelling unit must demonstrate compliance separately. The fixed orientation alternative requires that each unique dwelling unit in the building, as determined by orientation and floor level, must be separately modeled using an approved computer program. In this approach, surfaces that provide separation between dwelling units may be ignored since they are assumed to have no heat loss or heat gain associated with them. Surfaces that provide separation between dwelling units and central/interior corridor areas must be modeled for heat transfer if the corridor area is not directly conditioned or indirectly conditioned space. (See Reference Joint Appendix JA1 for definition.) If the corridor area is conditioned, the corridor area may be modeled separately.

Different orientations and locations of each unit type within the building must be considered separately. That is, a one-bedroom apartment on the ground floor of a three-story building is different from the same plan on a middle floor or the top floor, even if all apartments have the same orientation and are otherwise identical. Likewise, end units must be modeled separately from the middle units, and opposite end units must also be modeled separately. With this approach, every unit of the building must comply with the Energy Standards, so this unit-by-unit approach is more stringent than modeling the building as a whole (See Figure 8-1).

Figure 8-1: Multifamily Building Compliance Option



Demonstrate Compliance for Each Generic Unit Type in Each of its Characteristic Locations

Example 8-2

Question

When preparing compliance calculations for a three-story apartment complex, I have the option of showing compliance for each dwelling unit or for the entire building. If I use the individual dwelling unit approach, do I need to provide calculations for every dwelling unit?

Answer

Each dwelling unit must comply with the Energy Standards when using this approach. When dwelling units have identical conditions, the calculations can be combined. This means you will show separate compliance for all unique conditions, such as:

- Front-facing north
- Front-facing west
- Front/side walls facing east and north
- Front/side walls facing east and south
- Middle units and both end units
- Exterior roof, no exterior floor
- Exterior floor, no exterior roof

Surfaces separating two conditioned spaces (such as common walls) have little heat transfer and can be disregarded in the compliance calculations.

Note: For multiple dwelling units that are identical in every way except orientation, a single multiple orientation report can be used to demonstrate compliance for those units. (See Section 8.4.3 below.)

8.4.3 Unit-By-Unit Compliance Approach – Multiple Orientation Alternative

Another option for showing unit-by-unit compliance for a multifamily building is the multiple orientation alternative. This method is similar to the method that may be used for single-family master plans in subdivisions (described in Section 8.5).

The performance method may be used to demonstrate that a dwelling unit plan in a multifamily building complies regardless of how it is oriented. To assure compliance in any orientation, the annual energy consumption must be calculated in each of the four cardinal orientations: true north, true east, true south, and true west. With this option, a dwelling unit plan must be modeled using the identical combination of energy features and levels in each orientation and must comply with the energy budget in each case. If a multifamily dwelling floor plan is used as both reversed and original/standard floor plan types, either the reversed plan or the original/standard plan may be used to demonstrate compliance, but compliance must be shown in all four cardinal orientations using only one of the plan types.

Each unique dwelling unit plan must be modeled using the worst-case condition for the energy features that the plan may contain within the multifamily building (for example, highest glazing percentage, least overhangs, largest wall surface area, and with exterior walls instead of party walls, if applicable). See Reference Residential Appendix RA 2.6.2 for information that describes how to determine when a dwelling is considered to be a unique model. Each unique dwelling plan must also be modeled separately for each unique floor level.

8.5 Subdivisions and Master Plans

Subdivisions often require a special approach to energy compliance, since they generally include one or a few basic building or unit plans repeated in a variety of orientations. The basic floor plans, as drawn, may also be used in a mirror image or reversed configuration.

The two compliance options for subdivisions are:

1. Model each individual building, or building condition, separately according to the actual orientation.
2. Model all four cardinal orientations for each building or plan type with identical conservation features for no orientation restrictions.

8.5.1 Individual Building Approach

The most straightforward compliance option for subdivisions is to analyze each building in the project separately using any compliance method. This may be practical for subdivisions with only custom buildings, or with only one or two specific orientations for each building plan. This approach requires that each unit comply separately, with separate documentation submitted for each unit plan in the orientation in which it will be constructed.

