PRESCRIPTIVE ENERGY COMPLIANCE

FOR RESIDENTIAL ADDITIONS

COMPLIANCE PACKET

for the July 1992 Energy Efficiency Standards

MONROVIA, CALIFORNIA	NINE (9)
Building Department	**Climate Zone**

March 1994

CALIFORNIA ENERGY COMMISSION

City of MONROVIA
Department of Community Development • Building Division

PREAMBLE

In response to requests from both building departments and individual homeowners, the California Energy Commission has developed a tool to help homeowners demonstrate energy compliance for additions using the prescriptive approach. The **PRESCRIPTIVE ENERGY COMPLIANCE FOR ADDITIONS COMPLIANCE PACKET** provides the forms and information necessary to demonstrate prescriptive compliance of most additions and includes:

- Step by step instructions for demonstrating energy compliance using the prescriptive approach.
- Comprehensive table of prescriptive requirements for Packages D and E for all climate zones.
- Guidelines for prescriptive compliance of an addition **requiring minimum calculations and documentation.**
- Step by step thermal mass calculation worksheet.
- Certificate of Compliance and Mandatory Measures Checklist

In addition to the material provided by the California Energy Commission, the City of Monrovia has provided some additional information at the end of the packet. Included are drawings showing lighting requirements for kitchens and bathrooms, a list of energy consultants who can prepare energy calculations should you choose Options 2, 3 or 4 as discussed on page 1 of the packet and a list of information and notes which the City requires to be on the plans.

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TABLE OF CONTENTS

ENERGY COMPLIANCE FOR ADDITIONS - OVERVIEW

Introduction

This compliance packet is designed to help homeowners demonstrate energy compliance for an addition using the prescriptive compliance method, the simplest approach for demonstrating energy compliance.

Compliance Options for Additions

Any one of several options may be used in demonstrating energy compliance of an addition:

Option 1	Show that the addition alone meets the applicable prescriptive requirements.
Option 2	Show that the addition alone meets the performance method energy budget.
Option 3	Show that the remodeled building including the addition uses the same or less energy than the unimproved building and a separate addition that meets the performance method energy budget. (*This option allows you to take credit for increasing the conservation level of the existing building as part of the construction of the addition.*)
Option 4	Show that the whole existing-plus-addition building meets the prescriptive requirements or the performance method energy budget for the building as a whole.

Option 1, prescriptive compliance of an addition alone, is the simplest approach. This packet discusses only *Option 1*. If your design does not comply using this option, then you must either alter the design so it can meet *Option 1* or try to demonstrate compliance using one of the other options. For assistance in meeting compliance using one of the other options, refer to the *Residential Manual*. (See "*Where to Find Help*" on page 3.)

DEFINITIONS

Addition is defined as any change to a building that increases conditioned (heated or cooled) floor area and conditioned volume. Examples of additions include:

- New conditioned floor area and volume added to a building
- New conditioned space in an existing unconditioned building such as the remodel of a previously unheated basement, attic or garage

(Note that a loft which increases conditioned floor area, but not volume, would not be considered an addition.)

Conditioned Footprint Area is the total area of floor over unconditioned space, ambient air and slab-on-grade.

Fenestration Product is any transparent or translucent material plus any sash, frame, mullions, and dividers in the walls or roof/ceiling of a building including, but not limited to : windows, sliding glass doors, French doors, skylights, curtain walls and garden windows.

Interior Mass Capacity (IMC) is [Area of building material] x [UIMC of the material]

Mandatory Measures are minimum requirements for energy conservation which must be met in all cases regardless of compliance approach.

Note: The mandatory measures represent a minimum level of conservation. Mandatory measures may be superseded by the features required in the compliance approach if those features are more stringent.

All mandatory measures must be installed at or above the minimum required level. You must indicate proof of compliance by completing and submitting a Mandatory Measures Checklist (MF-1R) (see Attachment 3) along with your other energy documentation. In the column labeled "Designer," put the page number of the plan sheet which shows the required mandatory measure. Notes or details in the plans should also show all applicable mandatory features so the builder will clearly understand what is required.

Raised Floor Building is a building with a raised floor equal to 50 percent or more of its conditioned footprint area.

Slab-on Grade Building is a building with slab-on-grade floor area equal to more than 50 percent of its conditioned footprint area.

Unit Interior Mass Capacity (UIMC) is a measure of the effective heat capacity of a material.

Note: The greater the UIMC of a material, the greater the heat storage potential of the material. Building materials with a high UIMC value can moderate temperature variations in a home most effectively and thereby reduce heating and air conditioning needs.

HOW TO DEMONSTRATE ENERGY COMPLIANCE FOR AN ADDITION USING THE PRESCRIPTIVE PACKAGES

Step 1 Determine if your building is an addition as defined on page 2 of this packet.

Step 2 Determine if your addition is a *slab-on-grade (Package D)* building or a *raised floor (Package E)* building as defined on page 2.

Note: Packages D and E are the most commonly used prescriptive packages. For other package options, call the Commission's Energy Hotline or refer to the Residential Manual.

Step 3 Refer to **Table 1** (Page 4) for a summary of the prescriptive requirements for your addition based on the square footage of the addition.

Step 4 Wherever **Table 1** references "package" requirements, refer to **Table 2** (Page 5) for specific requirements for Packages D and E.

Step 5 Determine which Climate Zone your addition is in (your building department can give you this information.) Comply with the requirements applicable to your climate zone. To demonstrate prescriptive compliance of an addition with minimum calculation and documentation requirements, follow the guidelines provided on page 6.

