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11. Performance Approach

11.1 Overview

This chapter summarizes the whole building performance approach to compliance. It includes a discussion of computer methods, the procedures involved in determining the energy budget and the proposed building's energy use, and how to plan check performance compliance. The basic procedure is to show that the Time Dependent Valuation (TDV) energy of the proposed design is less than or equal to the TDV energy of the standard design. The standard design is a building with the same geometry as the proposed design, but the envelope and lighting features are defined by the prescriptive package requirements while the mechanical system is defined by a specific system-type as described in the Nonresidential ACM Reference Manual.

The performance method is the most detailed and flexible compliance path. The energy performance of a proposed building design can be calculated according to actual building geometry and site placement. Credit for certain energy features, such as a high efficiency mechanical system, cannot be taken in the prescriptive approach, but can be evaluated with an approved compliance software program utilizing the performance approach.

11.2 Performance Method Description

The Nonresidential Alternative Calculation Method (ACM) Approval Manual describes the application and approval process for submitted compliance software. The Nonresidential ACM Approval Manual is adopted as part of the Building Energy Efficiency Standards (Energy Standards) rule making process. The Nonresidential ACM Reference Manual is approved by the California Energy Commission (Energy Commission) that includes explanations of the instructions that all compliance software programs use to model the energy performance of the Proposed Design Building and the Standard Design Building. The reference manual also includes an explanation of the reference method and certification tests used by the Energy Commission to approve compliance software tools. Since the Nonresidential ACM is approved by the Energy Commission (just like the residential and nonresidential compliance manuals), it can be updated from time to time to allow for corrections and enhancements during the 2016 Energy Standards cycle.

11.2.1 Performance Concepts

The Warren-Alquist Act requires "performance standards" that establish an energy budget for the building in terms of energy consumption per ft² of floor space. This requires a complex calculation of the estimated energy consumption of the building and the calculation is only suited for a computer. The Energy Commission has developed a public domain computer program to do these calculations. For compliance purposes, it also approves the use of privately developed computer programs as alternatives to the public domain computer program. The public domain computer program and the Energy Commission-approved privately developed programs are officially called alternative calculation methods. It is easiest to refer to these programs as "compliance software," which will be the term used throughout this manual.

11.2.2 Minimum Capabilities

Compliance software must simulate or model the thermal behavior of buildings including envelope surfaces, lighting, space conditioning and service water heating systems. The calculations take into account:

- Conductive and convective heat gain and heat loss through walls, roof/ceilings, doors, floors, windows, and skylights.
- Solar radiant heat gain from windows, skylights, and opaque surfaces.
- Heat storage effects of different types of thermal mass.
- Building operating schedules for people, lighting, equipment and ventilation.
- Space conditioning system operation including equipment part load performance.
- Covered process mechanical equipment (kitchens, laboratories, parking garages).

11.2.3 California Energy Commission Approval

11.2.3.1 Alternative Calculation Methods (Compliance Software)

Compliance software must be approved by the Energy Commission. Approval involves the demonstration of minimum modeling capabilities, required input and output, and adequate user documentation. The compliance software must be able to:

1. Automatically calculate the energy budget of the standard design.
2. Calculate the energy use of the proposed design in accordance with specific fixed and restricted inputs.
3. Print the appropriate standardized compliance documents with the required information and format when a proposed building complies. Other reports that do not resemble documents may be printed for buildings that do not comply.

11.2.3.2 Input and Output Requirements

Input and output requirements and modeling capabilities are tested by using the compliance software to calculate the energy use of certain prototype buildings under specific conditions. These results are compared with the results from a reference computer program, which is EnergyPlus. This is explained in detail in the Nonresidential ACM Reference Manual.

11.2.4 Time Dependent Valuation (TDV)

Beginning with the 2005 Energy Standards, the metric or “currency” for assessing building performance is time dependent valued (TDV) energy. TDV energy replaced source energy that had been the compliance metric since the Energy Commission first adopted the Energy Standards in 1978.