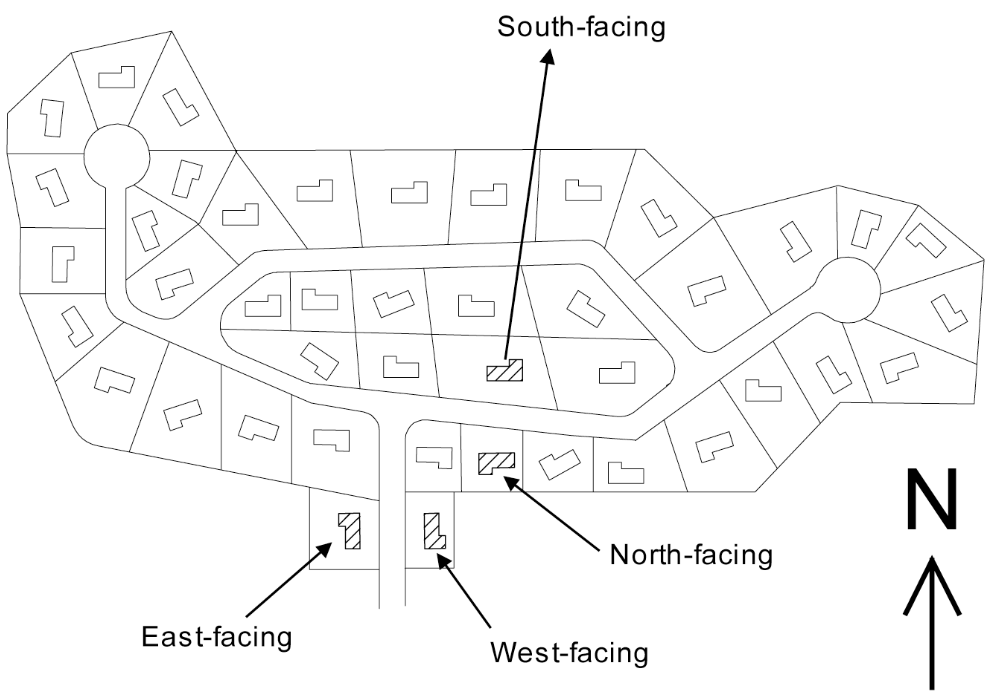
8.5.2 Multiple Orientation Alternative: No Orientation Restrictions

§150.1(b)

The performance method may be used to demonstrate that a single-family dwelling plan complies regardless of how it is oriented within the same climate zone. To assure compliance in any orientation, the annual energy consumption must be calculated in each of the four cardinal orientations: true north, true east, true south, and true west. With this option, the buildings must have the identical combination of conservation measures and levels in each orientation and comply with the energy budget in each case.

If a building floor plan is reversed, either the original plans or the reversed plans may be shown to comply in all four cardinal orientations.

Figure 8-2: Subdivisions and Master Plans Compliance Option



Demonstrate Compliance for Each Cardinal Orientation for Each Basic Model Type

For compliance, submit certificate of compliance documentation of the energy budgets for each of the four orientations to the enforcement agency. Only one CF1R form that documents compliance for all four orientations is required to be submitted to the enforcement agency for each unique plan.

Master plans that use the multiple orientation alternative and use a compliance approach that requires HERS field verification must submit a separate copy of the multiple orientation master plan certificate of compliance to the HERS Provider for every dwelling unit in the subdivision to satisfy the requirements of the HERS Provider data registry documentation procedures. In practice, the certificate of compliance information for each multiple orientation master plan may not need to be submitted to the HERS provider data registry more than once. However, a relationship must be established in the HERS Provider data registry among the applicable multiple orientation master plan certificate of compliance and the corresponding dwelling-specific installation certificates (CF2R), and the dwelling-specific certificates of field verification and diagnostic testing (CF3R). Thus, for the multiple orientation compliance approach in a master plan subdivision that has used a compliance option that requires HERS verification, the required energy compliance documentation for each dwelling unit should consist of a multiple orientation master plan certificate of compliance (CF1R), a dwelling-specific installation certificate (CF2R), and a dwelling-specific certificate of verification (CF3R).

8.6 HVAC Issues

8.6.1 No Cooling Installed

When a building does not have a proposed cooling system, there is no compliance credit. The air-conditioning system is modeled to be equivalent to Package A. A hypothetical cooling duct system is modeled as equivalent to Package A (for example, Attic, R-6) or as matching the heating system ducts. Modeling no ducts is not an appropriate assumption.

8.6.2 Equipment Without SEER or HSPF

For equipment without a tested seasonal energy efficiency ratio (SEER), the energy efficiency ratio (EER) is used in place of the SEER. Another option is to use the EER of the equipment and use it for both the SEER and EER entry. If this approach is used, the EER must be verified by a HERS Rater.