Step 6 Refer to the **Mandatory Measures Checklist (MF-1R)** (Attachment 3) and verify that the addition meets all applicable mandatory measures. Include a completed MF-1R with your compliance documentation.

Step 7 Complete a **Certificate of Compliance (CF-1R)** (Attachment 4) to document energy features in your addition. Attach a copy of the CF-1R to your building plans.

Where to Find Help

For additional information, call the **Energy Hotline** at (916) 654-5106 or (800) 772-3300 from 8 a.m. - noon and 1-3 p.m.

TABLE 1: PRESCRIPTIVE COMPLIANCE OF ADDITIONS
Summary of Section 152(a)1 Requirements of the Standards

COMPONENT	FLOOR AREA OF ADDITION (Square Feet)			
	≤ 100	100-499	500-999	≥ 1000
Insulation				
Ceiling	R-19	Package[1]	Package	Package
Wall[2]	R-13	R-13	R-13	Package
Floor	R-13	Package	Package	Package
Fenestration				
U-Value[3]	0.75	0.75	Package	Package
% of Conditioned Floor Area	≤ 50 Sq. Ft.	Pkg + Removed[4]	Pkg + Removed	Package
Shading	n/a	Package	Package	Package
Thermal Mass	n/a	Package	Package	Package
Space Heating & Cooling	Mandatory[5] (No electric)[6]	Package (No electric)	Package (No electric)	Package (No electric)
Water Heating				
No Change	n/a	n/a	n/a	n/a
Replacement: No Increase	No Electric[7]	No Electric[7]	No Electric[7]	No Electric[7]
Increase	Allowed w/ Calculation[8]	Allowed w/ Calculation	Allowed w/ Calculation	Allowed w/ Calculation

1. Meet the component prescriptive requirement for Package D for slab-on-grade construction or Package E for raised floor construction (see Table 2) and all mandatory requirements.
2. "Heavy" and "Light Mass" mass walls may meet the Package D or E requirements for mass wall insulation instead of R-13 (see Chapter 3 of the *Residential Manual*).
3. For compliance of additions and alterations only, dual glazed "greenhouse" windows and skylights may be assumed to meet this requirement.
4. The Package D or E fenestration area plus the area of any glazing removed because of the addition.
5. All applicable mandatory measures for insulation or HVAC systems must be met (see Attachment 3 for a copy of the Mandatory Measures Checklist. Refer to Chapter 2 of the *Residential Manual* for additional information.)
6. No electric resistance space heating may be installed.
7. No electric resistance water heating may be installed.
8. If the total number of water heaters increases in the residence, then the entire existing plus addition system must meet the water heating energy budget (see Chapter 6 of the *Residential Manual*). Table 3-4 of the *Residential Manual* lists water heating system combinations which have been pre-calculated to comply with the water heating budget.

TABLE 2
Prescriptive Requirements - Packages D and E
For use with Table 1

CLIMATE ZONE		1	2	3,4,6,7	5	8,9,10	11,12,13	14	15	16
ENVELOPE R- VALUES										
	Ceiling	38	30	30	30	30	38	38	38	38
	Wall	21	13	13	13	13	19	21	21	21
	Heavy Wall[1]	4.76	2.44	2.44	2.44	2.44	4.76	4.76	4.76	4.76
	Slab Floor	NR	NR	NR	NR	NR	NR	NR	NR	7[2]
	Raised Floor	19	19	19	19	19	19	19	19	19
FENESTRATION/GLAZING										
	U-value	.65	.65	.75	.75	.75	.65	.65	.65	60
	Maximum area	16%	16%	20%	16%	20%	16%	16%	16%	16%
SHADING COEFFICIENT										
	South Facing	.66	.66	.66	.66	.66	.66	.66	.40	.66
	West Facing	.66	.66	.66	.66	.40	.40	.40	.40	.66
	East Facing	.66	.66	.66	.66	.40	.40	.40	.40	.66
	North Facing	.66	.66	.66	.66	.66	.66	.66	.66	.66
THERMAL MASS		***** See Thermal Mass Calculation - Attachment 1 *****								
SPACE HEATING EFFICIENCY										
If Gas:	AFUE	78%	78%	78%	78%	78%	78%	78%	78%	78%
If Heatpump:	HSPF	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8
If Heatpump:	HSPF	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6
SPACE COOLING EFFICIENCY										
If Split:	SEER	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
If Package:	SEER	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7
WATER HEATING		***** See Table 1 *****								

MONROVIA

1. "Heavy" walls have a wall weight exceeding 40 pounds per square foot. The exterior wall used to meet this R-value cannot also be used to meet the thermal mass requirement. Heavy mass walls include, but are not limited to, walls constructed of concrete block, adobe, or other masonry materials.

2. Slab insulation must be installed along the slab edge to a depth of 16 inches or the depth of the footing, whichever is less. In a raised floor building, slab edge insulation must be installed along any slab portions of the building. Perimeter insulation is not required along the slab edge between conditioned space and the concrete slab of an attached unconditioned enclosed space, covered porches, or covered patios.

GUIDELINES FOR PRESCRIPTIVE COMPLIANCE OF AN ADDITION WITH MINIMUM CALCULATION AND DOCUMENTATION REQUIREMENTS

(Note: The following guidelines provide simple options; for other alternatives, refer to the Residential Manual. All features specified must be included on the plans, the CF-1R, and, where applicable, the MF-1R)

BUILDING ENVELOPE

Insulation Minimums: Specify batt or blown-in insulation with the required R-value between wood framing.