As the name implies, TDV values energy differently depending on the day of the year and hour of the day that a specific type of energy is used. This means that electricity saved on a hot summer afternoon will be worth more in the compliance process than the same amount of electricity saved on a winter morning. The value assigned to energy savings through TDV more closely reflects the market for electricity, gas, propane and other energy sources and provides incentives for measures, such as thermal storage or advanced daylighting that are more effective during peak periods.

Reference Appendix JA3 provides more information on TDV energy and detailed TDV data is available from the Energy Commission upon request. §100.2 states: “TDV multipliers for

propane shall be used for all energy obtained from depletable sources other than electricity and natural gas." A sample of the TDV values is shown below in Figure 11-1.

Figure 11-1: Annual TDV Energy Use Summary (Sample from NRCC-PRF-01-E)

B. COMPLIANCE RESULTS FOR PERFORMANCE COMPONENTS				§ 140.1
BUILDING COMPLIES				
1. Energy Component	2. Standard Design (TDV)	3. Proposed Design (TDV)	4. Compliance Margin (TDV)	5. Percent Better than Standard
Space Heating	5.8	5.7	0.1	1.7%
Space Cooling	6.6	13.3	-6.7	-101.5%
Indoor Fans	6.3	1.2	5.1	81.0%
Heat Rejection	1.3	--	1.3	--
Pumps & Misc.	4.2	--	4.2	--
Domestic Hot Water	23.3	24.8	-1.5	-6.4%
Indoor Lighting	41.2	41.2	--	0.0%
COMPLIANCE TOTAL	**88.7**	**86.2**	**2.5**	**2.8%**
Receptacle	42.6	42.6		0.0%
Process	--	--		--
Process Ltg	--	--		--
TOTAL	**131.3**	**128.8**		**1.9%**

11.2.4.1 Professional Judgment

Certain modeling techniques and compliance assumptions applied to the proposed design are fixed or restricted. That is, there is little or no freedom to choose input values for energy compliance modeling purposes. However, there are other aspects of energy modeling where some professional judgment may be necessary. In those instances, the compliance software user must decide whether a given input is appropriate.

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

Two questions may be asked in order to resolve whether appropriate 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, then 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 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, when applicable, should conform to standard engineering practice.

Example 11-1

Question

Three different sized windows in the same wall of a new one-story office building are designed without exterior shading, and they have the exact same 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 energy results whether or not 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.

11.3 Analysis Procedure

§140.1

This section is a summary of the analysis procedures used in demonstrating compliance with approved compliance software programs. Software users and those checking for enforcement should consult the most current version of the compliance software user's manual and/or on-line help and associated compliance supplements for specific instructions on the operation of the compliance software. Although there are numerous requirements for each software input, the data entered into each software version may be organized differently from one vendor to the next. As a result, it is not possible in this summary to present all variables in their correct order or hierarchy for any one software version. The aim is to identify the procedures used to calculate the standard design energy budget and the TDV energy use of the proposed building.

11.3.1 General Procedure

Any compliance software version approved by the Energy Commission may be used to comply with the Energy Standards. The following steps are a general outline of the process:

1. All detailed data for the building component(s) must be collected including fenestration areas and energy properties, wall, door, roof/ceiling, and floor areas, construction assemblies, mass characteristics, equipment specifications, lighting, and service water heating information from the drawings and specifications.
2. Although most compliance software requires the same basic data, some information and the manner in which it is organized may vary according to the particular software used. Refer to the compliance supplement that comes with each version of compliance software for additional details.
3. Be sure that the correct climate information has been selected for the building site location (see Reference Appendix JA2). Compliance software also adjusts outside heating and cooling design temperatures for local conditions using ASHRAE design data that is also located in Reference AppendixJA2.
4. Prepare an input file that describes the other thermal aspects of the proposed design according to the rules described in the software's compliance supplement.
5. Input values and assumptions must correctly correspond to the proposed design and conform to the required mandatory measures.
6. Run the compliance software to automatically generate the energy budget of the standard design and calculate the energy use of the proposed design.

11.3.1.1 **Computer Input Files**

When creating any 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 buildings being analyzed in the same project. Title names and explanatory comments should assist individuals involved in both the compliance and enforcement process.