Equipment without an heating seasonal performance factor (HSPF) rating is assumed to have 3.41 HSPF (electric resistance), 3.55 (electric radiant), or an HSPF calculated from a COP as *HSPF = (3.2 x COP) – 2.4.*

8.6.3 Multiple HVAC Systems

Buildings with multiple HVAC systems can be treated several ways as follows:

1. For buildings that have more than one system type, equipment type, or fuel type, where the types do not serve the same floor area, model either the building zone or enter the floor area served by each zone type.
2. When multiple system types serve different thermal zones in one building, model each system and the associated thermal zone separately from other systems and zones.

   Note: If both zones are associated with attic space, then a portion of the attic must be modeled with each zone.
3. Floor areas that are served by more than one heating or cooling system, equipment type, or fuel type must be modeled for compliance using the system with the most TDV energy consumption. For any areas served with electric resistance heat and another heating system (except for wood heating), the electric resistance shall be deemed to be the most TDV energy consuming system. The only exceptions to this are supplemental heating units may be installed in a space served directly or indirectly by a more efficient primary heating system. This is allowed if the thermal capacity of the supplement unit

does not exceed 2 kilowatts (kW), or 7,000 British thermal units per hour (Btu/h), and if the supplemental unit is controlled by a time-limiting device not exceeding 30 minutes. See §150.1(c)8C.

When there is more than one system meeting the heating or cooling load for the same space, all systems must still meet all the mandatory requirements of the Energy Standards.

For example, in a building with an appliance rated gas fireplace in combination with a central gas furnace, the central furnace would be used as the primary system and the fireplace would be treated as the supplemental system. The controls for the fireplace would not need to meet the setback thermostat requirements of §110.2(c) due to the exception.

For rooms such as the bedroom or bathroom, spot heating with a supplemental system may be desirable. Exception to §150.1(c)6 is provided for installing either a 2 kW electric resistance or 7,000 Btu/h gas heaters, with a 30-minute timer control for such instances. Therefore, this type of supplemental space heating need not meet the setback thermostat requirement.

8.6.4 Existing + Addition + Alteration Approach

The performance approach may be used to show compliance for alterations in existing buildings, new additions, and Existing + Addition + Alteration discussed in Section 9.7 of this manual. The following table can be used to model existing conditions based on the year of the building construction.

Table 8-1: Default Assumptions for Year Built (Vintage)

Conservation Measure	Before 1978	1978 to 1983	1984 to 1991	1992 to 1998	1999 to 2000	2001 to 2003	2004 to 2005	2006 to 2013	2014 to 2016
INSULATION U-FACTOR									
Cool Roof	0.10	0.10	0.10	0.10	0.10	0.10	0.10	Pkg. A	Pkg. A
Radiant Barrier	None	None	None	None	None	None	Pkg. A	Pkg. A	Pkg. A
Roof/Ceiling	0.079	0.046	0.046	0.046	0.046	0.046	0.046	0.046	0.031
Wall	0.356	0.110	0.110	0.102	0.102	0.102	0.102	0.102	0.102
Raised Floor –Crawl Space	0.099	0.099	0.099	0.049	0.049	0.049	0.049	0.049	0.037
Raised Floor-No Crawl Space	0.238	0.238	0.238	0.064	0.064	0.064	0.064	0.064	0.049
Slab Edge F-factor	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73
Ducts	R-2.1	R-2.1	R-2.1	R-4.2	R-4.2	R-4.2	R-4.2	Pkg. A	Pkg. A
LEAKAGE									
Building (ACH50)	7.7	7.7	7.7	7.7	7.7	7.7	7.7	6.8	5.0
Duct Leakage (%)	15%	15%	15%	15%	15%	15%	15%	15%	6%
FENESTRATION									
U-factor	Use Energy Standards Table 110.6-A , §110.6 for all Vintages								
SHGC	Use Energy Standards Table 110.6-B , §110.6 for all Vintages								
Shading Devices	Interior: Assumed to have draperies (not user editable). Exterior: Assumed to have 50% bugscreens, model actual overhangs.								
SPACE HEATING EFFICIENCY									
Gas Furnace (Central) AFUE	0.75	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78
Gas Heater (Room) AFUE	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65
Hydronic/Comb Hydronic	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78
Heat Pump HSPF	5.6	5.6	6.6	6.6	6.8	6.8	6.8	7.4	7.7
Electric Resistance HSPF	3.413	3.413	3.413	3.413	3.413	3.413	3.413	3.413	3.413
Electric Resistance Radiant HSPF	3.55	3.55	3.55	3.55	3.55	3.55	3.55	3.55	3.413
SPACE COOLING EFFICIENCY									
All Types, SEER	8.0	8.0	8.9	9.7	9.7	9.7	9.7	13.0	13.0
WATER HEATING									
Energy Factor	0.525	0.525	0.525	0.525	0.575	0.575	0.575	0.575	0.575