FENESTRATION

Maximum U-Value: Specify fenestration products certified to have a U-value equal to or less than the required U-value. Alternatively, the following fenestration products meet the .60, .65, and .75 U-value requirement in additions using the Commission's default U-value table:

- Any dual-glazed non-metal (such as wood or vinyl) frame product
- Any dual glazed skylights or dual glazed greenhouse windows

In addition, the following fenestration products meet the .75 U-Value requirement:

- Any dual glazed, metal frame, fixed (non operable) product
- Any dual glazed, thermally broken, metal framed product

SHADING COEFFICIENT

To meet a .66 shading coefficient requirement: Specify dual glazing.

To meet a .40 shading coefficient requirement, specify one of the following:

- Dual glazing with opaque white or translucent light interior roller shades
- Dual glazing with an exterior shade screen (with a shading coefficient = .34 or lower)
- Dual glazed wood framed French doors with less than or equal to 50% glass

Note: Shading devices used to meet the .40 shading coefficient requirement must be noted on the plans and installed at the time of final inspection. Any exterior shade screen used to meet this requirement must have manufacturer's literature documenting the product's shading coefficient.

THERMAL MASS

See Attachment 1, *Thermal Mass Calculation for Prescriptive Compliance of an Addition*

SPACE HEATING - Efficiency requirements for new equipment:

To meet the 78% AFUE requirement, specify an automatic dual setback thermostat with one of the following:

- Any central gas furnace listed in the Commission's *Directory of Certified Central Gas Furnaces* as meeting current standards
- Wall furnaces listed in Attachment 2

To meet the heat pump efficiency requirements, specify an automatic dual setback thermostat with the following:

- Any heat pump listed in the Commission's *Directory of Certified Central Air Conditioners and Heat Pumps* as meeting current standards

SPACE COOLING - Efficiency requirements for new equipment:

To meet the SEER requirement, specify an automatic dual setback thermostat with any unit listed in the Commission's *Directory of Certified Central Air Conditioners* as meeting current standards

WATER HEATING

No additional water heater is allowed without demonstrating compliance with water heating calculations or as a pre-calculated system. Refer to Chapter 6 of the *Residential Manual* for additional information.

Attachment 1

THERMAL MASS CALCULATION
(for prescriptive compliance of an addition)

Introduction

Thermal mass stores heat as a house warms and slowly releases the stored heat as the house cools. This helps moderate temperature variations within the home and reduces the need to use heating and cooling equipment.

For a slab-on-grade addition, thermal mass is only required when the addition increases the slab-on-grade area of the house. Therefore, for a second story addition to a slab-on-grade house, no additional thermal mass is required.

For a raised-floor addition, thermal mass is only required when the addition increases the conditioned footprint area (Refer to Page 2 for definitions). Therefore, for a second-story addition to a raised floor house no additional thermal mass is required if the conditioned footprint remains the same.

When thermal mass is required, refer to the following pages for a step-by-step sample calculation and a thermal mass calculation form.

Thermal Mass Surfaces

The following table, reprinted from the Residential Manual, lists thermal mass materials and designates which **floor** coverings are acceptable in specific locations in order to qualify for thermal mass credit.

Table G-15: Thermal Mass Coverings and Associated Categories[1]

Category 1: Acceptable as Exposed Mass In Any Location Within the Addition. Floor coverings/surfaces determined to be acceptable on any portion of a slab designated as thermal mass in any location within the conditioned space of the addition.

Category 2: Acceptable as Exposed Mass Only In Kitchens, Dining Areas which are Extensions to Kitchens, Pantries, Bathrooms, Laundry Rooms, Service Porches and/or Entries of the Addition. Concrete slabs with Category 2 surfaces must be treated as covered slab in other locations.

1. The intent of these guidelines is to prevent taking exposed thermal mass credit for floor materials that are likely to be covered with carpeting at the time of building occupancy.

Covering/Surface	Category
Brick	1
Concrete, Exposed Aggregate	1
Concrete, Painted and/or Polished	2
Concrete, Stamped	1
Concrete, Unfinished	2
Hardwood Veneer (except when installed on wood sleepers)	1
Resin-based Poured Flooring	2
Stone or Stone Veneer	1
Sheet Vinyl	2
Tile, Asphalt	2
Tile, Ceramic	1
Tile, Terrazo	1
Tile, Vinyl	2
Tile, Vinyl-Asbestos	2
Other Masonry Materials with Permanent Finishes Similar to Those Specified in Category 1 and Acceptable to the Building Official	1

SLAB-ON-GRADE ADDITIONS - Thermal Mass Compliance Options

For slab-on-grade construction, the thermal mass requirement can be met in one of three ways:

Option 1: 20% of the new slab-on-grade area must be exposed.

Option 2: Use two layers of 1/2" gypsum board on the walls and ceiling.

Option 3: Perform the following calculations to account for various common mass types within the addition:

A) Calculate the required thermal mass for a slab floor addition using the following calculation:

2.36 x _____ square feet = _____
(New slab-on grade area) (Minimum IMC goal)

B) Calculate the thermal mass Interior Mass Capacities (IMCs) by multiplying the area of each type of thermal mass times the Unit Interior Mass Capacity (UIMC) for that mass. UIMC values for common masses are included in the calculation. (A complete list of UIMC values is included in Table 3-2a of the ***Residential Manual***.)

Type of mass	Mass Area		UIMC		IMC
Covered Slab	_____	x	1.8	=	_____
Exposed Slab	_____	x	4.6	=	_____
0.63"(5/8) Gypsum	_____	x	0.1	=	_____
1.0" Gypsum	_____	x	0.5	=	_____
0.50" Tile	_____	x	0.8	=	_____
1.0" Tile	_____	x	1.7	=	_____
			Total	=	_____

C) If the total IMC meets or exceeds the minimum IMC goal, the thermal mass requirement is met.