11.3.2 Basic Data Entry

11.3.2.1 **Elements Used in Compliance Software**

The following elements are used by compliance software programs. These elements must be consistent with plans and specifications submitted in the building permit application:

1. **Opaque Walls**: Each opaque exterior wall construction assembly, wall area, orientation, and tilt. Heat capacities, or characteristics necessary to determine the heat capacity (conductivity, mass, volume) of opaque exterior walls, must be included. Interior demising wall area and characteristics must also be input.
2. **Doors**: All doors must be included.
3. **Opaque Roofs/Ceilings**: Each opaque exterior roof/ceiling construction assembly, roof/ceiling area, solar reflectance, thermal emittance, orientation, and tilt. Heat capacity, or characteristics necessary to determine the heat capacity (conductivity, mass, volume) of opaque exterior roof/ceilings, must be included.
4. **Raised Floors and Slab Floors**: Each floor construction assembly, including floor area.
5. **Fenestrations in Walls and Shading**: Each vertical glass area, orientation, tilt, U-factor, Solar Heat Gain Coefficient (SHGC), and Visible Transmittance (VT).
6. **Horizontal (Skylight) Glass and Shading**: Each horizontal or skylight glass area, orientation, tilt, U-factor and SHGC.
7. **Ventilation (Outside) Air**: Ventilation (or outside air) values in cfm/ft².
8. **Fan Power**: Fan power must be included. Fan power should be based on either brake horsepower (HP) at ARI conditions, nominal HP at ARI conditions, or brake horsepower at actual operating conditions (modeled horsepower must be substantiated by information contained in the construction documents).
9. **Cooling and Heating Efficiency**: The actual efficiency of the equipment included in the proposed design.
10. **HVAC System Type**: The basic type of the cooling and heating system (multiple zones or single zone) and the heating system fuel type (fossil fuel or electric). Note that some projects may have different system types serving separate zones.
11. **Sensible and Total Cooling System Capacity**: Sensible and total output capacity of the cooling system at ARI conditions.
12. **Heating System Capacity**: The output capacity of the heating system.
13. **Indoor Lighting:** Lighting loads and modeling non-mandatory controls for credit.
14. **Water Heating:** The water heating capacity, volume, and efficiency (including any solar thermal contribution).

15. **Other System Values**: All other space conditioning system components, process loads, or any other mechanical system that impacts the building energy performance must be included in the input file.

Refer to the compliance software user's manual for more detailed information on how each of the above values is used by the software.

11.3.3 Calculating TDV Energy

The compliance software calculates TDV energy for three main components:

1. The space conditioning energy use.
2. The indoor lighting energy use.
3. The service water heating energy use.

It does not allow energy credits or penalties for plug loads (even though a default value for the internal gains from plug loads is modeled in the hourly computer simulation), vertical transportation (elevators), outdoor lighting or other miscellaneous energy uses.

The proposed building energy budget is defined by §140.1(b) and includes the envelope, space conditioning and ventilation, indoor lighting, and water heating systems assigned to the building. The key component of calculating the TDV energy use of the proposed building is that if a feature of the building is not included in the building permit application, the energy use of that feature is equal to that of the standard energy budget defined in §140.1(a). That means that if a permit is submitted for a building shell (envelope only), and the performance approach is used to demonstrate compliance, trade-offs cannot be made between the envelope and the mechanical or lighting system.

The standard design budget is defined by replacing all of the energy features of the proposed building with a combination of the envelope features listed in the prescriptive package requirements in Tables 140.3 B or C of the Energy Standards. Lighting and mechanical values associated with the building occupancy and design are defined in the Nonresidential ACM Reference Manual.

11.3.3.1 Space Conditioning Energy Budget

The space conditioning energy budget is automatically determined from the software's user inputs and the corresponding elements of the proposed design. This budget is automatically re-calculated with each compliance run.