EXAMPLE 1: Thermal Mass Calculation for a Slab-On-Grade Addition

A 600 (20'x30') square foot slab-on-grade addition is proposed with a completely carpeted slab floor (covered slab) and 5/8" gypsum board walls. The walls are 8 feet high and contain 100 square feet of glazing and doors. Does this addition meet the thermal mass requirement?

Answer:

A) Calculate the minimum IMC required:

2.36 x 600 (New slab-on grade area) square feet = 1416 (Minimum IMC goal)

B) Calculate the thermal mass Interior Mass Capacities (IMCs) by multiplying the area of each type of thermal mass times the Unit Interior Mass Capacity (UIMC) for that mass. UIMC values for common mass types are included in the calculation. (A complete list of UIMC values is included in Table 3-2a of the ***Residential Manual***.)

Gross Wall Area = [100ft (wall length) x 8ft (wall height)]= 800 square feet
Net Wall Area = 800sf - 100sf (area of openings) = 700 square feet

Type of mass	Mass Area		UIMC	IMC
Covered Slab	600	x	1.8 =	1080
Exposed Slab		x	4.6 =	
0.63"(5/8) Gypsum	700	x	0.1 =	70
1.0" Gypsum		x	0.5 =	
0.50" Tile		x	0.8 =	
1.0" Tile		x	1.7 =	
			Total =	1150

C) The total IMC is less than the minimum IMC goal, therefore the thermal mass requirement is not met.

Since 1150 (Total IMC) < 1416 (Minimum IMC goal), the thermal mass requirement is **not** met.

IF the proposed walls are changed to 1" gypsum board, the IMC for the walls would be (700 x 0.5)= 350. This would change the total IMC to 1080+350 = 1430.

Since 1430 (Total IMC) > 1416 (Minimum IMC goal), the thermal mass requirement is met!

RAISED FLOOR ADDITIONS - Thermal Mass Compliance Options

For raised floor additions, the thermal mass requirement can be met in one of three ways:

Option 1: 5% of the new conditioned footprint area must be an exposed 2" thick concrete slab.

Option 2: Use 5/8" gypsum board on all walls and on the ceiling.

Option 3: Calculate the thermal mass required for a raised floor addition using the following calculation:

A) 0.18 x _____ square feet = _____
(Conditioned floor area) (Minimum IMC goal)

B) Calculate the thermal mass Interior Mass Capacities (IMCs) by multiplying the area of each type of thermal mass times the Unit Interior Mass Capacity (UIMC) of the mass listed in the calculation. (A complete list of UIMC values is included in Table 3-2a of the ***Residential Manual.)***

Type of mass	Mass Area		UIMC		IMC
Covered Slab	_____	x	1.8	=	_____
Exposed Slab	_____	x	4.6	=	_____
0.63"(5/8) Gypsum	_____	x	0.1	=	_____
1.0" Gypsum	_____	x	0.5	=	_____
0.50" Tile	_____	x	0.8	=	_____
1.0" Tile	_____	x	1.7	=	_____
			Total	=	_____

C) If the total IMC meets or exceeds the minimum IMC goal, the thermal mass requirement is met.

Example 2: Thermal Mass Calculation for a Raised Floor Addition

A 900 square foot second story addition is proposed in a raised floor house. Six hundred square feet of the addition are directly above the first floor conditioned area. The remaining 300 square feet are over the garage. There are 550 square feet of wall that is covered with 5/8" gypsum board. Does this addition meet the thermal mass requirement?

Answer:

A) Calculate the minimum IMC required:

New Conditioned Footprint Area = 300 square feet over unconditioned space

0.18 x 300 square feet = 54
(New conditioned footprint area) (Minimum IMC goal)

B) Calculate the thermal mass Interior Mass Capacities (IMCs) by multiplying the area of each type of thermal mass times the Unit Interior Mass Capacity (UIMC) for that mass. UIMC values for common mass types are included in the calculation. (A complete list of UIMC values is included in Table 3-2a of the ***Residential Manual.)***

Type of mass	Mass Area		UIMC		IMC
Covered Slab		x	1.8	=	
Exposed Slab		x	4.6	=	
0.63"(5/8) Gypsum	550	x	0.1	=	55
1.0" Gypsum		x	0.5	=	
0.50" Tile		x	0.8	=	
1.0" Tile		x	1.7	=	
			Total	=	55

C) The total IMC exceeds the minimum IMC goal, therefore the thermal mass requirement is met.

Since 55 (Total IMC) > 54 (Minimum IMC goal), the thermal mass requirement is met!

Attachment 2

LIST OF CEC CERTIFIED GAS SPACE HEATERS WITH AFUE > OR = TO "78.0%"

MFG_NAME	BRAND_NAME	MODEL	TYPE	F	INPUT	OUTPUT	AFUE	ADD_DT
CANADIAN FIREPLACE MFG	INSTA-FLAME	FSDV30	WDVG	L	22000	17150	78	02-AUG-93
SECURITY CHIMNEYS, LTD.	SECURITY FIREPLACES	SRGHIN	WVFT	G	22000	17160	78	20-JUL-93
SECURITY CHIMNEYS, LTD.	SECURITY FIREPLACES	SRGHIP	WVFT	G	22000	17160	78	20-JUL-93
WILLIAMS	FORSAIRE MAGNUM	6008131	WVFT	L	60000	49200	78	10-DEC-93
WILLIAMS	FORSAIRE MAGNUM	6008132	WVFT	G	60000	48600	78	10-DEC-93
WILLIAMS	FORSAIRE MAGNUM	6008531	WVFT	L	60000	49200	78	10-DEC-93
WILLIAMS	FORSAIRE MAGNUM	6008532	WVFT	G	60000	48600	78	10-DEC-93
WILLIAMS	FORSAIRE MAGNUM	6508131	WVFT	L	65000	53300	78	10-DEC-93
WILLIAMS	FORSAIRE MAGNUM	6508132	WVFT	G	65000	52325	78	10-DEC-93
WILLIAMS	FORSAIRE MAGNUM	6508531	WVFT	L	65000	53300	78	10-DEC-93
WILLIAMS	FORSAIRE MAGNUM	6508532	WVFT	G	65000	52325	78	10-DEC-93
SUBURBAN	SUBURBAN	DLII-0912E	WDVF	G	12000	9372	78.1	22-JAN-92
SUBURBAN	SUBURBAN	DLII-1220E	WDVF	G	20000	15620	78.1	22-JAN-92
SUBURBAN	SUBURBAN	DT-1020E	WDVF	G	20000	15620	78.1	22-JAN-92
SUBURBAN	SUBURBAN	DL-1220D	WDVF	G	20000	16000	78.5	22-JAN-92
SUBURBAN	SUBURBAN	DL-1220DT	WDVF	G	20000	16000	78.5	22-JAN-92
SUBURBAN	SUBURBAN	DT-1020K	WDVF	G	20000	16000	78.5	22-JAN-92
EFEL NORTH AMERICA	EFEL NORTH AMERICA	490.62	RHV	G	28000	22400	80	02-OCT-91
EFEL NORTH AMERICA	EFEL NORTH AMERICA	490.62	RHV	L	28000	22400	80	02-OCT-91
EFEL NORTH AMERICA	EFEL NORTH AMERICA	71BRITTANY	RHV	G	28000	22500	80	02-AUG-93
EFEL NORTH AMERICA	EFEL NORTH AMERICA	71BRITTANY	RHV	L	28000	22500	80	02-AUG-93
RINNAI AMERICA	RINNAI	RHFE-1001FA-1	WDVF	G	38400	31373	80.3	15-JAN-92
SUBURBAN	SUBURBAN	DL-0912D	WDVF	G	12000	9840	80.5	22-JAN-92
SUBURBAN	SUBURBAN	DL-0912DT	WDVF	G	12000	9840	80.5	22-JAN-92
RINNAI AMERICA	RINNAI	RHFE-551FA-1	WDVF	G	22000	18216	81.1	13-FEB-92
HITACHI LTD. MFG. CO.	MONITOR PRODUCTS INC	MONITOR 422	RHV	O	20815	17885	81.8	28-FEB-94
EFEL NORTH AMERICA	EFEL NORTH AMERICA	487.64	RHV	G	40000	32800	82	02-OCT-91
EFEL NORTH AMERICA	EFEL NORTH AMERICA	491.64	RHV	L	40000	32800	82	02-OCT-91
HITACHI LTD. MFG. CO.	MONITOR PRODUCTS INC	MONITOR 441	RHV	O	42820	35419	83.3	28-FEB-94
CAMBRIDGE ENGINEERING INC	CAMBRIDGE	C1200	RHU	G	1200000	1200000	99.9	29-DEC-92
CAMBRIDGE ENGINEERING INC	CAMBRIDGE	C1900	RHU	G	1900000	1900000	99.9	29-DEC-92
CAMBRIDGE ENGINEERING INC	CAMBRIDGE	C2500	RHU	G	2500000	2500000	99.9	29-DEC-92
CAMBRIDGE ENGINEERING INC	CAMBRIDGE	C390	RHU	G	400000	400000	99.9	29-DEC-92
CAMBRIDGE ENGINEERING INC	CAMBRIDGE	C600	RHU	G	600000	600000	99.9	29-DEC-92
CAMBRIDGE ENGINEERING INC	CAMBRIDGE	C900	RHU	G	900000	900000	99.9	29-DEC-92
TEMTEX	TEMTEX	AD 36	RHU	G	39000	39000	99.9	06-JUL-92
TEMTEX	TEMTEX	AD 36	RHU	L	31000	31000	99.9	06-JUL-92
TEMTEX	TEMTEX	ADL36N	RHU	G	39000	39000	99.9	06-JUL-92
TEMTEX	TEMTEX	ADL36P	RHU	L	31000	31000	99.9	06-JUL-92

39 records selected.

SQL> SPOOL OFF

Note: If the model number of the gas space heater you propose to use is not listed here, contact the Commission's Energy Hotline to determine whether or not it is certified and has an AFUE efficiency greater than or equal to 78%.

Mandatory Measures Checklist: Residential

MF-1R

NOTE: Lowrise residential buildings subject to the Standards must contain these measures regardless of the compliance approach used. Items marked with an asterisk (*) may be superseded by more stringent compliance requirements listed on the Certificate of Compliance. When this checklist is incorporated into the permit documents, the features noted shall be considered by all parties as binding minimum component performance specifications for the mandatory measures whether they are shown elsewhere in the documents or on this checklist only.