11.3.3.2 Lighting Energy Budget

The indoor lighting budget consists of the lighting power used by a building based on one of the following criteria:

1. When no lighting plans or specifications are submitted for permit and the occupancy of the space is not known, the standard lighting power density is 0.5 W/ft².
2. When no lighting plans or specifications are submitted for permit and the occupancy of the space is known, the standard lighting power is equal to the corresponding watt per ft² value derived in the Area Category Method of §140.6(c)2.
3. When lighting plans and specifications are submitted for permit, the standard lighting power is equal to the corresponding total allowed lighting power (in watts) that was used in calculating the proposed lighting level which can be based on either the Area Category Method or the Tailored Method (§140.6(c)2 or 3). A complete set of lighting plans and prescriptive documents are required to use the Tailored Lighting Method in

the performance approach. When this method is used to justify an increase in the allowed lighting watts, a lower lighting load in the proposed design cannot be modeled for credit. The standard design building uses the lesser of allowed Watts per ft² or actual lighting power to be installed in the building. The proposed design building uses the actual lighting power to be installed as detailed on the lighting plans. This value must be equal to or greater than the allowed Watts per ft².

For all occupancies except hotel guest rooms and high-rise residential living quarters, the proposed lighting power is input into the software. For residential occupancies (hotel guest rooms or high-rise residential buildings), the compliance software will automatically set the proposed lighting power and the standard design lighting power at the same value as specified in the Nonresidential ACM Reference Manual.

11.3.3.3 Service Water Heating Energy Budget

The service water heating budget consists of the service water heating energy used by a building assuming the service water heating system meets both the mandatory and prescriptive requirements for water heating.

The service water heating TDV energy use is calculated using one of two methods:

1. For nonresidential occupancies, a method described in the Nonresidential ACM Reference Manual uses the proposed design with minimal efficiency equipment as the standard design.
2. For hotels, motels and high-rise residential buildings, the water heating TDV energy budget is calculated using the methods and assumptions documented in the Residential ACM Reference Manual. This method sets the standard design based on gas fired equipment using a central system plus the solar thermal contribution. The installed system must be consistent with plans and specifications submitted in the building permit application.

11.4 Application Scenarios

The performance approach may be used for whole building permit applications; or for permit applications that involve any combination of building envelope, indoor lighting, and/or mechanical system. The performance method may be used to demonstrate compliance with the envelope alone or the mechanical system alone but cannot be used to show lighting compliance alone. A permit stage is when less than a whole building is being considered (e.g. the building envelope would be constructed in one permit phase, the mechanical system in another, etc).

11.4.1 Whole Building Compliance

Whole buildings are projects involving buildings where the applicant is applying for permits and submitting plans and specifications for all the major components of the building (envelope, mechanical, indoor lighting, and service water heating). This could be a first time tenant improvement that involves envelope, mechanical and lighting compliance, where plans and specifications for the entire building are being submitted for permit.

When a whole building is modeled using the performance approach, trade-offs can be made between the envelope, space conditioning, service water heating, and indoor lighting systems that are included in the permit application.

11.4.2 Compliance by Permit Stage

Compliance with only one or more building permit stages can be done using the performance approach except that indoor lighting cannot be done alone. A permit stage is a portion of a whole building permit: either envelope, mechanical, or lighting. This means that trade-offs in energy use are limited to only those features, or a single feature in the case of envelope or mechanical, included in the building permit application.

There are two basic scenarios that occur when performing compliance by permit stage:

1. Modeling future construction features that are not included in the permit application
2. Modeling existing construction that has complied with the Energy Standards.

11.4.2.1 **Modeling Future Construction by Permit Stage**

When a feature of a building is not included in the permit application, it is required to default to a feature automatically determined in the compliance software. The defaults vary for envelope, mechanical, and indoor lighting. The Nonresidential ACM Reference Manual and the software vendor's compliance supplements contain additional information on the default values.

The default envelope features do not apply when modeling future construction. Usually, this is the first permit requested and this feature must be modeled at a minimum. The proposed building's envelope features are input and an energy budget is automatically generated based on the proposed building's envelope, and/or space conditioning and indoor lighting system.

The default space conditioning system features are fixed if no space conditioning system is being permitted. The default space conditioning system is based on the standard design as determined in the Nonresidential ACM Reference Manual.