DESCRIPTION	DESIGNER	ENFORCEMENT
Building Envelope Measures		
* §150(a): Minimum R-19 ceiling insulation.		
§150(b): Loose fill insulation manufacturer's labeled R-Value.		
* §150(c): Minimum R-13 wall insulation in framed walls (does not apply to exterior mass walls).		
* §150(d): Minimum R-13 raised floor insulation in framed floors; minimum R-8 in concrete raised floors.		
§150(l): Slab edge insulation - water absorption rate no greater than 0.3%, water vapor transmission rate no greater than 2.0 perm/inch.		
§118: Insulation specified or installed meets California Energy Commission quality standards. Indicate type and form.		
§116-17: Fenestration Products, Exterior Doors and Infiltration/Exfiltration Controls a. Doors and windows between conditioned and unconditioned spaces designed to limit air leakage. b. Manufactured fenestration products have label with certified U-value, and infiltration certification. c. Exterior doors and windows weatherstripped; all joints and penetrations caulked and sealed.		
§150(g): Vapor barriers mandatory in Climate Zones 14 and 16 only.		
§150(f): Special infiltration barrier installed to comply with §151 meets Commission quality standards.		
§150(e): Installation of Fireplaces, Decorative Gas Appliances and Gas Logs 1. Masonry and factory-built fireplaces have: a. Closeable metal or glass door b. Outside air intake with damper and control c. Flue damper and control 2. No continuous burning gas pilots allowed.		
Space Conditioning, Water Heating and Plumbing System Measures		
§110-13: HVAC equipment, water heaters, showerheads and faucets certified by the Commission.		
§150(i): Setback thermostat on all applicable heating systems.		
§150(j): Pipe and Tank Insulation 1. Indirect hot water tanks (e.g., unfired storage tanks or backup solar hot water tanks) have insulation blanket (R-12 or greater) or combined interior/exterior insulation (R-16 or greater). 2. First 5 feet of pipes closest to water heater tank, non-recirculating systems, insulated (R-4 or greater). 3. All buried or exposed piping insulated in recirculating sections of hot water system. 4. Cooling system piping below 55°F insulated. 5. Piping insulated between heating source and indirect hot water tank.		
* §150(m): Ducts and Fans 1. Ducts constructed, installed and sealed to comply with UMC Sections 1002 and 1004; ducts insulated to a minimum installed value of R-4.2 or ducts enclosed entirely within conditioned space. 2. Exhaust fan systems have backdraft or automatic dampers 3. Gravity ventilating systems serving conditioned space have either automatic or readily accessible, manually operated dampers..		
§114: Pool and Spa Heating Systems and Equipment 1. System is certified with 78% thermal efficiency, on-off switch, weatherproof operating instructions, no electric resistance heating and no pilot light.		
2. System is installed with: a. At least 36" pipe between filter and heater for future solar heating. b. Cover for outdoor pools or outdoor spa.		
3. Pool system has directional inlets and a circulation pump time switch.		
§115: Gas-fired central furnace, pool heater, spa heater or household cooking appliance have no continuously buring pilot light. (Exception: Non-electrical cooking appliance with pilot < 150 Btu/hr.)		
Lighting Measures		
§150(k): 40 lumens/watt or greater for general lighting in kitchens and rooms with water closets; and recessed ceiling fixtures IC (insulation cover) approved.		

Certificate of Compliance: Residential

 CF-1R

Project Title _____ Date _____

Project Address _____

Documentation Author _____ Telephone _____

Compliance Method (Package, Point System or Computer) _____ Climate Zone _____

Building Permit # _____

Plan Check / Date _____

Field Check / Date _____

Enforcement Agency Use Only

GENERAL INFORMATION

Total Conditioned Floor Area: _____ ft^2

Building Type: (check one or more)
___ Single Family ___ Addition
___ Multi-Family ___ Existing-Plus-Addition

Front Orientation: ___ North / East / South / West / All Orientations
(Input orientation in degrees and circle one.)

Number of Dwelling Units: _____

Floor Construction Type: Slab / Raised Floor (circle one or both)

BUILDING SHELL INSULATION

Component Type	Insulation R-Value	Construction Assembly U-Value	Location/Comments (attic, to garage, typical, etc.)
Wall			
Wall			
Roof			
Roof			
Floor.....			
Floor.....			
Slab Edge			

FENESTRATION

Fenestration Orientation	Area (sf)	Fenestration U-Value	Shading Devices: Interior (roller blind, etc.)	Shading Devices: Exterior (shadescreen, etc.)	Overhang (yes/no)	Framing Type (metal/wood/vinyl)
Front..... ( )						
Front..... ( )						
Left..... ( )						
Left..... ( )						
Rear ..... ( )						
Rear ..... ( )						
Right..... ( )						
Right..... ( )						
Skylight						
Skylight						

THERMAL MASS

Type/Covering (slab/exposed, tile, etc.)	Area (sf)	Thickness (inches)	Location/Description (kitchen, bath, etc.)

Project Title _____ Date _____

HVAC SYSTEMS

Note: Input hydronic or combined hydronic data under Water Heating Systems, except Design Heating Load.

Heating Equipment Type (furnace, heat pump, etc.)	Minimum Efficiency (AFUE/HSPF)	Distribution Type and Location (ducts/attic, etc.)	Duct or Piping R-Value	Thermostat Type	Heat Pump Configuration (split or package)

Cooling Equipment Type (air conditioner, heat pump, evap. cooling)	Minimum Efficiency (SEER)	Duct Location (attic, etc.)	Duct R-Value	Thermostat Type	Configuration (split or package)

WATER HEATING SYSTEMS

Water Heater Type	Distribution Type	Number in System	Rated[1] Input (kW or Btu/hr)	Tank Capacity (gallons)	Energy[1] Factor or Recovery Efficiency	Standby[1] Loss (%)	External Tank Insulation R-Value

1. For **small gas storage** (rated input ≤ 75,000 Btu/hr), **electric resistance and heat pump water heaters**, list Energy Factor. For **large gas storage water heaters** (rated input ≥ 75,000 Btu/hr), list Rated Input, Recovery Efficiency and Standby Loss. For **instantaneous gas water heaters**, list Rated Input and Recovery Efficiency.