The default lighting system features depend on whether or not the occupancy of the space is known. If the space occupancy is known, the allowed lighting power is determined using the Area Category Method for each zone that the occupancy is known. If the space occupancy is not known, 0.5 W/ft² is assumed for both the proposed energy use and the energy budget

The default service water heating system features are fixed based on building occupancy. Default service water heating systems are specified for each occupancy type. For nonresidential occupancies other than hotels, motels and high-rise residential buildings the default is a gas-fired storage type system.

11.4.2.2 **Modeling Existing Construction by Permit Stage**

When existing indoor lighting or an existing mechanical system is not included in the permit application, the compliance software may use default values for certain inputs. The Nonresidential ACM contains additional information on the default values.

The envelope features are based on the compliance software user's inputs to the compliance software. The user inputs the proposed building's conditioned floor area, glazing, wall, floor/soffit, roof/ceiling, and display perimeter features. The compliance software then applies the proposed building's features to the standard design in order to calculate the energy budget. If an application for an envelope permit is not being sought, the compliance software will automatically default the features of the standard design to be the same as the features of the proposed design.

Default space conditioning system features are fixed based on the building's existing space conditioning system. The user inputs the existing space conditioning system, including

actual sizes and types of equipment. The compliance software then applies the proposed building's space conditioning features to create a standard design mechanical system used to calculate the energy budget. This means that if an application is not being sought for a mechanical permit, the compliance software will automatically default the features of the standard design to become the proposed design.

Default service water heating system features are fixed based on building occupancy. Default service water heating systems are specified for each occupancy type. Water heating information will only be listed as "Existing".

Default lighting system features are based on the known occupancy of the building. The allowed lighting power is determined based on the Area Category lighting power for the proposed design, or an existing modeled lighting power from field data. The compliance software then applies the proposed building's indoor lighting power to the standard design in order to calculate the energy budget. This means that if an application for a lighting permit is not being sought, the compliance software will automatically default the lighting features of the standard design to be the same as the lighting features of the proposed design.

11.4.3 Additions Performance Compliance

An addition that consists of both new conditioned floor area and added volume will be treated similar to a new building in the performance approach. All systems serving the addition will require compliance to be demonstrated; and either the prescriptive or performance approach can be used for each stage of the construction of the addition.

Note: When existing space conditioning or water heating is extended from the existing building to serve the addition, those systems do not need to comply with new construction energy efficiency requirements; however, all applicable mandatory measures must be met for new components and controls.

11.4.3.1 **Addition Only**

Additions that show compliance with the performance approach independent of the existing building must meet the requirements for new buildings. §141.0(a) states that the envelope and indoor lighting of the addition, any newly installed space conditioning, electrical power distribution system, or water heating system must meet mandatory measures and the applicable energy budget:

1. If the permit is done in stages, the rules for each permit stage apply to the addition’s performance run.
2. If the whole addition (envelope, lighting and mechanical) is included in the permit application, the rules for whole buildings apply.

11.4.3.2 **Existing Plus Addition**

Additions may also show compliance by either:

1. Demonstrating that efficiency improvements to the envelope component of the existing building, as well as certain indoor lighting and mechanical improvements, offset substandard addition performance (see §141.0(a)2Bii).
2. Showing that the existing building combined with the addition meet the requirements of §141.0(b) as new construction.

§141.0(a)2 states that the envelope and indoor lighting in the conditioned space of the addition, and any newly installed space conditioning, electrical power distribution system or service water heating system, must meet the mandatory measures. The energy use of the

combination of the altered existing building plus the proposed addition shall be equal to or less than the energy use of the existing building with all alterations meeting the requirements of §141.0(b)2 plus the standard energy budget of an addition that complies with §140.1.

This approach allows the applicant to improve the energy efficiency of the existing building so that the entire building meets the energy budget that would apply if the existing building were unchanged, and the addition complied on its own. Changes to features in the existing building are considered alterations.

For a full description of when and how altered components in the existing building are counted as a credit or penalty in the performance calculation, as well as basic energy modeling rules for alterations, see Section 11.4.4.2 below.

Example 10-2

Question

3,000 ft² of conditioned space is being added to an existing office building. 25% of the lighting fixtures in the existing office space are being replaced with more efficient fixtures. Can credit be taken for the improved lights in the existing building to comply through the existing-plus-addition performance approach?

Answer

Credit can only be taken for lighting efficiency improvements resulting in a lower lighting power than is required to meet §140.6. Otherwise, credit may be taken for improvement(s) to the envelope components only. Lighting in the existing building must meet all prescriptive requirements in this case (more than 10% of the lighting fixtures are replaced or the connected load is increased).

11.4.4 Alterations Performance Compliance

Using the performance approach for an alteration is similar to demonstrating compliance with an addition.

11.4.4.1 Alterations of the Permitted Space

Altered spaces can show compliance with the performance approach independent of the remainder of the existing building, but must still meet the requirements for the altered components of the building as specified in §141.0(b)2. These require that envelope and lighting alterations, as well as any new or replacement space conditioning or service water heating system serving the alteration, meet the mandatory measures. The permitted space alone may comply with the energy budget determined using approved compliance software.

If the permit is done in stages, the rules for each permit stage apply to the alteration performance run.

11.4.4.2 Alterations in Existing Buildings without an Addition

Alterations may also show compliance by demonstrating that the energy use of the proposed design -- including all energy efficiency improvements to the existing building -- is equal to or less than the standard design energy budget which is based on the alterations meeting the requirements of §141.0(b)2 and Table 141.0-D of the Energy Standards. Note that §141.0(a)1 also requires that envelope, lighting, space conditioning and service water heating system alterations meet the applicable mandatory measures.

This approach allows the applicant to improve the energy efficiency of the existing building so that it meets the energy budget that would apply to the entire building if the existing

building other than the portion being altered was unchanged. Changes to features in the existing building are considered alterations.

An energy penalty is assigned to any altered component that does not meet or exceed the requirements of §141.0(b)2B. A credit is assigned to an alteration (improvement) that exceeds the requirements in §141(b)2B as summarized in Table 141.0-D of the Energy Standards and further detailed in the Nonresidential ACM Reference Manual. The compliance software sets the standard design for the altered component as listed in Table 141.0-D of the Energy Standards.

This compliance approach includes the entire building which means the ensemble of all enclosed space in a building, including the space for which a permit is sought, plus all conditioned and unconditioned space within the structure. The inclusion of the characteristics of unconditioned spaces have an effect on the overall performance budget of the building due to the loads of the unconditioned spaces adjacent to the conditioned spaces which can be beneficial to the overall compliance margin.

When using this compliance approach it is important to take into account all changes in the building's features that are:

- **EXISTING** (that remain unchanged);
- **ALTERED** (improved or replacement); and
- **NEW** (all new).

Note that surfaces which are being completely removed from the existing building – roofs/ceilings, exterior walls and floors, and all glazing removed within those surfaces – are not modeled. Except for replacement fenestration with third party verification of the existing glazing type allowed for trade-off by improving the existing building, which is limited to the amount a particular improvement exceeds the applicable prescriptive requirements of §141.0(b)2.

To show compliance with this approach you need to follow the instructions in the compliance software user's manual. Documentation of the existing building's glazing areas is required to be submitted with the permit application if this method is used for replacement fenestration credit.

Example 11-3

Question

Alterations to an existing office building in Climate Zone 12 includes replacing all single clear metal frame operable windows with new NFRC-rated windows (U-factor =0.45, SHGC=0.31.) What standard design values will the compliance software use for the replacement fenestration area?

Answer

The standard design will use the values in Table 141.0-A (U=0.47, SHGC=0.31 and VT=0.32) of the Energy Standards regardless of whether the replacement windows' values exceed those Table 141.0-A values of the Energy Standards.

11.4.4.3 **Existing-Plus-Addition-Plus-Alteration**

For additions, the most flexible compliance method is to consider the entire existing building along with the addition (Existing + Addition + Alteration)[1]. The combination of additions and alterations to the existing building may be shown to comply by demonstrating that the proposed design energy use is equal to or less than the standard design energy budget based on the alterations meeting the requirements of §141.0(b)2 summarized in Table 141.0-D of the Energy Standards and additions meeting the requirements of §141.0(a)2.