SPECIAL FEATURES/REMARKS (Add extra sheets if necessary)

_____

COMPLIANCE STATEMENT

This certificate of compliance lists the building features and performance specifications needed to comply with Title 24, Parts 1 and 6, of the California Code of Regulations, and the administrative regulations to implement them. This certificate has been signed by the individual with overall design responsibility. When this certificate of compliance is submitted for a single building plan to be built in multiple orientations, any shading feature that is varied is indicated in the Special Features/Remarks section.

Designer or Owner (per Business & Professions Code)

Name: _____
Title/Firm: _____
Address: _____
_____
Telephone: _____
Lic. #: _____

_____
(signature) (date)

Documentation Author

Name: _____
Title/Firm: _____
Address: _____
_____
Telephone: _____

_____
(signature) (date)

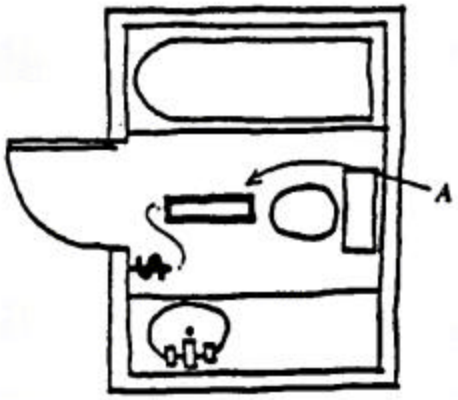
Enforcement Agency

Name: _____
Title: _____
Agency: _____
Telephone: _____

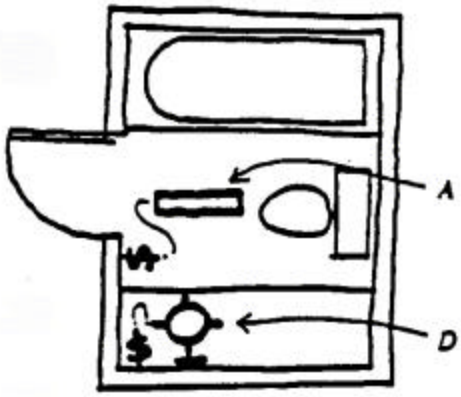
_____
(signature/stamp) (date)

Bathroom Lighting Examples

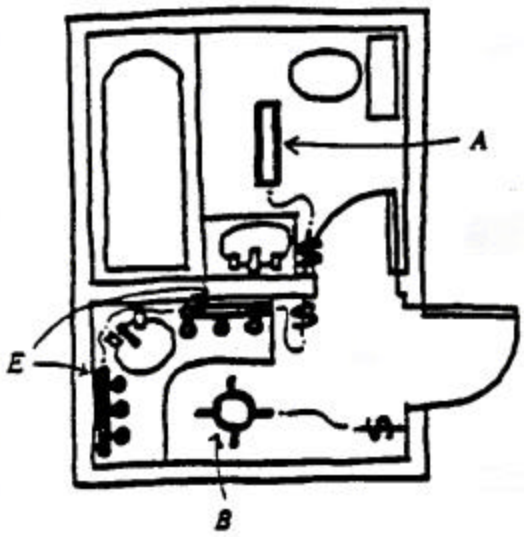
If there is more than one light fixture in a room, the fluorescent fixture shall be switched at an entrance to the room.



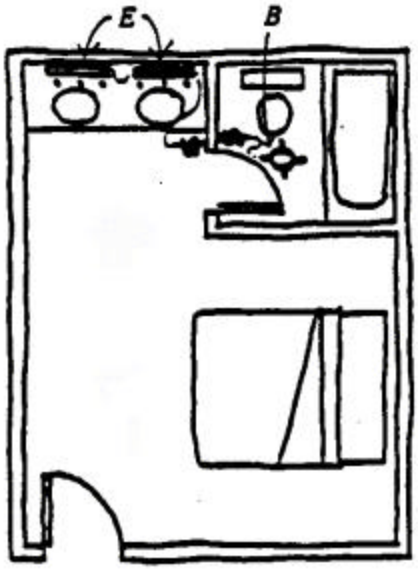
"A" must be fluorescent



"A" must be fluorescent; "D" can be incandescent



"A" or "B" must be fluorescent

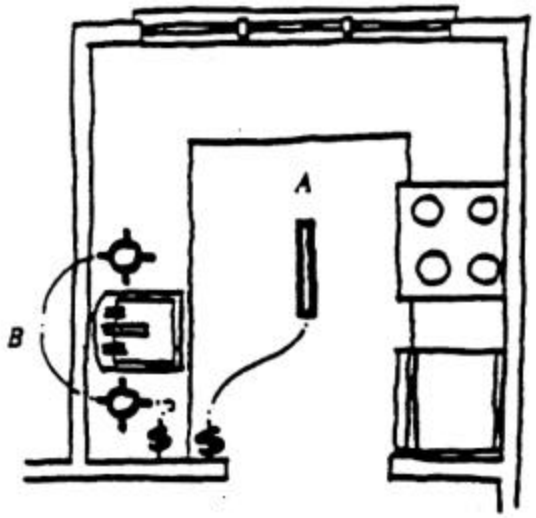


"B" or "E" must be fluorescent

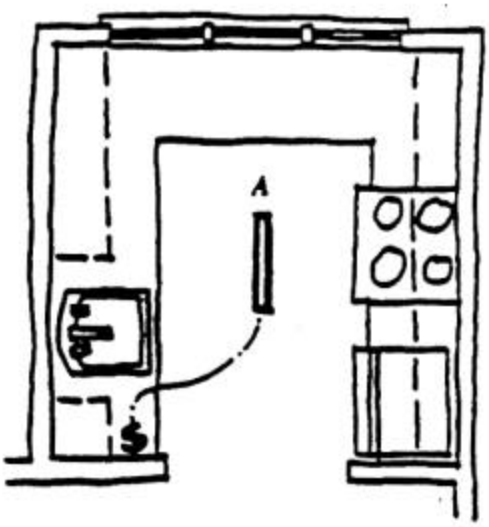
— over for kitchen lighting examples —

Kitchen Lighting Examples

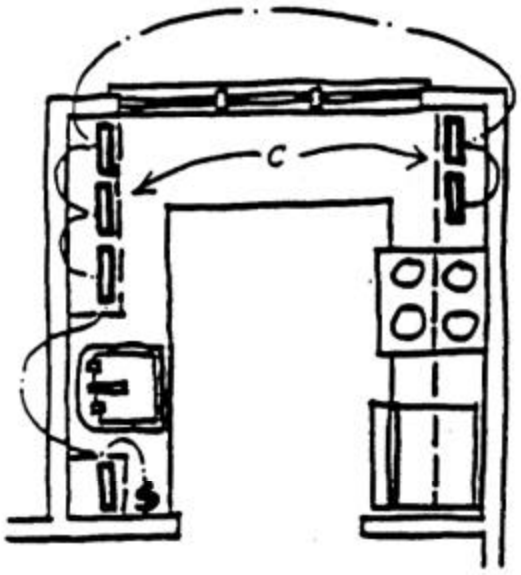
The required fluorescent fixture(s) shall be controlled by the most accessible switch(es) in the kitchen



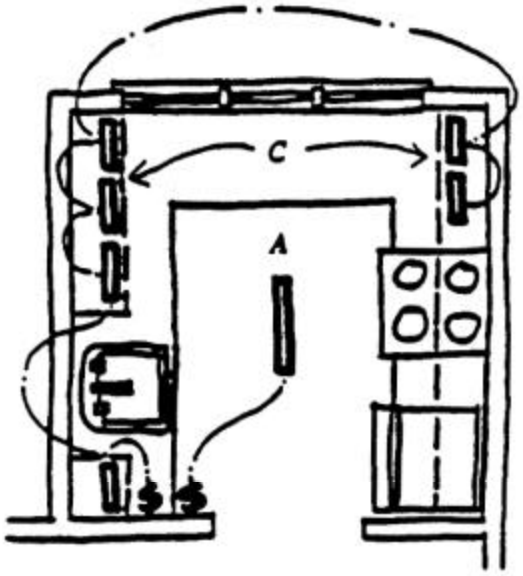
"A" must be fluorescent



"A" must be fluorescent



All of "C" must be fluorescent



"A" or all of "C" must be fluorescent

— over for bathroom lighting examples —

List of
T-24 ENERGY CONSULTANTS

** Indicates consultants who have prepared a number of energy calculations in the Monrovia area.*

*California Energy Designs, Inc.
4517 Angeles Crest Hwy.
La Canada, CA 91011
(818) 790-6817

*Mark D. Madison
Title 24 Energy Consultants
560-B Riverdale Drive
Glendale, CA 91204
(818) 244-0131

*Suntech
1445 W. Beverly Blvd.
Montebello, CA 90640
(213) 728-2534

Fundament & Associates
P. O. Box 549
Huntington Beach, CA 92648
(714) 374-2374

Amber Energy Design
29885 Second St., Unit A & B
Lake Elsinore, CA 92330
(714) 674-8974

C & Y Consulting Engineers
8450 Garvey Blvd., #230
Rosemead, CA 91770
(818) 289-9981

Donald E. Morecraft
ENERGY DESIGN
(619) 243-5265

*Don Chaney
Construction Computer Analysis
(818) 917-1054

*Perfect Design & Engineering
441 S. Garfield Avenue, #A
Monterey Park, CA 91754
(818) 571-7198

Alternative Energy Systems
137 S. San Fernando Blvd., Ste. 161
Burbank, CA 91502
(818) 563-4880

Aurelio B. Gabot
757 Janice Lane
Walnut, CA 91789
(818) 965-4154

Jeff Kushner/J.W. Kushner & Associates
530 Maple Avenue
Torrance, CA 90503
(310) 618-9190

Heritage Energy Group
Title 24 Energy Calculations
(714) 573-2237

Charles Chen, President
Charles Chen & Associates
3027 W. Garvey Ave. #102
Alhambra, CA 91803
(213) 283-4348

See other side for additional names

Richard Cram, Principal
1820 Virazon Drive
La Habra Heights, CA 90631
(213) 697-1977

Richard A. Palmer Energy Mgmt Engrg.
1910 E. Warner, Suite A
Santa Ana, CA 92705
(714) 261-5704

Arnel B. De Silva, P.E.
Arnel De Silva & Assoc.
16329 Dubesor Street
La Puente, CA 91744
(818) 917-9410

James H. Terry
Terry Engineering
180 E. Main St., Suite 135
Tustin, CA 92680
(714) 838-1124

Coulter Winn
702 Oakdale Avenue
Monrovia, CA 91016-3015
(818) 357-7213

S. M. Daderian & Assoc., Inc.
3686 E. Colorado Blvd.
Pasadena, CA 91107
(818) 793-1727

Kenneth P. Redford
Redford Engineering
(800) 564-2471

Solargy Inc.
22028 Ventura Blvd., #207
Woodland, CA 91364
(818) 347-6096

Cameron Unruh CNA, Construction Svc
1430 S. Grand Ave., #263
Glendora, CA 91740
(818) 967-8738