For a full description of when and how altered components in the existing building are counted as a credit or penalty in the performance calculation, see Section 11.4.4.2.

Using this compliance method, credit may be taken for energy efficiency features added to the existing building. When the prescriptive approach is used, compliance can be demonstrated if the altered component meets or exceeds the requirements of §141.0(b)1 for that component. When the performance approach is used, the altered component must meet or exceed the requirements in §141.0(b)2, or another alteration(s) must be made to the existing building that exceeds the requirements of §141.0(b)2 and saves the additional energy necessary to make up for the alteration(s). Alternatively, when there is an addition, the addition can be designed to exceed prescriptive requirements to offset proposed existing building alterations that do not meet prescriptive requirements.

Alterations may include previous fenestration improvements that were made to the building after original permit (when the existing building was first constructed). The upgraded efficiency values of the current fenestration must be documented as the proposed design; and the standard design is based on the current Energy Standards. The permit applicant must provide evidence that the previous glazing improvements were made subsequent to the original construction of the building and documentation to confirm the glazing type of the previously existing fenestration. Such evidence may involve a receipt, a signed statement from previous owners, or in case where previous owners are not available, a signed statement of the current owner or other record. Note that previous fenestration improvements that have been used to achieve compliance for previous additions and alterations cannot be considered for compliance for subsequent additions and alterations.

11.4.5 Alternate Performance Compliance Approach

Any addition, alteration or repair may demonstrate compliance by meeting the requirements applicable to new buildings for the entire building. Using this method, the entire building could be shown to comply in permit stages or as a whole building. The rules for new buildings permit stage compliance (Section 11.4.1) and whole building compliance (Section 11.4.2) would apply.

Documentation of the existing building's features is required to be submitted with the permit application if this method is used.

[1]This method may also is be used whenever an alteration is made to existing buildings, whether or not there is an addition to the building at the same time.

11.5 Enforcement and Compliance

At the time a building permit application is submitted to the enforcement agency, the applicant also submits plans and energy compliance documentation. This section describes the documents and procedures for documenting compliance with the performance requirements. The Nonresidential ACM has specific and detailed output/reporting requirements for all approved compliance software.

Compliance software output is required to specify the run initiation time, a unique run code, and the total number of pages of documents printed for each proposed building run on each page whenever a building complies with the Energy Standards. The plan checker is strongly encouraged to verify these output features for a performance compliance submittal to ensure that the submittal is a consistent set of compliance documentation. The Nonresidential ACM Reference Manual forbids compliance software from printing valid compliance documents for a proposed building design that does not comply. The plan checker should pay special attention to the PRF-01 document and the Exceptional Conditions List on that document. Every item on the Exceptional Conditions List deserves special attention and may require additional documentation, such as manufacturer's cut sheets or special features on the plans and in the building specifications.

The compliance software requirements will automatically produce and reiterate the proper set of documents that correspond to the particular proposed building submitted for a permit. However, the plan checker should verify the type of compliance and the required documents. Whenever an existing building or existing building components are involved in the compliance calculation, the plan checker should look for the term EXISTING that identifies EXISTING building components that remain unchanged. Similarly if the compliance document indicates a component is ALTERED these changes should be verified. In the types of permit applications where some building components are unknown, the unknown components cannot be entered by the user and cannot be reported on output documents. The PRF-01 document will show all the pertinent information required for a complete submittal.

The compliance documents associated with the performance approach are generated automatically and the entire printout is called the PRF-01.

Unless minimal efficiency and default capacities are used in the performance analysis, design drawings or specifications must be provided to document the differences in the capacities and efficiencies of the proposed equipment.

Other documentation supporting each non-standard or non-default value used in the performance approach and indicated in the Exceptional Conditions list on the PRF-01 document must also be included.

11.5.1 Performance Inspection

Performance approach inspection is identical to other inspections required by the Energy Standards. For information on inspection of envelope, mechanical and lighting systems, refer to Chapter 2, Compliance and Enforcement.